2024

PHOENIX, ARIZONA, USA ☀ OCT. 20-24

ECCE

IEEE ENERGY CONVERSION CONGRESS & EXPO

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WELCOME FROM GENERAL CHAIR | ROLANDO BURGOS

It is my honor and a true privilege to invite you to attend the 16th IEEE Energy Conversion Congress and Exposition (ECCE 2024), taking place in Phoenix, Arizona, from October 20-24, 2024. ECCE is proudly sponsored by both the **IEEE Industrial Application Society (IAS)** and **IEEE Power Electronics Society (PELS)**.

ECCE 2024 will feature two-page Late Break Research Briefs, Post-Journal paper presentations, and the standard technical papers. It will also offer special sessions on emerging technologies and industry-oriented topics, and of course, tutorials, which have become a staple element of the ECCE technical program. Lastly, stimulating, thought-provoking plenary talks by renowned industry and academic world leaders and experts will complete what is expected to be an overall sound program.

Similarly, the Exhibition promises to be another great success this time around, taking advantage of Phoenix's burgeoning reputation as one of the top-10 fastest growing tech hubs in the United States. ECCE 2024, to be held in the "Silicon Desert," will once again offer an excellent platform to showcase new start-ups and established power industry companies, as well as universities and research institutions, to the more than 2,400 attendees that are expected. The new Career Fair will further catalyze interactions, giving exhibitors and attendees the possibility to get connected and to hire the best in the electrical engineering and power electronics fields. We certainly hope that exhibitors will have a prime opportunity to elevate their presence and to make a lasting impact on what is expected to be a most dynamic audience.

Lastly, the technical program chairs have been busy at work revising the scope and list of major topics for ECCE 2024, ensuring that a strong emphasis is placed on advanced cutting-edge power and energy conversion technology. As a result, ECCE 2024 will feature a unique blend of scientific and technology development research and innovations; from materials and components, to power converters, electrical machines, electrical transportation, controls, and digital systems, all the way to the power grid and future electrical and electronic systems. Energy and power conversion have become vital enabling technologies to society, and ECCE 2024 will strive to capture their interdisciplinary nature providing a formidable platform from where to present their state of the art to the world.

So, whether you are looking to challenge yourself intellectually, immerse yourself in the latest technological developments, or to simply reconnect with friends and colleagues, mark your calendars and get ready to attend a great conference, and to enjoy sunny Phoenix this coming fall. We will be waiting for you.

Rolando Burgos
ECCE 2024 General Chair

WELCOME FROM TECHNICAL PROGRAM CHAIRS

The future of our world—its social and economic progress, and its ability to meet the challenges posed by a growing population—will be profoundly shaped by advancements in electrification technologies. As we strive to create a more prosperous life for people across the globe, both in developed and developing regions, the role of energy conversion becomes increasingly crucial. Power electronics and related subsystems are at the heart of transforming natural energy sources into usable forms for various applications, and they will continue to lead the charge in this electrification-driven future. This ongoing evolution presents a wealth of opportunities for technical innovation, advancement, and wealth creation. The IEEE Energy Conversion Congress & Expo (ECCE) stands at the forefront of these developments, offering a unique platform for collaboration among industry leaders, academic researchers, and government institutions from around the world. ECCE is where new ideas take shape, where the latest technologies are showcased, and where future trends in electrification are explored.

This year, we received an impressive 1884 submissions from authors worldwide, making this event the largest ECCE conference ever organized. The Technical Program Committee (TPC), comprising Chairs, Vice Chairs, and Topic Chairs, meticulously organized the review process across various tracks. Each paper underwent rigorous evaluation, receiving between three to five reviews from global experts. The Vice Chairs for each track convened virtually to recommend papers for acceptance and to determine their mode of presentation, with final approvals granted by the Technical Program Committee Chairs.

The 2024 conference program features 1169 technical papers, which will be presented in 109 oral sessions and 41 poster sessions. This year, just like last year, we are featuring Journal-to-Conference presentations and Express Research Brief papers. Additionally, there will be 19 special sessions and 27 tutorial sessions.

All papers presented at ECCE 2024 will be uploaded to the IEEE Xplore Digital Library, making them accessible to the global research community. We encourage authors to submit their work for potential publication in IEEE Transactions on Industry Applications, IEEE Transactions on Power Electronics, IEEE Transactions on Transportation Electrification and the Journal of Emerging and Selected Topics on Power Electronics. Please refer to the editorial boards of these publications for their specific policies on accepting conference papers for publication.

On behalf of the Technical Program Committee, we extend our warmest welcome to you at ECCE 2024 in the Valley of the Sun, Phoenix— a vibrant city renowned for its year-round sunshine, stunning desert landscapes, and rich cultural heritage. If you are a fan of outdoor adventure in Phoenix, be sure to explore the breathtaking hiking trails and scenic desert parks.

This conference is the result of countless hours of dedication and expertise from our colleagues around the world. We are deeply grateful for your contributions, which have been instrumental in making this event a success. We also wish to express our heartfelt thanks to Conference Chair, Professor Rolando Burgos, whose unwavering inspiration and confidence in our team made this significant undertaking possible.

Thank you, and we hope you enjoy the 2024 ECCE events.

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GENERAL INFORMATION

Registration Hours

Lower Level Exhibit Hall Pre-function Registration Area

Sunday, October 20 ..... 7:30AM – 7:00PM

Monday, October 21 ..... 7:30AM – 6:00PM

Tuesday, October 22 ..... 7:30AM – 5:00PM

Ballroom 120 Pre-function Registration Area

Wednesday, October 23 ..... 7:30AM – 6:00PM

Thursday, October 24 ..... 7:30AM – 5:00PM

Exhibit Hall Hours

Exhibit Hall 5/6

Monday, October 21 ..... 4:00PM – 7:30PM

Tuesday, October 22 ..... 10:30AM – 5:30PM

Career Fair Hours

Exhibit Hall 5/6

Tuesday, October 22 ..... 8:30AM – 11:30AM

Creative Digressions + Prayer Room

Sunday through Thursday | 8:00AM – 6:00PM

Room 130

The Creative Digression + Prayer room is available to attendees looking for a break from busy conference activities. This room will be equipped with tables in order to facilitate one-on-one discussions, idea generation sessions, business meetings, or quiet social interactions. Coffee and tea will also be available.

In addition to a quiet meeting or working space, this room will also serve as our prayer room which allows for individuals or small groups to come together in a quiet space for prayer, meditation, and/or reflection throughout the day. Please respect the requirement for a peaceful, quiet atmosphere when using this room for either function.

Kiddie Corp

Monday through Thursday | 9:00AM – 5:00PM

Room 127B

KiddieCorp is pleased to provide a children's program during ECCE 2024. KiddieCorp is in its thirty-seventh year of providing high-quality children's programs and youth services to conventions, trade shows, and events.

The program is for children ages eight weeks through 12 years old. Activities include exciting themes, arts & crafts, group games, music & movement, board games, story time, dramatic play, etc. KiddieCorp provides activities appropriate for each age group, using safe and sturdy equipment. Children can make their own choices within KiddieCorp's program.

Cost = $10 an hour per child

Attendees have full access to Wi-Fi in all meeting rooms, lobbies, and food court. Network: Complimentary

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Download the ECCE2024 mobile app to access all things related to the conference, including session information, exhibitors and locations, floor plans, timely notifications, and more! Attendee credentials are required to sign into the app (the email you used when registering for the conference).

Visit the Apple Store or Google Play Store and search **PheedLoop Go!**

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The use of cameras and/or recorders is strictly prohibited during the oral and poster sessions. Limited use is allowed for exhibitors in their own booth area. Personal photography is allowed at social functions.

Distributing Commercial Material at ECCE

Exhibitors: Exhibitors may only distribute commercial materials in their booth. ECCE reserves the right to remove without notice any materials not in compliance with this policy. Active recruiting is prohibited at all times except during the Career Fair hours.

Non-Exhibitors: Distribution of commercial material in the ECCE 2024 hotel space (including directly to the hotel rooms of ECCE participants), meeting space and Exhibit Hall by people or organizations not participating in the exposition is prohibited. ECCE reserves the right to remove without notice any materials not in compliance with this policy.

SCHEDULE-AT-A-GLANCE

Sunday, October 20th

7:30AM – 7:00PM	**Registration** ..... *Lower Level Registration – Exhibit Hall 5/6 Prefunction*
7:30AM – 3:30PM	**Speaker Ready Room** *127A*
8:00AM – 6:00PM	**Creative Digressions/Prayer Room** *130*
9:30AM – 10:00AM	**Coffee Break** ..... *100 level prefunction*

Tutorials • 8:00AM – 11:30AM

124A	126B	121C	122A	122B	126A	123	121A	124B	122C	121B
T1: Bidirectional WBG Power Switches and the Applications they Enable	**T2:** Reliable and Efficient Packaging of SiC Power Devices for Automotive and Industrial Applications	**T3:** Current Source PWM Converters – From Theory to Practice	**T4:** Design of the Magnetic Components: Key Aspects, Approach, and Practice	**T5:** Methods to Identify & Control Highly Non-Linear Three-Phase Machines	**T6:** Bearingless Motors: Fundamentals and Current Status	**T7:** Direct Current (DC) Distribution Systems: Modeling, Control, Protection, and Real-World Implementation	**T8:** Electrosurgery Power Electronics: A Revolution in the Making	**T9:** Electric Propulsion Systems for Electric Aircraft	**T10:** Advanced Power Electronics for Health-Conscious Fast Charging and Wireless Charging for Future E-Mobility	**T11:** Digital Twin of Renewable Energy Sources: Modernization and Renovation of Overloaded Power Systems

11:30AM – 1:00PM	**Lunch On Your Own**
2:30PM – 3:00PM	**Coffee Break** ..... *100 level prefunction*

Tutorials • 1:00PM – 4:20PM

129A	126B	121C	122A	122B	126A	123	124A	124B	122C	121B	125AB	128AB	121A
T12: Practical Consider-ations for the Application of High Power Si and SiC Modules	**T13:** Electro-magnetic Compat-ibility of Switched-Mode Power Supplies	**T14:** State-of-the-Art and Future Research Directions for 48V to 0.7V / 2,000A Power Con-version for Future CPU, GPU, FPGA Applications	**T15:** Design & Optimization of High Torque Density Permanent Magnet Synchronous Machines for Traction Applications	**T16:** Model Predictive Control of Power Electronics – an Intuitive and Simple Concept for the Future	**T17:** Artificial Intelligence Applications for Switched Reluctance Motors Drives	**T18:** Harvesting the Solar Energy: Modeling, Control, and Simulation of Photo-voltaic Systems	**T19:** Under-ground Mining Fleet Electri-fication: Challenges and Oppor-tunities	**T20:** Electric Propulsion: Challenges and Oppor-tunities	**T21:** Recent Advances in Wireless Power Transfer Technology for Electric Vehicles and Smart Devices	**T22:** Hardware-in-the-Loop Systems for Power Electronics Engineers: from Theory to Applications	**T23:** Reflective Surge Voltage Mitigation for Fast-Switching Motor-Drive Systems	**T24:** Battery States Monitoring and Estimation Using Impedance Identification Techniques	**T25:** Identifying & Analyzing Total Lifecycle Energy Footprints in Large & Small Systems

4:30PM – 5:00PM	**ECCE Newcomers Reception** *129B*
6:00PM – 8:00PM	**Welcome Reception** ..... *Ballroom 120*

Monday, October 21st

7:30AM – 6:00PM	**Registration** ..... *Lower Level Registration – Exhibit Hall 5/6 Prefunction*
7:00AM – 8:00AM	**Speakers Breakfast** *131ABC*
7:30AM – 8:30AM	**Keynote Breakfast** ..... *Dressing Room*
7:30AM – 3:30PM	**Speaker Ready Room** *127A*
8:00AM – 6:00PM	**Creative Digressions/Prayer Room** *130*
8:00AM – 11:30AM	**Keynotes** ..... *Ballroom 120BCD*
9:00AM – 5:00PM	**Kiddie Corp** *127B*
9:45AM – 10:00AM	**Coffee Break** ..... *Ballroom 120 Prefunction*
11:30AM – 12:50PM	**Lunch On Your Own**
11:30AM –12:50PM	**WIE Distinguished Leaders Panel and Luncheon** *131ABC*

Oral Sessions • 12:50PM – 2:30PM

121A	121B	121C	122A	122B	129A	122C	123	124A	124B	129B	127C
S1: Converters for Renewable Grid Integration	**S2:** Grid-Forming Technologies I	**S3:** Design Automation, Digital Twins, and Condition Monitoring	**S4:** Inductive Wireless Power Transfer for Transportation	**S5:** Switched Capacitor Converters	**S6:** DC-DC Converters	**S7:** Power Converters for Next-Gen Electricity Grids	**S8:** Electric Machines for Transportation	**S9:** Induction Motor Drives	**S10:** Gate Drivers	**S11:** Emerging Technologies 1	**Post Journal Presentation 1**

Special Sessions • 12:50PM – 2:30PM

125AB	128AB	126AB
SS1: Energy Transition and Energy Access – Common Challenges and Enabling Technologies	**SS2:** Dynamic Modeling and Control of Inverter-Based Resources: A Bottom-Up Approach Spanning from Networked Microgrids to Bulk Transmission Interconnection – Part 1	**SS3:** Design Automation for Power Electronics – Design Methods, Challenges and Education – Part 1

2:30PM – 3:00PM	**Coffee Break**

Oral Sessions • 3:00PM – 4:40PM

121A	121B	129A	122A	122B	122C	121C	123	129B	124A	124B	127C
S12: Control for Renewable Energy Systems	**S13:** DC/Hybrid Solid-State Breakers	**S14:** Grid-Forming Technologies II	**S15:** Battery Management Systems for Transportation	**S16:** DAB Based DC-DC Converters	**S17:** Advanced Control Algorithm for Grid-Connected Applications	**S18:** Fault Analysis of Power Converters	**S19:** Induction Machines	**S20:** Axial Flux Machines	**S21:** Control of Electric Drives	**S22:** Thermal Management in Power Electronics	**S23:** Medium/High-Frequency Transformer Design and Integration

Special Sessions • 3:00PM – 4:40PM

128AB	126AB	125AB
SS2: Dynamic Modeling and Control of Inverter-Based Resources: A Bottom-Up Approach Spanning from Networked Microgrids to Bulk Transmission Interconnection – Part 2	**SS3:** Design Automation for Power Electronics – Design Methods, Challenges and Education – Part 2	**SS4:** Simulation-Driven Electric Propulsion: Shaping the Future of Transportation

4:00PM	**Expo Hall Opens** ..... *Exhibit Hall 5/6*
5:00PM – 7:30PM	**Expo Hall Reception** ..... *Exhibit Hall 5/6*
5:00PM – 7:30PM	**Student Demos** ..... *Exhibit Hall 5/6*
5:30PM – 7:10PM	**Poster Session 1** ..... *Exhibit Hall 5/6*
7:00PM – 9:00PM	**Organizing Committee Dinner** *131ABC*
7:00PM – 9:00PM	**PELS Mentorship Roundtable** *221AB*

Tuesday, October 22nd

7:30AM – 5:00PM	**Registration**	*Lower Level Registration – Exhibit Hall 5/6 Prefunction*
7:00AM – 8:00AM	**Speakers Breakfast**	*131ABC*
7:30AM – 10:30AM	**Speaker Ready Room**	*127A*
8:00AM – 6:00PM	**Creative Digressions/Prayer Room**	*130*
8:30AM – 11:30AM	**Career Fair**	*Exhibit Hall 5/6*
8:30AM – 3:30PM	**High School Outreach Teacher Meeting** *(invitation only)*	*131ABC*
9:00AM – 5:00PM	**Kiddie Corp**	*127B*

Oral Sessions • 8:30AM – 10:10AM

121A	121B	129A	121C	122A	122B	122C	129B	123	124A	124B	127C
S24: Multiport Converters for Renewable Energy	**S25:** Grid-Forming Technologies III	**S26:** Smart Buildings and Behind-the-Meter Technologies	**S27:** Cybersecurity in Power Electronics and Power Systems	**S28:** EV Charging Infrastructures	**S29:** Multi-Phase AC-DC Converters	**S30:** Model Predictive Control in Power Electronics	**S31:** Control of Multilevel Converters I	**S32:** IPM and Synchronous Reluctance Machines I	**S33:** PMSM Drives	**S34:** GaN Device Modeling and Characterization	**Post Journal Presentation 2**

Special Sessions • 8:30AM – 10:10AM

125AB	126AB	128AB
SS5: Advancements in Modeling, Control, and Operation of Converter Dominated Power Systems	**SS6:** Net Zero Carbon Power Converters Design and Production: Where Are We Now?	**SS7:** P2964 IEEE Standard for Datasheet Parameters and Tests for Integrated Gate Drivers

10:00AM – 2:30PM	**Canyon Lake – Dolly Steamboat Tour**	
10:10AM – 10:30AM	**Coffee Break**	*Exhibit Hall 5/6*
10:30AM – 12:10PM	**Poster Session 2**	*Exhibit Hall 5/6*
10:30AM – 5:30PM	**Exhibit Hall Open**	*Exhibit Hall 5/6*
12:00PM – 2:30PM	**Expo Lunch**	*Exhibit Hall 5/6*
1:30PM – 5:00PM	**Student Demonstrations Judging**	*Exhibit Hall 5/6*
2:30PM – 4:10PM	**Poster Session 3**	*Exhibit Hall 5/6*
5:00PM – 5:30PM	**Luminaries Special Sessions Light Reception**	*Level 1 Prefunction*
5:30PM – 7:00PM	**Luminaries Special Sessions**	*124AB & 129AB*
7:30PM – 9:30PM	**PELS & IAS YP Event**	*Off-site*

Wednesday, October 23rd

7:30AM – 6:00PM	**Registration**	*Ballroom 120 Prefunction*
8:00AM – 6:00PM	**Creative Digressions/Prayer Room**	*130*
7:00AM – 8:00AM	**Speakers Breakfast**	*131ABC & 132AB*
7:30AM – 5:00PM	**Speaker Ready Room**	*127A*
9:00AM – 5:00PM	**Kiddie Corp**	*127B*

Oral Sessions • 8:30AM – 10:10AM

121A	121B	121C	122A	122B	129A	122C	123	124A	124B	129B	127C
S35: Energy Storage I	**S36:** Vehicle-to-Grid (V2G) and Grid-to-Vehicle (G2V) Technologies	**S37:** Machine Learning and AI for IBR-Interfaced Grids	**S38:** Hydrogen Fuel Cell Traction and Infrastructure	**S39:** LLC Resonant Converters	**S40:** High Frequency DC-DC Converters	**S41:** EMI Design and Considerations in Power Electronics	**S42:** IPM and Synchronous Reluctance Machines II	**S43:** Predictive Control of Motor Drives	**S44:** Packaging and Integration of WBG Devices	**S45:** Emerging Technologies 2	**Post Journal Presentation 3**

Special Sessions • 8:30AM – 10:10AM

125AB	126AB	128AB
SS8: Empowering Sustainable Futures: The Critical Role of Power Electronics in Energy and Industry	**SS9:** Advancements in Multilevel Converters for Electric Vehicles/ Grid-Tied Applications	**SS10:** Aerospace Electrified Propulsion - Integrated Powertrain Development And Testing for Future Electrified Skies – Part 1

Wednesday, October 23rd *(continued)*

10:10AM – 10:40AM **Coffee Break** ..... *Level 100 Prefunction*

Oral Sessions • 10:40AM – 12:20PM

121A	127C	121B	122A	122B	129A	122C	121C	123	129B	124A	124B
S46: Hydrogen Applications	**S47:** Converters in Renewable Energy Systems I	**S48:** Grid-Connected Power Converter Control	**S49:** Hybrid and Electric Vehicle Power Electronics	**S50:** AC-DC Converters	**S51:** Single Phase DC-AC Converters	**S52:** Modeling and Control of Resonant Converters	**S53:** Machine Learning in Modeling and Control of Power Converters	**S54:** Modeling and Analysis of Electrical Machines I	**S55:** Bearingless and High-Speed Machines	**S56:** Modulation Strategies in Electric Drives	**S57:** SiC Device Modeling, Sensing, and Characterization

Special Sessions • 10:40AM – 12:20PM

128AB	125AB	126AB
SS10: Aerospace Electrified Propulsion - Integrated Powertrain Development And Testing for Future Electrified Skies – Part 2	**SS11:** Sustainable Energy Systems as Primary Sources to Advance the Grid	**SS12:** Next Generation AI for Power Electronics: Explainable, Flexible, and Lightweight

12:20PM – 2:00PM **Lunch On Your Own**

Oral Sessions • 2:00PM – 3:40PM

121A	121B	122A	129B	122B	129A	122C	121C	123	124A	124B	127C
S58: Converters in Renewable Energy Systems II	**S59:** Grid Enhancing Technologies (GETs)	**S60:** Capacitive Wireless Power Transfer for Transportation	**S61:** On-board Battery Chargers	**S62:** Modular Power Converters	**S63:** Topology of Multi-Level Converters	**S64:** Control of Power Converters I	**S65:** Reliability and Diagnostics of Power Converters	**S66:** Modeling and Analysis of Electrical Machines II	**S67:** Electric Drives General	**S68:** PCB-Based Components and Integration	**Post Journal Presentation 4**

Special Sessions • 2:00PM – 3:40PM

125AB	126AB	128AB
SS13: Professor Ned Mohan Memorial Session	**SS14:** Breakthroughs in Medium-Voltage SiC Power Module: Design, Validation and Application	**SS15:** Power Hardware in the Loop: Unlocking the Future of Energy Conversion Research and Testing – Part 1

3:40PM – 4:10PM **Coffee Break** ..... *Level 100 Prefunction*

Oral Sessions • 4:10PM – 5:50PM

121A	121B	122A	122B	129A	122C	121C	123	129B	124A	127C	124B
S69: Photovoltaic Systems	**S70:** Grid Stability and Power Quality	**S71:** Applications of Electric Traction and Propulsion	**S72:** Control of DC-AC Converters	**S73:** Resonant and Soft Switched Converters	**S74:** Stability Aspects in Power Electronics Systems	**S75:** Control of Power Converters II	**S76:** Materials, Losses, Thermal and Manufacturing Issues I	**S77:** Switched Reluctance and Flux Switching Machines	**S78:** Traction and Aircraft Drives	**S79:** Monitoring and State Estimation of Electric Drives	**S80:** Loss Characterization and Modeling for Active and Magnetic Components

Special Sessions • 4:10PM – 5:50PM

128AB	126AB
SS14: Power Hardware in the Loop: Unlocking the Future of Energy Conversion Research and Testing – Part 2	**SS16:** Solid State Circuit Protection for LV/MV Aapplications

6:00PM – 8:00PM **Networking Dinner** ..... *Heard Museum*

Thusday, October 24th

7:30AM – 5:00PM	**Registration** ..... *Ballroom 120 Prefunction*
8:00AM – 6:00PM	**Creative Digressions/Prayer Room** *130*
7:00AM – 8:00AM	**Speakers Breakfast** *131ABC*
7:30AM – 12:00PM	**Speaker Ready Room** *127A*
9:00AM – 5:00PM	**Kiddie Corp** *127B*

Oral Sessions • 8:30AM – 10:10AM

121A	121B	127C	121C	122A	122B	122C	123	129B	124A	124B	129A	125AB
S81: Wind Energy Grid Integration	**S82:** Solid-State Transformers	**S83:** DC Microgrids	**S84:** Multi-physics and Physics-based Modeling and Design	**S85:** Electric Aircraft Propulsion Technologies	**S86:** Control of Multi-Level Converters II	**S87:** Converter Power Quality	**S88:** Diagnostics, Noise and Vibration in Electric Machines	**S89:** Additive Manufacturing and other Advanced Manufacturing Thecnologies in Electric Machines	**S90:** Motor Drive Reliability	**S91:** Materials, Modeling, and Characterization for Magnetics and Capacitors	**S92:** Emerging Technologies 3	**Post Journal Presentation 5**

Special Session • 8:30AM – 10:10AM

128AB
SS17: MVDC – Status, Technologies and Challenges – Part 1

10:10AM – 10:40AM	**Coffee Break** ..... *Level 100 Prefunction*

Oral Sessions • 10:40AM – 12:20PM

121A	121B	122A	122B	129A	122C	121C	123	129B	124A	124B	127C
S93: Energy Storage II	**S94:** Grid-Forming Technologies IV	**S95:** Other Topics in Transportation Electrification	**S96:** AC-AC Power Converters	**S97:** Flying Capacitor Multi-Level Converter	**S98:** Modelling, Design and Optimization for Power Converters	**S99:** Control for Power Converters in Electric Vehicles Chargers	**S100:** Wound Field and PM Machines	**S101:** Materials, Losses, Thermal and Manufacturing Issues II	**S102:** Sensorless Drives	**S103:** Power Modules	**Post Journal Presentation 6**

Special Sessions • 10:40AM – 12:20PM

128AB	126AB	125AB
SS17: Status, Technologies and Challenges – Part 2	**SS18:** Advancing Load Modeling and Power Electronics Integration in Evolving Grid Environments: Challenges, Solutions, and Open-Source Approaches	**SS19:** Power-dense Electric Traction Drive Component Integration, Packaging, and Manufacturing Challenges for Commercial and Industrial Vehicles

12:20PM – 2:00PM	**PELS & IAS Awards Luncheon** *Ballroom120*
2:00PM – 3:40PM	**Poster Session 4** ..... *Ballroom120 Prefunction*
3:30PM – 4:00PM	**Coffee Break** ..... *Level 100 Prefunction*

Free Tutorials • 4:10PM – 5:40PM

124AB	129AB
T26: Latest Development and New Technology Trends in Solid State Transformer	**T27:** From "PM" to "PM+X": Novel Variable FluxMachines for Wide-Speed-Range Applications

5:40PM – 7:00PM	**Closing Reception** ..... *Ballroom 120A*

PELS, IAS & ECCE MEETINGS

Do you want to get more involved in IEEE IAS and/or IEEE PELS? Then we enthusiastically invite you to attend many of the IAS or PELS open meetings, editor meetings, and technical committee gatherings. You will network, learn, and engage with colleagues who share your technical interests. Unless indicated as an "invitation only," the meetings below are generally open to society members.

IAS Committee Meetings at ECCE

Sunday, October 20	
2:00PM – 3:30PM	**IAS - IPCSD Standards Meeting** .. *Room 127C*
3:30PM – 6:00PM	**IAS - IPCSD Department & Editorial Meeting** *Room 127C*
Tuesday, October 22	
2:00PM – 3:00PM	**IAS Renewable and Sustainable Energy Conversion Systems Committee (RESC) Meeting** *Room 122B*
2:00PM – 3:00PM	**IAS Industrial Drives Committee (IDC) Meeting** *Room 125AB*
3:00PM – 4:00PM	**IAS Transportation Systems Committee (TSC) Meeting** *Room 123*
3:00PM – 4:00PM	**IAS Industrial Power Converters Committee (IPCC) Meeting** *Room 122A*
4:00PM – 5:00PM	**IAS Power Electronics Devices and Components Committee (PEDCC) Meeting** *Room 122C*
4:00PM – 5:30PM	**IAS Electrical Machines Committee (EMC) Meeting** *Room 125AB*

ECCE Committee Meetings

Sunday, October 20	
4:30PM – 5:00PM	**ECCE Newcomers Orientation** *Room 129B*
Tuesday, October 22	
7:30AM – 8:30AM	**ECCE 2024, 2025 and 2026 Handoff** *(Invitation Only)* *Room 132AB*
8:30AM – 9:30AM	**ECCE 2025 Organizing Committee Meeting** *(Invitation Only)* *Room 132AB*
10:00AM – 12:00PM	**ECCE Steering Committee Meeting** *(Invitation Only)* *Room 132AB*

PELS Meetings *(open to everyone, unless specifically indicated otherwise)*

Sunday, October 20

12:30PM – 2:00PM	ITRG Brainstorming	Room 222A
2:00PM – 3:30PM	Roadmap Meeting *(closed meeting)*	Room 221C
4:00PM – 6:00PM	Town Hall Meeting	Room 221A&B
4:00PM – 4:30PM	Town Hall Reception	Room 221A&B

Monday, October 21

11:30AM – 1:00PM	TC 6: Emerging Power Electric Technologies	Room 221A&B
11:30AM – 3:00PM	Membership Committee Meeting	Room 221C
11:30AM – 1:00PM	ECCE-Europe Steering Committee	Room 222B
11:30AM – 1:00PM	ITRW	Room 222A
1:00PM – 2:30PM	TC 11: Aerospace Power	Room 221A&B
1:00PM – 2:30PM	Industry Committee	Room 222B
1:30PM – 2:30PM	History Committee	Room 222A
2:30PM – 3:30PM	IFEC Information Session	Room 222B
3:00PM – 4:30PM	Chapter Chair Forum	Room 221C
3:00PM – 4:30PM	TC 7: Critical Power and Energy	Room 222A
4:00PM – 5:00PM	Letters Meeting with Xionfei *(closed meeting)*	Room 222B
7:00PM – 9:00PM	Mentorship Roundtables	Room 221A&B

Tuesday, October 22

8:00AM – 9:30AM	Asian Power Electronics Coordinate Committee	Room 221C
8:00AM – 9:00AM	Nominations Committee	Room 222A
9:00AM – 10:30AM	Standards Initiative about Solid State Transformer	Room 222A
9:00AM – 10:30AM	TC 3: Electrical Machines, Drives, and Automation	Room 222B
9:30AM – 11:00AM	Mentorship Committee Meeting	Room 221C
10:30AM – 11:30AM	eGrid Steering Committee	Room 222A
10:30AM – 12:00PM	DE&I Committee	Room 222B
11:00AM – 12:00PM	Empower a Billion Lives *(closed meeting)*	Room 221A&B
11:00AM – 12:30PM	TC 10: Design Methodologies	Room 221C
11:30AM – 1:00PM	TC 8: Electronic Power Grid Systems	Room 222A
12:00PM – 1:00PM	Empower a Billion Lives *(open meeting)*	Room 221A&B
12:00PM – 1:30PM	WIE Committee	Room 222B
1:00PM – 2:00PM	SAC Meeting	Room 221C
1:00PM – 2:00PM	Region 3-6 Chairs Meeting	Room 222A
1:00PM – 2:30PM	TC 12: Energy Access and Off-Grid Systems	Room 222A
2:00PM – 4:00PM	VP Industry & Standards	Room 221C
2:00PM – 3:30PM	TC 1: Control of Modeling of Power Electronics	Room 222B

PELS Meetings *(continued)*

Tuesday, October 22 *(continued)*

2:30PM – 3:30PM	PEDG Steering Committee	*Room 222A*
3:30PM – 5:00PM	TC 5: Sustainable Energy	*Room 222A*
3:30PM – 5:00PM	TC 9: Wireless Power Transfer Systems	*Room 222B*
4:00PM – 5:30PM	TC 2: Power Components, Integrations, & Power ICs	*Room 221A&B*
4:00PM – 5:30PM	TC 4: Electrical Transportation Systems	*Room 221C*
4:30PM – 6:30PM	Energy Access Committee South Star Challenge *(Invite Only)*	*Room 222A*
5:00PM – 6:00PM	Region 1-3 Chairs Meeting	*Room 222B*
7:30PM – 9:30PM	PELS/IAS YP Reception	*Off-site*

Wednesday, October 23

7:30AM – 9:00AM	WIE Breakfast	*Room 221A&B*
9:00AM – 12:00PM	VP of Technical Operations	*Room 221C*
9:00AM – 10:30AM	ECCE Asia Coordination Committee	*Room 222B*
10:00AM – 12:00PM	VP Products Open Meeting	*Room 221A&B*
10:30AM – 12:00PM	SPEC Steering Committee	*Room 222B*
12:00PM – 2:00PM	PELS Publications Awards Lunch	*Room 221A&B*
1:00PM – 3:00PM	PELS Global Intersociety Relations/Education/Digital Media Committee	*Room 221C*
1:00PM – 5:00PM	VP of Conferences	*Room 222A*
1:00PM – 6:00PM	Digital Media/Education Recording Room	*Room 222B*
2:00PM – 3:30PM	Meet with the EICs	*Room 221A&B*
3:00PM – 4:30PM	Strategic Planning Committee (FEPPCON)	*Room 221C*
4:00PM – 5:00PM	ITRG	*Room 221A&B*

Thursday, October 24

7:30AM – 8:15AM	AdCom Breakfast	*Room 221A&B*
8:00AM – 12:00PM	Digital Media/Education Recording Room	*Room 222B*
8:30AM – 11:30AM	AdCom Meeting (AM)	*Room 221A&B*
12:20PM – 2:20PM	PELS & IAS Awards Lunch	*Ballroom 120*
2:00PM – 5:00PM	Digital Media/Education Recording Room	*Room 222B*
2:30PM – 6:00PM	AdCom Meeting (PM)	*Room 221A&B*

SPECIAL EVENTS

ECCE Welcome Reception

Sunday, October 20 | 6:00PM – 8:00PM
Location: Ballroom 120CD

The conference will host a Sunday Welcome Reception welcoming colleagues from both ECCE and IAS. The Presidents of IAS and PELS will greet attendees at the event. You will also have a chance to thank and mingle with our corporate partners and meet and greet our colleagues who have become IEEE Fellows this year.

Newcomer's Orientation

Sunday, October 20 | 4:30PM – 5:00PM
Location: Room 129B

The Newcomer's Orientation is designed for first time attendees and will cover everything you need to know about the conference, schedules, program offerings, behind-the-curtain tricks and tidbits to help you navigate the conference.

Teacher Outreach Event

Tuesday, October 22 | 8:30AM – 3:30PM
Location: Room 131ABC

Building on the success of last year's event, the IEEE Energy Conversion Congress and Expo (ECCE) is excited to present the 2024 workshop for educators: Integrating Renewable Energy and Power Electronics. In collaboration with Engineering for US All (e4usa) and Experiential, this workshop is designed to help high school teachers and community college professors incorporate power conversion technology into their curricula.

Participants will have the opportunity to build hands-on projects, including a wireless phone charger and a solar-powered battery charger. Additionally, they will receive an XRP robot kit, supplies, and instructional materials to support further classroom integration.

The workshop is scheduled for Tuesday, October 22, 2024, from 8:30 AM to 3:30 PM, and attendance is by *invitation only*.

Exhibit Hall Opening Reception

Monday, October 21 | 5:00PM – 7:30PM
Location: Exhibit Hall 5/6

Join us for the opening of the ECCE 2024 Exhibit Hall! Enjoy a drink and tastes of hors d'oeuvres from around the world as you mingle with industry partners and friends and explore the latest advances in products and services to meet the needs of current and future challenges facing the energy conversion industry.

Luminaries Special Sessions

Tuesday, October 22 | 5:00PM – 7:00PM
Location: 129AB (Dr. John Kassakian Special Session)
124AB (Prof. Hirofumi (Hiro) Akagi Special Session)

Join us for an exclusive series of special sessions dedicated to honoring the contributions of two esteemed scholars in the field of power electronics:

- **Dr. John Kassakian**, Professor of Electrical Engineering, Emeritus, The Massachusetts Institute of Technology
- **Prof. Hirofumi (Hiro) Akagi**, Distinguished Professor at the Tokyo Institute of Technology

This unique opportunity offers a chance to learn from their experiences, celebrate their remarkable achievements, and engage in discussions about future trends in this dynamic domain. The sessions will open with a light networking reception to be followed by the opportunity to enjoy the special session.

Networking Dinner

Wednesday, October 23 | 6:00PM – 8:00PM
Location: Heard Museum

This unique night brings together members from both PELS and IAS to enjoy a night of networking. Hosted off-site at the world renowned Native American museum, the Heard Museum, attendees will get a chance to both network and be immersed in local culture. Transportation via chartered bus will be provided and will leave from the convention center in a 10 minute continuous loop starting at 5:50pm. The museum is also easily accessible by light rail or short Uber or the ever popular Waymo autonomous car ride.

Scan the QR code below for detailed information on getting to the Heard Museum by the alternative methods listed above.

IEEE PELS & IAS Awards Luncheon

Thursday, October 24 | 12:10PM – 2:00PM
Location: Ballroom 120ABCD

We will gather to celebrate the great achievement of some of our colleagues at our traditional IEEE Award Luncheon event.

Closing Reception

Thursday, October 24 | 5:40PM – 7:00PM
Location: Ballroom 120A

Join us for coffee and dessert following the FREE 90-minute tutorials.

WOMEN IN ENGINEERING (WIE) Events

WIE Distinguished Leaders Panel and Luncheon

Monday, October 21 | 11:30AM – 12:45PM

Location: Room 131ABC
Phoenix Convention Center

The IEEE ECCE Women in Engineering (WIE) Committee is excited to invite you to an inspiring and insightful panel discussion on the topic **"Challenges and Triumphs: Empowering Future Leaders in Power Electronic."** By panelists:

- **Ms. Gaudy M. Bezos-O'Connor** (NASA)
- **Dr. Olga Spahn** (ARPA-E)
- **Prof. Keyue Ma Smedley** (University of California Irvine)
- **Prof. Brad Lehman** (Northeastern University)

Join us as distinguished leaders in the power electronics field discuss the challenges they have overcome to rise to leadership roles and highlight how they are supporting the next generation of engineers with inclusion and diversity. The panel will address critical issues such as gender equality, career development, and leading with vision.

The discussion will be followed by an awards ceremony to recognize outstanding achievements. Be sure to arrive early and stay through the end for a chance to receive a special gift—quantities are limited! This is an exclusive opportunity to gain valuable insights, network with leaders, and be part of an important conversation about empowering future leaders in engineering.

This event is open to everyone! Register now to reserve your spot by visiting the ECCE website.

WIE Breakfast

Elevated Engineer: Critical Communication Skills

Hosted by IEEE PELS WIE & DEI Committees

Wednesday, October 23 | 7:30AM – 9:00AM

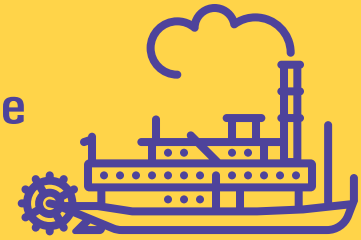
Room 221A&B
Phoenix Convention Center

How can you communicate effectively and keep your listeners hooked? How can you strengthen your presentation style? This breakfast event will focus on communication skills – a critical tool to help engineers speak, respond, and present effectively. The event features Sherri Thomas – a Fortune 100 Leadership Coach and President of Your Leadership Lab who has helped over 10,000 company leaders, managers, and high performers successfully grow and advance their careers. Join us to gain Sherri's valuable insights on elevating your communication skills. Elevated Engineer events are open to all and focus on offering valuable professional development opportunities.

Registration is free. To register please go to the ECCE website or visit www.bit.ly/3TBWI7T

TOUR OPTION
The Dolly Steamboat Scenic Nature Cruise on Canyon Lake Tour

Tuesday, October 22 | 10:00AM – 2:30PM



Want to get out of the convention center for a little to see some of the local scenery? If so, then enjoy the half day tour ECCE has arranged this year in Phoenix.

Tuesday, October 22
Cost: $85
Bus departs Phoenix Convention Center: 10:00AM (returning at approximately 2:30PM)

Boat tour time:
12:00PM – 1:30PM
Transportation from the convention center and lunch onboard will be provided with your paying ticket.

How to Purchase:
Tickets for this tour are available for purchase when registering for the conference.

Tour Details: View Beautiful Canyon Lake Scenery
Tortilla Flat, AZ (about an hour drive from downtown Phoenix)

Sit back, relax and take in the gorgeous views of Canyon Lake! During this one-and-a-half-hour, six-mile cruise, you may see desert bighorn sheep, bald eagles and a host of other animals and local wildlife viewed from the decks of the Dolly! The tour will also touch on the beautiful flora from the stately Saguaro cacti to the microscopic organism called desert varnish. Discover why there's more to Arizona than just desert on this spectacular Canyon Lake cruise. You never know what you might learn about Canyon Lake, Tortilla Flat and the surrounding area aboard the Dolly. The steamboat also features climate controlled lower and upper decks.

SOCIETY MEETINGS

PELS Members' Townhall Meeting

Sunday, October 20
Refreshments at 4:00PM | Meeting 4:30PM- 6:00PM
Location: Room 221A&B

IEEE Power Electronics Society President, Brad Lehman, is delighted to invite you to the upcoming PELS Membership Townhall Meeting. This Townhall meeting will provide you with an opportunity to engage with fellow PELS members, gain insights into the society's initiatives, and share ideas towards shaping the future of power electronics. We encourage all PELS members, from students to professionals, to attend this event. Let us come together to strengthen our professional network, foster collaboration, and drive innovation in power electronics.

PELS-IAS Young Professionals Reception

Date: Tuesday, October 22 | 7:30PM–9:30PM
Location: Arizona Wilderness Brewing DTPHX

Registration link: Please visit ECCE website.

You are cordially invited to attend the IAS-PELS Young Professionals (YP) reception which will take place during the IAS Annual Meeting / ECCE in Phoenix, AZ. The YP reception provides an ideal opportunity to network and socialize with fellow young professionals.

Please register as soon as possible as place is limited to the first 200 registrants. Registration is compulsory for attendance.

For any queries regarding the YP reception, please contact the ECCE YP Chair, Joseph Kozak (joseph.kozak@jhuapl.edu).

We hope you can join us.

PRESENTER INFORMATION

Oral Presenters

SPEAKER READY ROOM

Sunday through Thursday

Location: Room 127A

All oral presenters must check in at the Speaker Ready Room at least four (4) hours prior to their scheduled session. Even if you have submitted your presentation in advance and have no changes, you must check and confirm that the presentation is correct.

Speaker Ready Room Hours:

Sunday, October 20 . . . . . 7:30AM – 3:30PM
Monday, October 21 . . . . . 7:30AM – 3:30PM
Tuesday, October 22 . . . . . 7:30AM – 10:30AM
Wednesday, October 23. . . . . 7:30AM – 5:00PM
Thursday, October 24 . . . . . 7:30AM – 12:00PM

You may also edit your presentation during speaker ready room hours. If you have edits to your presentation, you will need to re-upload your presentation by 4:00PM the day prior for speakers presenting before 12:00PM or by 12:00PM for speakers presenting after 1:00PM. Please note, if you have edits to your presentation after the cutoff time, you will need to bring them with you on a flash drive directly to the session room. AV personnel will upload all presentations onto the laptop in your scheduled session room.

ORAL PRESENTERS' ORIENTATION

A Speakers' Breakfast will be held for oral presenters and session chairs from 7:00AM – 8:00AM Monday, Tuesday and Thursday in room 131ABC on Level 1. Speaker's Breakfast on Wednesday will be held in 131ABC and 132ABC. See your assigned room below:

Wednesday Speaker's Breakfast 131ABC – all oral session presenters and chairs

Wednesday Speaker's Breakfast 132ABC – all special session presenters and chairs

Oral presenters should meet with their respective session chairs to review the format and timing of their session and alert conference management of any changes. Oral Presenters should attend the orientation each day that they are scheduled to provide an oral presentation (or chair a session); you may only attend on days on which you are scheduled to speak.

Poster Presenters

POSTER PRESENTATION SCHEDULE

Monday, October 21 and Tuesday, October 22

Location: Exhibit Hall 5/6

POSTER SESSION I
Monday, October 21 . . . . . 5:30PM – 7:10PM

POSTER SESSION II
Tuesday, October 22 . . . . . 10:30AM – 12:10PM

POSTER SESSION III
Tuesday, October 22 . . . . . 2:30PM – 4:10PM

Location: Ballroom 120 Prefunction Area

POSTER SESSION IV
Thursday, October 24 . . . . . 2:00PM – 3:40PM

Posters will be on display on Monday and Tuesday in Exhibit Hall 5/6. Thursday Poster Sessions will be held on Level 100 pre-function outside Ballroom 120. Poster presenters should be available for questions at their display boards during their scheduled poster presentation time. Your poster will be assigned a specific poster board number and section referenced in the Poster Session section of the program. If you are unsure which session your poster should be presented, please review the complete Technical Session schedule.

Poster Presenters will have access to Exhibit Hall 5/6 as well as Level 100 prefunction ballroom 120 area to set up and tear down their posters at the times listed below.

POSTER SESSION I

Monday, October 21

Setup . . . . . 5:00PM – 5:30PM
Poster Session . . . . . 5:30PM – 7:10PM
Breakdown . . . . . 7:10PM – 7:40PM

Presenters for Poster Session I must have their posters set-up no later than 5:30PM. Any posters that remain on the poster boards at 7:40PM, and do not belong in Poster Session II will be removed and kept at the Registration Desk.

POSTER SESSION II

Tuesday, October 22

Setup . . . . . 10:00AM – 10:30AM
Poster Session . . . . . 10:30AM – 12:10PM
Breakdown . . . . . 12:10PM – 12:40PM

Presenters for Poster Session II must have their posters set-up no later than 10:30AM. Any posters that remain on the poster boards at 12:40PM and do not belong in Poster Session III will be removed and kept at registration.

POSTER SESSION III

Tuesday, October 22

Setup . . . . . 2:00PM – 2:30PM
Poster Session . . . . . 2:30PM – 4:10PM
Breakdown . . . . . 4:10PM – 4:40PM

Presenters for Poster Session III must have their posters set-up no later than 2:30PM. Any posters that remain on the poster boards at 4:40PM will be removed and kept in the Staff office (126C).

POSTER SESSION IV

Thursday, October 24

Setup . . . . . 1:30PM – 2:00PM
Poster Session . . . . . 2:00PM – 3:40PM
Breakdown . . . . . 3:40PM – 4:10PM

Presenters for Poster Session IV must have their posters set-up no later than 2:00PM. Any posters that remain on the poster boards at 4:10PM will be removed and kept in the Staff office (126C). All uncollected posters will be discarded at the end of the conference.

PLENARY SESSION | KEYNOTE SPEAKERS

Monday, October 21 8:00AM – 11:30AM

General Chair Welcome

Rolando Burgos
Virginia Tech University
ECCE 2024 General Chair

PELS President Welcome

Brad Lehman
Northeastern University
PELS 2024 President

IAS President Welcome

Andy Knight
University of Calgary, Canada
IAS 2024 President

8:15AM | Power Semiconductor Technologies for Future Grid Needs

Olga Spahn
Program Director
Advanced Research Projects Agency – Energy (ARPA-E)

Dr. Olga Spahn currently serves as a Program Director at the Advanced Research Projects Agency-Energy (ARPA-E). Her focus at ARPA-E is on grid resiliency, power management and distribution, aviation and instrumentation for harsh environments leveraging optical and semiconductor device technologies.

Before joining ARPA-E, Dr. Spahn managed Advanced and Exploratory Systems at Sandia National Laboratories where she oversaw new system development and technology maturation activities for Nuclear Deterrence applications. Prior to that, she managed the Semiconductor Material and Device Sciences department where she focused on advancement of wide- and ultrawide- bandgap semiconductor devices and applications, which earned an R&D 100 Award. Her experience as a principal investigator spans technology development for nuclear non-proliferation, photonics and optoelectronics, optical MEMS, and laser material processing.

Dr. Spahn holds her B.S. in Electrical Engineering from University of Illinois Urbana-Champaign, M.S. and Ph.D. in Electrical Engineering from University of California, Berkeley. She has published more than 90 publications, holds 3 patents, and is a co-author of several book chapters.

ABSTRACT

Technological advances in power electronics have enabled unprecedented growth of renewable energy sources in the electrical power grid. Moreover, decarbonization efforts rely on the electrification of everything from transportation to industrial processes, causing a dramatic increase in demand for electricity. Power electronics have the potential to minimize the increased demand, but new approaches are needed to improve the performance and actuation speeds. ARPA-E has an extensive power electronic portfolio with significant efforts in key technology enablers to improve grid control, resilience, and reliability. Its recent program – Unlocking Lasting Transformative Resiliency Advances by Faster Actuation of power Semiconductor Technologies (ULTRAFAST) seeks to advance the performance limits of silicon, wide bandgap, and ultrawide bandgap semiconductor devices and significantly improve their actuation methods to support a more capable, resilient, and reliable future grid.

This talk will focus on ARPA-E perspective on power electronics for the future grid and its resiliency and reliability, as well as other applications. Selected past and current power electronics programs at ARPA-E will be reviewed and some example activities will be discussed.

9:00AM | Electrification Brings Performance Improvements to Rugged Offroad Machinery and Paves the Way to Autonomy

Matthew Potter
Director of Robotics and Mobility Technologies
John Deere Intelligent Solutions Group

Matthew Potter is the Director of Robotics and Mobility Technologies in the Intelligent Solutions Group at John Deere. His teams lead research, development, and deployment of power dense, ruggedized motor drives, power converters, and electric machines in support of vehicle programs throughout the Deere enterprise.

Throughout his career, he has worked in many advanced robotics technologies in the defense and mobility industries. He's developed products in stabilization, electric drives, robotics, and self-driving. In his over 10-year career with John Deere, Potter has led various teams that deliver products in satellite-enabled guidance, hybrid-electric drivetrain, machine learning, and computer vision. In his prior role, he served as Senior Director of Engineering at Blue River Technology, acquired by John Deere in 2017, and launched See & Spray Ultimate, a first-of-its-kind AI-based computer vision system for agriculture.

Matthew earned his bachelor's in mechanical engineering from the University of Nebraska, a master's in mechanical engineering from the University of Minnesota, and a master's in engineering management from the University of Wisconsin.

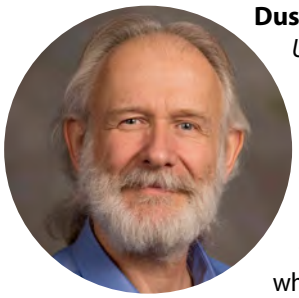
ABSTRACT

You won't find two industries with a bigger impact on people than agriculture and construction. John Deere produces intelligent, connected machines and applications that are helping revolutionize these industries. In this keynote, Matt Potter will show how electrification technologies provide measurable advantages to the machinery used in these rugged performance environments and will demonstrate how electrification is an important building block to enable an autonomous future.

9:45AM – 10:00AM | Coffee Break

Ballroom 120 Prefunction

10:00AM | Electronic Energy Routing for Future Electrical Power Systems



Dushan Boroyevich
University Distinguished Professor
Virginia Polytechnic Institute and State University

Dushan Boroyevich received his Dipl. Ing. degree from the University of Belgrade in 1976 and his M.S. degree from the University of Novi Sad in 1982, in what then used to be Yugoslavia. He received his Ph.D. degree in 1986 from Virginia Tech, Blacksburg, USA. From 1986 to 1990, he was an assistant professor and director of the Power and Industrial Electronics Research Program at the University of Novi Sad. He then joined the Bradley Department of Electrical and Computer Engineering at Virginia Tech as associate professor. He is now University Distinguished Professor and Associate Vice President for Research and Innovation in Energy Systems at Virginia Tech. He was the president of IEEE Power Electronics Society for 2011-12.

Prof. Boroyevich is a member of the US National Academy of Engineering and is recipient of 4 honorary professorships in China and Taiwan, as well as numerous other awards, including the IEEE William E. Newell Power Electronics Technical Field Award and the European Power Electronics Association Outstanding Achievement Award. His research interests include electronic power distribution systems, multi-phase power conversion, power electronics systems modeling and control, and integrated design of power converters. Dushan advised almost 50 Ph.D. and 50 M.S. students.

ABSTRACT

Today, only ~20% of the total human energy consumption is from electricity. Since almost all sustainable energy is first converted to electricity, we may need to build 4-10 additional electrical power systems in the next 30 years if we are to achieve a sustainable energy abundance! But, constant-frequency synchronous (50/60 Hz) electromechanical grid cannot balance constantly varying distributed renewable generation with variable consumption instantaneously, and anyway, why would we build additional new power systems using the 150-year old technology?

The presentation will outline possible power electronics solutions for transporting electrical energy from renewable electricity generation through a global network of undersea and underground electrical HVDC and MVDC lines connected by electronic energy routers ("solid-state substations"). Several innovative approaches for implementing high-power-density converters for routing electrical energy packets, utilizing wide bandgap semiconductor devices operating at high-frequencies, will be described. Examples of design, implementation and testing of experimental MV and LV modules will be illustrated. This will include descriptions of intelligent gate drivers, current and voltage sensors, planar and coaxial power interconnects, auxiliary power system components, integrated passives, and electro-thermo-mechanical layout for partial-discharge-free operation. A novel concept of implementing real-time distributed control algorithms in modular multi-core hardware and multi-thread software will be discussed as well.

The new electronic power system, will be able to collect energy from wherever the sun is shining and wind is blowing and deliver it instantly, at the speed of light, to customers anywhere around the world.

10:45AM | NASA Electrified Powertrain Flight Demonstration (EPFD) Project: Progress Towards Reducing Barrier Electric Aircraft Propulsion (EAP) Technology and Integration Risks

Gaudy M. Bezos-O'Connor
Program Manager
Electrified Powertrain Flight Demonstration Project
NASA Aeronautics Research Mission Directorate

Ms. Bezos-O'Connor has over 4 decades of project management and R&D experience delivering high-risk, high-pay-off aerospace solutions for NASA in partnership with the FAA, the aerospace industry and academia. A highly collaborative leader, she brings a solid history of success in public-private partnerships and innovative project management strategies. For the past decade and a half, Ms. Bezos-O'Connor has been at the forefront of enabling Sustainable Aviation through NASA's Environmentally Responsible Aviation Project, and Advanced Air Transport Technology Project and the FAA CLEEN Program. Currently she is the Project Manager of NASA's aviation industry-led MW-class electrified powertrain flight demonstration project that could transform the aerospace industry and result in a dramatic reduction of aircraft emissions and enable sustainable aviation.

ABSTRACT

The NASA EPFD Project goals are to (1) demonstrated integrated MW-Class electrified powertrains in flight using industry platforms; (2) facilitate a new aviation industry S-Curve: Electrification of Aircraft Propulsion; and (3) enable thin-haul, regional and next generation SA EAP market entrants in the 2030-2035 timeframe. This presentation will address the barriers to entry of EAP technologies and how NASA Aeronautics Research Mission Directorate (ARMD) EAP Portfolio and the EPFD Project and their industry partners are maturing the technologies and reducing the aircraft integration risks to enable a sustainable aviation future.

LUMINARIES SPECIAL SESSIONS

Join us for an exclusive series of special sessions dedicated to honoring the contributions of two esteemed scholars in the field of power electronics:

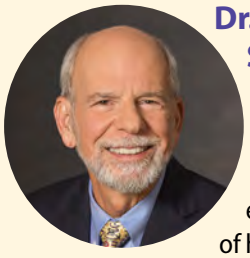
> **Dr. John Kassakian**
> *Professor of Electrical Engineering, Emeritus*
> *The Massachusetts Institute of Technology*

> **Professor Hirofumi (Hiro) Akagi**
> *Distinguished Professor*
> *Tokyo Institute of Technology*

Tuesday, October 22

Level 100 Prefunction

5:00PM – 5:30PM | Light Refreshments
5:30PM – 7:00PM | Special Sessions



Dr. John Kassakian SPECIAL SESSION

Room 129AB

John Kassakian graduated from the Ridgefield Park, NJ, public schools in 1961 and entered MIT, from which he received all four of his degrees. He didn't purchase any MIT logo apparel until successfully completing his freshman year. In the middle of his doctoral program, he served two years in the US Navy, including tours on the carriers Enterprise and Forrestal, and as the Naval Ship Systems Command's Technical Representative to Univac in support of the 7th fleet during the Vietnam war.

After completing his doctorate, he joined the MIT faculty where he established one of the earliest academic power electronics programs. His early research on semiconductor devices resulted in discovering the parasitic oscillation mechanism causing paralleled MOSFETs to fail. This resulted in design modifications by manufacturers of device packages using multiple chips in parallel. He and his students were the first to demonstrate conversion using MOSFETs at 10 MHz. His subsequent research successfully applied photonic crystals to thermophotovoltaic systems. It also addressed higher voltage automotive electrical systems. In this later area he convened and lead a consortium of automotive OEMs and suppliers, establishing the 42 V ASAE standard.

Dr. Kassakian has served as a consultant to industry and government. He designed the induction heating process that now produces Cheerios. He has served on four public company boards of directors, and on the board of ISO-New England (the NE electrical system operator) he chaired the System Planning and Reliability Committee.

Professor Hirofumi (Hiro) Akagi SPECIAL SESSION

Room 124AB

Hirofumi (Hiro) Akagi was born and grew up in Okayama, Japan. He received his Ph. D. degree in electrical engineering from the Tokyo Institute of Technology, Tokyo, Japan, in 1979. He is currently Distinguished Professor at the Tokyo Institute of Technology. Since he started as a graduate student in 1974, he has been doing and conducting extensive research in the field of power electronics. His research includes line-commutated cycloconverters using thyristors, field-oriented control of induction and synchronous motors, industrial induction heating/corona discharge treatment systems based on high-frequency resonant inverters using IGBT modules, active/passive EMI filters for inverter-drive motors, and applications of modular multilevel cascade converters and inverters to STATCOMs, MVDC/HVDC systems and motor drives, as well as bidirectional isolated dual-active-bridge (DAB) converters using SiC-MOSFET/SBD modules. He has authored and coauthored 148 IEEE Transactions/Journal papers, including three invited, solely-authored papers published in *Proceedings of the IEEE*.

The power electronics community has recognized Prof. Akagi as a pioneer of the three-level neutral-point-clamped (NPC) inverter and the p-q theory, or instantaneous power theory, in three-phase circuits. These research contributions led Prof. Akagi to receive the following awards: the 2001 IEEE Power Electronics Society William E. Newell Award, the 2004 IEEE Industry Applications Society Outstanding Achievement Award, the 2008 IEEE Richard Harold Kaufmann Award sponsored by the IAS, the 2012 IEEE Power & Energy Society Nari Higorani Custom Power Award, the 2018 IEEE Medal in Power Engineering sponsored by the IAS, PELS, IES, and PES, as well as the 2020 EPE (European Power Electronics and Drives Association) Gaston Maggetto Medal. He is the inaugural and currently sole recipient of both IEEE and EPE medals.

SPECIAL SESSIONS

Monday, October 21 12:50PM – 2:30PM

SS1 | Energy Transition and Energy Access – Common Challenges and Enabling Technologies

Room 125AB
Chair/Organizer:
Issa Batarseh, *University of Central Florida*

Ensuring affordable, reliable, sustainable and modern energy for all by 2030 – one of 17 Sustainable Development Goals) adopted by world leaders providing a shared blueprint for peace and prosperity for people and the planet – encompasses two main agendas: energy transition (transitioning away from fossil fuels by increasing the share of renewables in the global energy mix and increasing energy efficiency), and energy access (universal access to affordable, reliable and modern energy services). Decarbonisation of the electricity supply and electrification of demand, as major enablers of the energy transition, have seen a remarkable acceleration in the past few years, largely enabled by exponential technologies such as PV, electric vehicles, and energy storage. On the other hand, the rate of progress in reaching 680 million people without electricity access and over 2 billion with unreliable access, is lagging, with affordability and scalability as persistent challenges. At the same time, contexts without electricity access have the opportunity to leapfrog 20th-century solutions by leveraging renewable, decentralised, power electronics-enabled, bottom-up approaches. This special session aims to facilitate a dialogue on technology developments that are enabling the acceleration of energy transition, put forward some of the challenges, explore how these technology developments can enable leap-frogging in energy access contexts and discuss how bringing these two agendas closer together can enable sharing learnings and resources and accelerate progress.

Session Panelists/Speakers
Jaber Abu Qahouq, *University of Alabama*
Jelena Popovic, *University of Twente*
Joseph Benzaquen, *Georgia Tech*
Laurens Mackay, *DC Opportunities*
Simon Round, *Hitachi Energy*

SS2 | Dynamic Modeling and Control of Inverter-Based Resources: A Bottom-Up Approach Spanning from Networked Microgrids to Bulk Transmission Interconnection

Room 128AB
Chair/Organizer:
Xiaonan Lu, *Purdue University*
Jin Tan, *National Renewable Energy Laboratory*

Part 1: 12:50PM – 2:30PM
COFFEE BREAK
Part 2: 3:00PM – 4:40PM

There are tremendous industry practices and academic research efforts in modernizing power systems with power electronics technologies nowadays, and the topics include but are not limited to localized and network-interconnected microgrids, grid-forming capabilities, interactive and integrated inverter-based resources, and transmission system interconnection of bulk renewable power plants, among others. Advanced and cutting-edge technologies have been proposed and developed to address the challenges and concerns with the growing development and deployment of inverter-based resources (IBRs). Note that the challenges and R&D efforts lie in multiple sections throughout the entire electric grid, ranging from grid-edge customers and substations to large-scale distribution systems and upstream transmission networks. Innovative and cutting-edge technologies are being developed and field-validated toward resilient and modernized power grids with 100% IBRs. To highlight the cutting-edge technologies of dynamic modeling and control of grid-interactive power electronic inverters, we will focus on a bottom-up approach in this special session, starting from grid-edge IBRs forming networked microgrids to large-scale integration of hybrid power plants with renewables and energy storage systems in bulk transmission systems. More importantly, we will emphasize the practices, recent progress, and lessons learned from industrial sectors with support and input from original equipment manufacturers (OEMs), utilities, independent system operators (ISOs), and government agencies. The session intends to share the latest experience in the area of IBR grid integration and stimulate the interests of a broad audience group.

SS3 | Design Automation for Power Electronics – Design Methods, Challenges and Education

Part 1: 12:50PM – 2:30PM
COFFEE BREAK
Part 2: 3:00PM – 4:40PM

Room 126AB
Chair/Organizer:
Kevin Hermanns, *PE-Systems GmbH*

Power electronics stands at the forefront of technological innovation, driving the efficient management and utilization of electrical energy across diverse applications. Amidst escalating demands for energy efficiency and sustainability, the integration of design automation methodologies emerges as a pivotal strategy to streamline the development of power electronic systems. This session will highlight the current landscape of design automation in power electronics and explain its methods, challenges and impact on educational paradigms. Design automation epitomizes a paradigm shift in power electronics design, catalyzing expedited prototyping, optimization, and validation processes through computational algorithms and simulation tools. From conceptualization to implementation, automated design methodologies empower engineers to navigate intricate design spaces, leveraging optimization algorithms and machine learning techniques to uncover optimal solutions. Furthermore, the synergy between automation and domain-specific knowledge fosters the realization of innovative designs, transcending conventional design boundaries. Nevertheless, the integration of design automation in power electronics confronts multifaceted challenges stemming from the inherent complexity of power electronic systems. Non-linearities, multi-domain interactions, and stringent performance requirements pose formidable obstacles, necessitating the development of robust modeling frameworks and simulation platforms. Moreover, ensuring the reliability and safety of automated design methodologies remains imperative, particularly in safety-critical applications such as automotive and aerospace systems. In the realm of education, the infusion of design automation principles into power electronics curricula assumes paramount significance in nurturing adept

engineers equipped to tackle contemporary design challenges. Traditional pedagogical approaches often prioritize theoretical underpinnings over practical applications, underscoring the need for experiential learning opportunities. By integrating hands-on experiences with simulation tools, optimization algorithms, and real-world case studies, educators can cultivate a cohort of proficient designers adept at harnessing automated design methodologies. In summation, design automation heralds a new era in power electronics design, promising enhanced efficiency, innovation, and sustainability. Despite inherent challenges, the amalgamation of automated design methodologies into educational frameworks augurs well for the cultivation of a skilled workforce capable of navigating the intricacies of modern design landscapes. As the pursuit of energy-efficient technologies gains momentum, embracing design automation emerges as a cornerstone for driving progress and catalyzing transformative advancements in power electronics.

Session Panelists/Speakers

Audrey Guidera, *Red Hat*
Katherine Kim, *National Taiwan University*
Peter Wilson, *Dyson*
Philipp Kappes, *PE-Systems GmbH*
Subham Sahoo, *Aalborg University*
Wilmar Martinez, *KU Leuven – EnergyVille*

Monday, October 21 3:00PM – 4:40PM

SS4 | Simulation-Driven Electric Propulsion: Shaping the Future of Transportation

Room 125AB
Chair/Organizer:
Sabin Carpiuc, *MathWorks*

Transitioning to electric propulsion is a critical step forward in making transportation across land, sea, and air more sustainable. This shift is set to revolutionize the transport sector by offering a cleaner alternative to conventional internal combustion engines. However, the advanced state of traditional propulsion technologies, developed over a century, means that moving rapidly to electric propulsion systems presents considerable challenges. These include ensuring safety during operations, maintaining high performance, ensuring reliability under various conditions, and enhancing overall efficiency. Electric propulsion systems are complex, consisting of sophisticated power electronics, electric motors, energy storage, and control systems designed to maximize efficiency. The development and testing of these systems require comprehensive simulations capable of accurately predicting performance across diverse scenarios. Utilizing both computer and real-time simulations is crucial in addressing these challenges, providing engineers and researchers with essential tools for testing and refining electric propulsion technologies in a simulated environment. The ability to simulate and evaluate new electric propulsion concepts before building physical prototypes is key to advancing transportation technologies. This approach not only speeds up the development timeline but also significantly reduces costs and the likelihood of unforeseen failures. Additionally, it encourages greater collaboration by connecting individuals globally. Enhancements in computing power and the use of field-programmable gate arrays (FPGAs) have already improved the speed and accuracy of simulation models. Further advancements in artificial intelligence, machine learning, and cloud computing are set to further enhance our ability to simulate and analyze complex systems. The traditional method of trial and error is increasingly being replaced by simulation-driven development. This session aims to establish a collaborative forum where participants can exchange insights on best practices, innovative techniques, and integrating simulation into the workflow for designing the electric propulsion systems of the future. By doing so, it seeks to bridge the gap between theoretical research and practical application. This collaborative effort is essential for overcoming the technical barriers associated with electric propulsion and for paving the way towards a greener, more efficient future in transportation. The session will provide a platform for industry and academia to come together, fostering an environment of learning and innovation crucial for the rapid advancement and adoption of electric propulsion technologies. Through this dialogue, we aim to identify new research directions and set the stage for the next generation of transportation solutions that are not only environmentally friendly but also economically viable and technologically feasible.

Session Panelists/Speakers

Bulent Sarlioglu, *University of Wisconsin-Madison*
Gianmario Pellegrino, *Politecnico di Torino*
H. Alan Mantooth, *University of Arkansas*
Sheldon Williamson, *Ontario Tech University*

Tuesday, October 22 8:30AM – 10:10AM

SS5 | Advancements in Modeling, Control, and Operation of Converter Dominated Power Systems

Room 125AB
Chair/Organizers:
Ujjwol Tamrakar, *Sandia National Labs*
Reinaldo Tonkoski, *Technical University of Munich*

The modern electric grid landscape is undergoing a major paradigm shift with massive integration of renewable energy systems. Most modern grid components are starting to encompass power electronic converters in several applications ranging from generation (wind, photovoltaics), transmission, energy storage and even active loads. This has transformed the electric grid from a bulk synchronous generation-based system to a converter-dominated power system (CDPS). CDPSs involve fast dynamics which presents significant challenges with its modeling, control, protection, and operation. However, this paradigm shift also presents opportunities to provide unique services which has the potential to make the electric grid flexible, reliable, and resilient than ever before. This special session aims to address the recent advancements in modeling, control, protection, and operation of CDPSs. The presentations will discuss aspects of efficiently operating and coordinating the electric grid under a converted-dominated paradigm including energy storage systems. Since, the interaction of power electronic based components with the grid is still not fully understood, power hardware in the loop and real-time simulation techniques are vital tools to accurately analyze CDPSs. This session will explore how these methods can be leveraged improve operations and control of CDPSs.

Session Panelists/Speakers

Abhishek Banarjee, *Siemens Technology*
Fernando Bereta dos Reis, *Pacific Northwest National Laboratory*
Giovanni De Carne, *Karlsruhe Institute of Technology*
Jacob Mueller, *Sandia National Labs*
Reinaldo Tonkoski, *Technical University of Munich*
Rohit Jinsiwale, *Pacific Northwest National Laboratory*

SS6 | Net Zero Carbon Power Converters Design and Production: Where Are We Now?

Room 126AB

Chair/Organizers:
Kamaan Geoffrey Jalo, *University of Pavia*
Norma Anglani, *University of Pavia, Italy*
Stefano Bennati`, *Alens S.A, Italy*

The transition towards a sustainable energy future calls for a paradigm shift in the design and production of power converters, which are integral components of modern electrical systems. Achieving net-zero carbon emissions throughout the lifecycle of power converters has emerged as a critical imperative in mitigating climate change and advancing towards a decarbonized economy. This topic examines the current landscape of net-zero carbon power converters design and production, exploring the progress made, challenges faced, and prospects in this rapidly evolving field. In assessing the current state of net-zero carbon of power converters, emphasis is placed on technological advancements driving innovation in materials, design methodologies, and manufacturing processes. Additionally, the abstract delves into the role of collaborative efforts among industry stakeholders, regulatory frameworks, and market dynamics in shaping the trajectory of sustainable converter production. Through an analysis of market demand, economic viability, and scalability considerations, key insights are gleaned into the opportunities and barriers confronting converter manufacturers in their pursuit of net-zero carbon goals. Furthermore, the abstract highlights the significance of life cycle assessments, supply chain decarbonization strategies, and consumer expectations in guiding sustainable practices across the power converter industry. By examining case studies, best practices, and emerging trends, this abstract offers valuable perspectives on the current achievements and future directions of net-zero carbon power converters design and production. Ultimately, this abstract provides a comprehensive overview of the current situation in net-zero carbon power converters, shedding light on the collective efforts, innovations, and challenges shaping the industry's trajectory towards a more sustainable and resilient energy future.

Session Panelists/Speakers

Ariya Sangwongwanich, *Aalborg University, Denmark*
Johann W. Kolar, *ETH Zurich Switzerland*
Stefano Bennati`, *Alens S.A, Italy*

SS7 | P2964 IEEE Standard for Datasheet Parameters and Tests for Integrated Gate Drivers

Room 128AB

Chair/Organizer:
Tanya Gachovska, *MDA Space Montreal*

Power electronics applications employ power switches. Every switch requires a gate driver, a power amplifier that receives a low-power input from a controller and produces a high-current driving output for the gate of high-power switches such as an IGBT, MOSFET, JFET, or HEMT. Some gate drivers have protection features such as fast short-circuit protection (e.g. DESAT), active Miller clamp, shoot-through protection, shutdown, and overcurrent protection, which make them well-suited for both silicon and wide-bandgap power devices. However, it is difficult to compare the IC gate drivers using their datasheet parameters. Every company names the drivers' pins and parameters with different approaches. The parameters are tested at different conditions and methodology or in most of the cases the conditions and the methodology are not given. Only some companies give the selected test circuits. IEEE-IAS PEDCC has initiated a working group for a standard to provide datasheet parameters and tests for integrated gate drivers, which include non-isolated gate drive, level-shifted gate drive, and isolated gate drive. The standard scope includes terminology, mnemonic, and pins' description; parameters and definitions; and test methods and conditions to obtain the parameters. The working group has worked for more than thre years. The special session will include an update on the work done from the group.

Session Panelists/Speakers

Leslie Marquez Arroyo, *Texas Instruments*
Srivatsa Raghunath, *Infineon Technologies*
Zheyu Zhang, *Rensselaer Polytechnic Institute*
Wolfgang Frank, *Infineon Technologies, Germany*
Xiaoqing Song, *University of Arkansas, USA*
Mitchell Van Ochten, *ROHM Semiconductor*

Wednesday, October 23 8:30AM – 10:10AM

SS8 | Empowering Sustainable Futures: The Critical Role of Power Electronics in Energy and Industry

Room 125AB

Chair/Organizers:
Yonghao Gui, *Oak Ridge National Laboratory*
Zian Qin, *TU Delft, Netherlands*
Weihang Yan, *R&D Staff, National Renewable Energy Laboratory, USA*

This special session aims to showcase the transformative impact of power electronics in various sectors, including renewable energy integration, electric vehicle (EV) infrastructure, mining electrification, and advanced power system management. Leading experts will present the latest developments, strategies, and applications that utilize power electronics to address up-to-date energy challenges and promote the transition toward a more sustainable and efficient global energy landscape. The session also aims to highlight groundbreaking advancements in power electronics and encourage collaboration and knowledge exchange among researchers and industry professionals. The session will begin by exploring new protection strategies for Inverter Based Resources (IBRs) and Distributed Energy Resources (DERs). It will then discuss the important role of power electronics in enhancing EV charging infrastructure, sharing research findings from EU, Dutch national, and industry-funded projects. Additionally, there will be discussions on a new estimation-based protection method for voltage source converters, which will introduce dynamic phasor models to enhance the reliability and sensitivity of protection systems. The reliability and engineering of wind power converters under real operating conditions will be addressed, which will offer a systematic guideline for evaluating the performance and durability of these critical components. Furthermore, the session will delve into the electrification of the mining industry, a crucial element in the transition to a net-zero economy by 2050. The final presentation will introduce a distributed voltage regulation method for modern distribution systems using power electronics interfaced assets.

Session Panelists/Speakers

Yonghao Gui, *Oak Ridge National Laboratory,USA*
Weihang Yan, *National Renewable Energy Laboratory, USA*
Kaiyu Liu, *Eaton, USA*
Dao Zhou, *Aalborg University, Denmark*
Tianqi Hong, *University of Georgia, USA*
Zian Qin, *TU Delft, Netherlands*

SS9 | Advancements in Multilevel Converters for Electric Vehicles/ Grid-Tied Applications

Room 126AB

Chair/Organizer:
Nidhi Mishra, *Birla Institute of Technology Mesra, India*

The special session would functionalize with recent advancements in multilevel converters (MLCs) for electric vehicles (EVs) and grid-tied applications. This would deal with emerging modulation strategies and high-power conversion for DC/AC applications. As MLCs have numerous active switches, driver circuits, etc involved, it could lead to fault. Therefore, resilience and fault-tolerant capabilities are the major aspects that need to be dealt with. Resilience capability is required for the overall life-cycle assessment. Electromagnetic compliance (EMC) is the major need for EVs. For EMI prediction, suppression, and EMC optimization design for EVs. The Powertrain is the heart of the vehicle and delivers the power to the wheels. This would consist of equipment and setup to help the students and faculties gain a better grasp of motor technology, hybrid vehicles, and fuel cell technology. They will design, prototype, test, and, optimize the Powertrain setups. The battery for an electric vehicle is one of the crucial and most expensive components. This will perform various mechanical and electrical tests for the battery/ cell, along with the battery pack design and cell sorting. Study the BMS functionality and design and create the safety circuit for balanced charge and discharge characteristics. The charging station consists of a converter connecting the grid to a DC bus where EVs get connected through battery chargers. An energy management strategy based on optimal power flow is also proposed by integrating a solar PV generation system with a charging station to ease the impact of fast charging on the grid. The session would provide a new outlook for the efficient and reliable system for EVs and grid-tied applications.

Session Panelists/Speakers

Nidhi Mishra, *Birla Institute of Technology, Mesra, India*
Subho Mukherjee, *Oak Ridge National Laboratory, USA*
Dr. Sreenivasa S Jaldanki, *Oak Ridge National Laboratory, USA*

SS10 | Aerospace Electrified Propulsion – Integrated Powertrain Development and Testing for Future Electrified Skies

Part 1: 8:30AM – 10:10AM
COFFEE BREAK
Part 2: 10:40AM – 12:20PM

Room 128AB

Chair/Organizers:
Bulent Sarlioglu, *University of Wisconsin-Madison*
Gokcin Cinar, *University of Michigan*
Peter de Bock, *U.S. Department of Energy*
Xin Wu, *U.S. Department of Energy*
Ziaur Rahman, *Booz/Allen/Hamilton*

This panel addresses the newest advances in integrated power train development and testing for future aerospace electrified propulsion. Electric and hybrid propulsion for aircraft are gaining worldwide attention, and there are accelerated research and development going on in this area. Over 200 start-ups, airframers, government agencies, and universities work on the electric propulsion of aircraft. The goal is to reduce emissions, reduce dependency on fossil fuels, and create safe and sustainable aviation. Significant innovations and technological advancements in electric motors and their associated drives have been developed for this new transportation area. DOE's ARPA-e has funded cutting-edge teams in developing technology breakthroughs, as has NASA, AFRL, and other government agencies. For example, the DOE ARPA-e ASCEND (Aviation-class Synergistically Cooled Electric-motors with iNtegrated Drives) project aims to achieve transformational improvements in integrated powertrain (motor + power electronics + thermal management) power density for electrified aviation systems with a target of >12kW/kg. New materials for electric machine design and power electronics, new cooling technologies, and optimization techniques are expected to significantly increase specific power density and efficiency. Experiments of these systems are ongoing, and this special session aims to bring experts together to discuss these new ideas, technological developments, and testing. Participants will include representatives for the DOE-E ARPA-E ASCEND, NASA University Leadership Initiative (ULI), and NASA Electrified Powertrain Flight Demonstration (EPFD) projects.

Session Panelists/Speakers

Eric Bartsch, *VerdeGo Aero*
Gaudy Bezos-O'Connor, *NASA*
Thomas Jahns, *University of Wisconsin-Madison*
Sara Roggia, *magniX*
Jin Wang, *Ohio State University*
Tao Yang, *University of Nottingham*
Amy L. Jankovsky, *NASA*
Fabian Isaza, *ATO Hybrid Electric GE Aviation*
Ayman El-Refaie, *Marquette University*
Jeffrey Engler, *Wright Electric*
Matthew Gardner, *University of Texas at Dallas*
Thanatheepan Balachandran, *Hinetics*

Wednesday, October 23 10:40AM – 12:20PM

SS11 | Sustainable Energy Systems as Primary Sources to Advance the Grid

Room 125AB

Chair/Organizers:
Yongheng Yang, *Zhejiang University*
Gab-Su Seo, *National Renewable Energy Laboratory*
Juan Carlos Balda, *University of Arkansas*
Ke Ma, *Shanghai Jiaotong University*

As we move towards carbon neutrality, more and more renewable and sustainable energy systems will be installed across the globe. Power electronics is the key enabling technology for efficient and reliable utilization of renewable and sustainable energy. In this context, the conventional power grid architecture is transitioning to renewable-based distribution generation (DG) and power-electronic-dominant systems, where early retirements and replacements of conventional synchronous generators (SGs) are common. In conventional power grids, the frequency is governed by such SGs with large rotating inertia. By contrast, power electronics have fast dynamics and almost zero (low) inertia. That is, such inverter-based DG systems are becoming low inertia or inertia-less, making the system's frequency less robust. Hence, it requires the power converters that act as the interface for sustainable energy and DG to provide advanced functions to maintain grid stability and controllability. That is, further technologies should be developed for sustainable energy systems to advance the power grid, where these systems, being the primary energy sources, should be much more active in grid regulation. Accordingly, in recent years, many have developed grid-forming technologies, e.g., virtual synchronous generators (VSGs)/machines (VSMs), virtual oscillator control (VOC), matching control, and others schemes such as virtual inertia control to enable power-electronic-based DGs to provide frequency support. This, to enhance the grid robustness, is demanding. At the same time, there are certain challenges to be addressed. Hence, this Special Session on Sustainable Energy Systems as Primary Sources to Advance the Grid is proposed to discuss recent advancements in grid-forming technologies

for power-electronic-dominant grids. This special session is organized by the IEEE PELS Technical Committee 5 on Sustainable Energy Systems (TC5), featuring experts from academia and industrial (national laboratories) sectors. We provide this planform to ECCE 2024 participants to discuss the challenges as well as opportunities. At the same time, we will also share the thoughts from the IEEE TC5 about this technology. Topics covered include 1) Standards, requirements, and modeling of grid-forming systems, 2) Grid-forming control of sustainable energy systems, 3) Advanced operation of sustainable energy systems as primary sources, and 4) Testing of power electronics systems for the grid integration. In this Special Session, progress in standardization and requirements of grid-forming technologies will be covered, as well as the stability modeling and analysis. Various grid-forming control strategies will be overviewed and benchmarked, and advanced operations like black start, transient stability control and system-level coordinative control will be discussed. Finally, the testing methods and scenarios will be briefed to further advance the technologies. All with a background of power electronics, and interested in modernizing the power grid are welcome.

Session Panelists/Speakers

Wenzong Wang, *Electric Power Research Institute, USA*
Frede Blaabjerg, *Aalborg University, Denmark*
Philip T. Krein, *University of Illinois at Urbana-Champaign, USA*
Ke Ma, *Shanghai Jiaotong University, China*

SS12 | Next Generation AI for Power Electronics: Explainable, Flexible, and Lightweight

Room 126AB
Chair/Organizers:
Dehong Xu, *Zhejiang University*
Xinze Li, *University of Arkansas*
Homer Alan Mantooth, *University of Arkansas*

The integration of Artificial Intelligence (AI) within power electronics marks a pivotal shift towards propelling the industry's growth, offering novel perspectives in modeling, design, control, monitoring, and diagnostics. However, the full potential of AI technologies encounters significant hurdles that hinder widespread adoption in the power electronics domain, encapsulated in three primary challenges: • Data Dependence: The accuracy of AI algorithms significantly relies on the availability of vast datasets. In the realm of power electronics, acquiring such comprehensive data, including hardware prototype or fault occurrence information, can be exceptionally challenging. • Poor Interpretability: The opaque nature of many AI models, which are developed through extensive data training, renders their predictions somewhat mysterious, lacking clear explanations grounded in physical theories. This opacity in AI's decision-making process limits its acceptance across the industry due to concerns over transparency and interpretability. • Application Limitations: The effectiveness of AI algorithms is confined by the scope of their training data, posing restrictions on their adaptability to scenarios beyond their initial programming. Addressing these constraints, the session introduces Physics-Informed Neural Networks (PINNs) as a groundbreaking innovation, contoured to embed physics-based domain knowledge directly into AI frameworks. This integration offers a robust countermeasure against the traditional limitations of AI-aided design, enhancing interpretability, reducing data dependency, and broadening algorithm applicability. This presentation will dissect the application of PINNs through three strategic approaches: • Physics-in-Loss: Incorporating physical laws directly into the loss function, guiding the learning process towards more accurate and physically plausible solutions. • Physics-in-Initialization: Using physics-based insights to pre-define neural network weights, facilitating models that align more closely with real-world phenomena right from their initial stages. • Physics-in-Architecture: Reconfiguring neural network structures to reflect underlying physical principles, boosting the model's adaptability to varying operational conditions and design changes. To demonstrate the efficacy of this approach, the session will showcase the development of the Dual Active Bridge (DAB) converter family using a PINN configured with physics-in-architecture. This model exhibits exceptional flexibility and accuracy in predicting the converter's time-series performance, adaptable to any topology variations within the DAB family and resilient against shifts in operational conditions and modulation strategies. Attendees will also be treated to a live code demonstration, offering a practical exploration of implementing PINNs in power electronics. This interactive segment aims to empower attendees with firsthand experience in leveraging PINNs for their projects, illuminating a pathway towards more explainable, flexible, and lightweight AI applications in power electronics. By bridging the gap between traditional AI and physics-informed approaches, this session aims to inspire a new wave of research and development within the industry, fostering the creation of universally applicable, efficient, and transparent AI solutions in power electronics.

Session Panelists/Speakers

Fanfan Lin, *The Zhejiang University-University of Illinois Urbana-Champaign Institute*
Xin Zhang, *Zhejiang University*
Huai Wang, *Aalborg University*

Wednesday, October 23 2:00PM – 3:40PM

SS13 | Professor Ned Mohan Memorial Session

Room 125AB
Chair/Organizer:
Kaushik Basu, *Indian Institute of Science, Bangalore, India*

Session to honor the professional contributions of Late Professor Ned Mohan. Presentations by former students and colleagues of Professor Ned Mohan on technical contributions and impact in research and education of power electronics, power systems, electric machines, and drives. Time at the end will be budgeted for the audience to offer their thoughts and share memories.

Session Panelist/Speaker

Sairaj Dhople, *University of Minnesota*

SS14 | Breakthroughs in Medium-Voltage SiC Power Module: Design, Validation and Application

Room 126AB
Chair/Organizer:
Xiaoling Li, *National Renewable Energy Laboratory (NREL)*

Medium voltage (MV, between 1 kV ac and 35 kV ac) power semiconductor modules serve as critical elements within a spectrum of applications, notably in the context of MV motor drives, solid-state transformers, as well as solid-state and hybrid circuit breakers. These modules assume a pivotal role in both industrial and power grid landscapes, exemplified by their indispensability in versatile domains, including MVDC naval platforms, MVDC distribution, and HVDC systems, among others. Furthermore, their significance is underscored by their growing relevance in nascent sectors such as electric vehicle fast charging stations, data center power supply, renewable energy initiatives, and aerospace applications, where their utility continues to expand. MV SiC MOSFETs present a compelling and viable alternative to conventional low-voltage Si devices. The remarkable breakdown electric field of SiC (4H-SiC 3×106 V/cm compared to Si 0.3×106 V/cm) combined with the unipolar device structure contributes to attractive on-state resistance, amplified switching speeds and diminished switching losses. Its distinct advantages have initiated a revolution in multi-level

MV applications. All these superior characteristics exhibited by MV SiC MOSFET power modules render them a highly promising choice for MV power electronics applications. The high blocking voltage capability of the SiC MOSFET simplifies the converter topology by obviating the need for series connection of power devices or modular converters. Meanwhile, the increase of conventional packaging dimension to accommodate the MV insulation results in high parasitics and, therefore, degrades the devices' performance. This disparity between anticipated and actual performance underscores the incompatibility of conventional standardized commercial packaging modules with the multifaceted demands in MV applications. Astute consideration and balanced trade-offs are essential regarding the intricate interplay between voltage insulation, packaging parasitic parameters and cooling systems. The combination of high insulation voltage and fast switching speed inherent in MV SiC MOSFETs introduces heightened complexities in power module packaging and validation. This special session will include the following sections: 1) Special MV power module design considerations on considering insulation, parasitic and electromagnetic interference (EMI): H. Alan Mantooth (20 min) 2) Wire-bonded 10 kV power module with enhanced insulation and optimized module-system interface: H. Alan Mantooth, Xiaoling Li (20 min) 3) Wire-bondless 10 kV power module with high power density and reduced electric field: Christina DiMarino (20 min) 4) Enhanced thermal and insulation performance in MV power module via single-phase fluorinated liquid cooling: Teng Long (20 min) 5) Characterization and validation of MV power modules: Yue Zhao (20 min)

Session Panelists/Speakers

Christina DiMarino, *Virginia Tech/CPES*
H. Alan Mantooth, *University of Arkansas*
Teng Long, *University of Cambridge*
Xiaoling Li, *National Renewable Energy Laboratory (NREL)*
Yue Zhao, *University of Arkansas*

SS15 | Power Hardware in the Loop: Unlocking the Future of Energy Conversion Research and Testing

Part 1: 2:00PM – 3:40PM
COFFEE BREAK
Part 2: 4:10PM – 5:50PM

Room 128AB

Chairs/Organizers:
Srdjan Srdic, *EGSTON Power Electronics GmbH, Austria*
Daniel Skibicki, *EGSTON Power Electronics GmbH, Austria*
Christian Nagl, *EGSTON Power Electronics GmbH, Austria*

The high penetration of inverter-based resources into traditional power systems and the ongoing transportation electrification call for more advanced validation and testing of the energy conversion subsystems over the entire development cycle. Power Hardware in the Loop (PHIL) simulations are gaining popularity as an effective tool for validating and testing new energy conversion solutions in both academia and industry. To explore the diverse applications and benefits of PHIL in R&D and testing, a panel discussion will be held featuring leading experts from both academia and industry. Throughout the discussion, the panelists will highlight the advantages of PHIL testing over traditional simulation and testing approaches, such as high fidelity, concurrent testing, repeatability, and versatility. They will also discuss the challenges associated with PHIL testing, such as the need for precise mathematical models, high-fidelity power amplifiers, and the importance of high-speed communication and real-time computation. The panel will highlight the ongoing PHIL standardization efforts by led by the IEEE P2004 Working Group. With the increasing complexity and use of power electronics in power distribution systems, PHIL testing can provide valuable insights into the behavior and performance of these new systems under both normal and abnormal operating conditions. The panelists will examine the role of PHIL simulations in improving the resiliency and power quality of current power distribution systems, as well as the potential of PHIL in the development of future smart grids and microgrids. The panelists will discuss the use of PHIL testing in identifying potential failures or weaknesses in power distribution systems and in developing strategies for improving their reliability and stability. The potentials of PHIL in medium-voltage systems will be evaluated as well. The panelists will also discuss the applications of PHIL in development and testing of power converter solutions for transportation electrification, electrified aerospace propulsion, as well as defense and emerging SST applications. The panelists will share their experiences and insights on how PHIL testing can be used to evaluate the integration of the power converter solutions and will also cover the importance of testing those systems in relevant (close-to-reality) environment, which is crucial for their successful mass rollout. The panel discussion will provide a unique opportunity to learn more about PHIL from leading experts in the field of power electronics and power systems, and gain insights into both existing and emerging applications of PHIL in R&D and testing. The discussion will be of interest to researchers, engineers, and industry professionals involved in the design and development of power electronics systems, as well as those interested in the applications of PHIL in power distribution, smart grid technologies, energy storage and transportation electrification.

Session Panelists/Speakers

Barry Mather, *National Renewable Energy Laboratory*
Drazen Dujic, *EPFL*
Giovanni De Carne, *Karlsruhe Institute of Technology*
Johan Enslin, *DOE ARPA-E*
Iqbal Husain, *North Carolina State University, FREEDM*
Karl Schoder, *Florida State University, CAPS*
Srdjan Srdic, *EGSTON Power Electronics GmbH*
Troy Beechner, *RCT Systems*

Wednesday, October 23 4:10PM – 5:50PM

SS16 | Solid State Circuit Protection for LV/MV Applications

Room 126AB

Chairs/Organizers:
Mudit Khanna, *Ideal Power Inc*
Govind Chavan, *ABB*
Xiaoqing Song, *University of Arkansas*

The world is rapidly advancing towards a more sustainable and green energy infrastructure to address climate change. It is expected that by 2040, solar and wind together to contribute the largest share of the world's energy mix. Power semiconductor switch technology is an enabling technology for energy transition. With solar, wind and other renewable energy sources being used as distributed energy resources (DERs), in addition to the power converters, protection circuits have also become critical. EVs, charging infrastructure, and modern industries also require robust protection technology to ensure safe deployment of high voltage high energy electrical equipment. At the same time, greater flexibility from these power conversion and protection systems is desired where battery energy storage solutions can be used to provide energy back to grid or home. Traditionally, mechanical circuit breakers have been used for circuit protection, but they suffer from slow response time, large arcing currents (especially in DC applications), and mechanical wear and tear. Solid state protection overcomes these issues by offering very fast response time and low arcing. For DC circuit breakers, solid state protection becomes even more important. This session will discuss the existing switch technologies which can address these requirements. The panel will also discuss the requirements of solid-state protection, current challenges and how we overcome these. The presentation from the speakers will give the audience an insight into the state of the industry for such applications, requirements

for the power switch and other protection devices and future developments. The presentations will be accompanied by an interactive discussion with the audience.

Session Panelists/Speakers
Govind Chavan, *ABB*
Mudit Khanna, *Ideal Power Inc*
Prasad Paruchuri, *Onsemi*
Subhashish Bhattacharya, *North Carolina State University*
Xiaoqing Song, *University of Arkansas*

Thursday, October 24 8:30AM – 10:10AM

SS17 | MVDC – Status, Technologies and Challenges

Part 1: 8:30AM – 10:10AM
COFFEE BREAK
Part 2: 10:40AM – 12:20PM

Room 128AB
Chair/Organizer:
Marco Liserre, *Kiel University*

Medium voltage direct current (MVDC) can facilitate the integration of renewable energy sources such as photovoltaic and wind turbines into the electricity grid. The use of MVDC in PV parks reduces costs and increases efficiency. Offshore wind farms and remote areas can benefit from MVDC transmission due to the improved power transfer capability of DC compared to the conventional AC system. In urban distribution, MVDC systems can enable more efficient and cost-effective power distribution, resulting in reduced grid congestion in densely populated areas.

In addition, MVDC can play an important role in connecting two AC networks with different voltage levels, phase angles and frequencies. Such MVDC-based links can provide voltage support and dynamic control to the weak networks. In the case of remote areas, where voltage fluctuations or instability is a serious problem due to limited infrastructure, MVDC converters can inject and absorb reactive power as needed, stabilising voltage levels while ensuring a steady supply to consumers.

Despite all the advantages discussed, the MVDC grid is still in the early stages of development and its benefits need to be clearly demonstrated before large-scale commercial adoption.

This special session will discuss in detail the latest developments in MVDC power distribution systems, highlighting the state of the art and new developments. The focus will be on modular multilevel converters to connect MVDC to the AC system and DC/DC converters to adjust the voltage level.

As MVDC is already used in electric drives, useful insights into the potential and challenges of MVDC technology will be gained from this field. The special session will also give examples from different parts of the world to check the state of advancement of the technology with 4 speakers from research institutions and 4 speakers from industry.

Session Panelists/Speakers
George Cheng, *Rockwell Automation,*
Johan Enslin, *DOE ARPA-E*
Jungsoo Park, *Hyosung Heavy Industries Corporation, Republic of Korea*
Marc Hiller, *Karlsruhe Institute of Technology (KIT)*
Navid Zargari, *Rockwell Automation*
Simon Round, *Hitachi Energy*
Thiwanka Wijekoon, *Huawei Research Centre Nuremberg, Germany*

Thursday, October 24 10:40AM – 12:20PM

SS18 | Advancing Load Modeling and Power Electronics Integration in Evolving Grid Environments: Challenges, Solutions, and Open-Source Approaches

Room 126AB
Chair/Organizers:
Aaqib Peerzada, *Pacific Northwest National Laboratory*
Bhaskar Mitra, *Pacific Northwest National Laboratory*

Grid Edge Sensing refers to the deployment of advanced sensors and monitoring technologies at the periphery of the power distribution network, allowing for real-time data acquisition and analysis. This strategic positioning enables utilities and grid operators to gather precise information about electricity consumption, generation, and overall grid health. The integration of sensors at the grid edge enhances situational awareness, promotes efficiency, and unlocks a range of opportunities for a more resilient and responsive power system. Over the past decade, the penetration of solid state-based power electronic controlled residential loads has grown considerably. Moreover, recent advancements in technology and legislation aimed at deeply decarbonizing the power grid have hastened the integration of distributed energy resources (DERs), hydrogen production especially in medium to low-voltage power grids. The shift from centralized to distributed generation is expected to reduce carbon emissions, but it comes with challenges, particularly the rise in the use of non-linear loads, exacerbating power quality issues. One prominent concern is the escalating harmonic pollution on the power grid. To combat the threat of worsening power quality, electric utilities must use sophisticated mathematical models that encapsulate the behavior of such non-linear loads to support critical planning and operational applications. Inaccurate modeling of non-linear loads can have significant operational impacts such as sub-optimal dispatch, overheating, and loss of thermal life of power equipment such as service transformers, under or overestimation of total harmonic distortion (THD) in system voltages, voltage stability issues, or undesired protection operations. A serious concern in medium to low-voltage power systems is the phenomenon of harmonic resonance. The electric utilities in North America typically use shunt-connected capacitor banks for power factor correction. The interaction of added capacitance with the inductive circuit can result in resonance at a critical harmonic frequency. This has a significant impact on the total distortion levels which can easily exceed the normal amount leading to a variety of operational issues. Existing practices in load modeling and forecasting predominantly involve static approaches and assume that all the power is distributed at the fundamental frequency (60 Hz). To mitigate the risk of operational impacts from load model inaccuracies it is essential to develop open-source load models representing scenarios of high penetration of power electronics. As the grid undergoes transformative changes, characterized by the rise of electrified transportation, smart loads, the rapid deployment of microgrids in stand-alone and networked configurations, and the advent of grid edge technologies, the traditional static load modeling techniques prove insufficient. The collective efforts of the panel session, that focuses on recalibration and the development of open-source load models, showcase a commitment to addressing the challenges with grid modernization power electronics integration. This panel session will feature experts from diverse industries discussing the recalibration of load modeling. They will address steps taken by different agencies, including the installation of advanced grid-edge sensors for improved calibration, and managing the vast data volume. The focus is on updating load modeling to align with capacity planning, addressing current challenges, and outlining mitigation steps for an evolving grid.

Session Panelists/Speakers
Mattewos Tefferi, *G&W Electric Co.*
Scott Hinson, *Pecan Street*
Soumya Kundu, *Pacific Northwest National Laboratory*

SS19 | Power-dense Electric Traction Drive Component Integration, Packaging, and Manufacturing Challenges for Commercial and Industrial Vehicles

Room 125AB

Chair/Organizers:
Dakshina Murthy Bellur, *Cummins Corp. R&T*
Santhosh Krishnamoorthi, *Cummins Corp. R&T*

Electric traction drive plays a vital role in the journey of decarbonization as a key electric energy conversion system in hybrid, battery, and fuel-cell electric vehicles (xEVs). The performance and durability requirements of these electric traction systems applied in commercial and industrial xEVs is stringent when compared with those in passenger vehicles thus making it challenging to improve its power density. This special session brings speakers from industry and research organizations to present the challenges in component design, integration, packaging, and manufacturing of power-dense traction inverters and motors for commercial heavy duty and industrial xEVs. The format of this hundred-minute session will be hybrid with formal presentations followed by a full-panel Q&A and discussions. The first set of presentations will establish the electric traction drive's demanding requirements applied in commercial and industrial xEVs. The second set of presentations will cover motor and inverter designs for higher power density and component integration for windings, magnets, insulation, power modules, and bus bars. The final presentation will cover manufacturing difficulties and emerging design practices for heat sinks, capacitors, and interconnections. The last segment will be set for Q&A and open discussions. This special session is intended for practicing engineers, researchers, component suppliers, standards agencies, industry support personnel, and students aspiring to join industry who are interested in accelerating the development of high-power-dense electric traction drive technology which is durable and reliable.

Session Panelists/Speakers

Akm Arafat, *Drive System Design Inc.*
Christina DiMarino, *Virginia Tech/CPES*
Santhosh Krishnamoorthi, *Cummins Corp. R&T*
Shajjad Chowdhury, *Oak Ridge National Laboratory*
Brij Singh, *John Deere, USA*

Sunday, October 20 8:30AM – 11:50AM

T1 | Bidirectional WBG Power Switches and the Applications They Enable

Room 124A

Jin Wang, *Ohio State University*
Thomas Jahns, *University of Wisconsin*
Victor Veliadis, *PowerAmerica & North Carolina State University*

There are numerous mass volume power applications where it is necessary to control the flow of bidirectional power, including electric vehicles (vehicle to grid, vehicle to home, and vehicle to vehicle), distributed and grid-tie power systems using regenerated energy and/or energy storage components, and solid-state circuit breaker protection. Silicon carbide (SiC) and gallium nitride (GaN) based bidirectional power switches can enable these applications with their compelling advantages of high efficiency, high blocking voltage capability, and low system weight and volume. In particular, monolithic switches that allow for bidirectional symmetric conduction and voltage blocking with a chip area close to that of a similarly rated unidirectional switch are ideally suited to fuel a revolution in power electronics technology. Today, monolithic bidirectional (MBD) power semiconductor switches are not commercially available. Instead, back-to-back (anti-series) connection schemes of unidirectional power MOSFETs or IGBTs are typically used, resulting in a 4X penalty in chip area and high cost. However, various types of SiC and GaN bidirectional concepts are being investigated including bonded-wafer bidirectional IGBTs, monolithic dual-gate bidirectional GaN switches, and monolithic back-to-back connected SiC MOSFETs and JFETs. In the first section of this tutorial, the semiconductor technology of SiC and GaN bidirectional switches will be reviewed including their operating principles, and their lateral and vertical geometry configurations. The performance advantages of MBD switches will be highlighted and promising MBD devices reported to date will be analyzed. As SiC and GaN devices approach mass commercialization propelled by insertion in electric vehicles and consumer electronics, respectively, fabrication of SiC/GaN MBD switches is becoming economically viable enabling their wide adoption. The second section will explore key volume applications and power converter topologies that will benefit from BD switches. The world is full of opportunities for integrated motor drives that combine the motor and power electronics in the same housing. Some of the most promising power converter topologies for these applications such as matrix converters, current-source inverters, Vienna rectifiers, and T-cell converters will benefit greatly from the availability of WBG-based BD switches. In fact, some of these promising topologies such as the matrix converter and PWM current source inverter have been blocked from the marketplace for many years because of the commercial unavailability of BD switches. In recognition of the compelling advantages of SiC and GaN bidirectional power switches, the second section of the tutorial will focus on several specific applications and circuit topologies to explore the transformative impact the availability of WBG-based BD switches is destined to have on the practicality and future potential of these topologies in commercial applications. These examples will be carefully chosen to highlight the breadth of applications and topologies that are likely to benefit significantly from the commercial availability of BD switches, as well as some of the practical engineering issues that will be encountered in the process of applying them. Finally, attention will be devoted to how the applications benefiting from BD switches will grow as the voltage and current ratings of commercialized BD switches expand in the future.

T2 | Reliable and Efficient Packaging of SiC Power Devices for Automotive and Industrial Applications

Room 126B

Anton Miric, *Heraeus Electronics*
Habib Mustain, *Heraeus Electronics*

Power modules play a key role to provide efficient electricity supply in a wide range of market segments – automotive, industrial, green energies, energy distribution, traction etc. As the market keeps growing, significant effort is spent on increasing its efficiency while decreasing cost and form factor. Continuously smaller die areas are used to reach the required current output - this drives the increased use of SiC semiconductors in power modules. The semiconductor die is the most expensive and only active component in power modules. As such, it is the major driver for new developments of power modules. Due to the smaller size of the semiconductors, it is possible to produce more dies on the same wafer and reduce the associated cost. On the other hand, smaller semiconductors lead to higher power density as the same current is transported through a smaller area, resulting in increased current density per die. This leads to rising power and current density, higher operating temperatures and switching frequencies, especially for wide band gap semiconductors, SiC and GaN. Surging junction temperatures and consequently extended temperature ranges significantly impact the requirements regarding reliability of the complete stack of materials. Also affected are growing prerequisites for heat dissipation and current carrying capacity. All these factors drive use of new packaging materials, e.g., sinter pastes, copper die top connections, new encapsulation materials and substrate materials. It is important to consider the full stack of materials in the power module to reach optimal performance. All it takes is one weak material within the stack to significantly reduce the thermal performance, power density and reliability. New wide band gap materials generate benefits of significantly higher switching frequencies. At the same time, faster switching behavior stimulates overvoltage, which can damage the semiconductor. This is especially valid for higher power density power modules. All this creates the need for the development of new packaging solutions: - increased power loss per chip area requires materials with better heat dissipation. - more power needs better current carrying capability of packaging materials. - elevated operating temperatures require packaging solutions with significantly improved reliability. - increased switching frequencies, especially in combination with high current require improved substrate and module design concepts for reduced parasitic inductance. To illustrate the innovation of new packaging solutions, this tutorial will discuss the following material developments for packaging of SiC power devices: 1. Metal ceramic substrates 2. Sintering technologies for die attach 3. Sintering and soldering technologies for substrate attachment 4. Technologies for interconnection on the top of the die 5. Outlook (encapsulation, low stray inductance substrates).

T3 | Current Source PWM Converters – From Theory to Practice

Room 121C

Petar Grbović, *University of Innsbruck/ Innsbruck Power Electronics Lab. (i-PEL)*

Power electronics and switching mode power converters in general are today part of every segment of our life. Any piece of electric equipment we have today is somehow based on power electronics and switching mode power converters; home appliance, industrial equipment, renewable energy, automotive, avionic, ICT, military, etc., etc. Conversion efficiency, specific power, power density and converter cost are today the most critical requirements for new applications. One way to increase the conversion efficiency and reduce cost/size/weight is to deploy multi-level and/or multi-cell converters and partial power processing power converters. Historically, very first power converters were Voltage Source Converters (VSC) based on the vacuum tubes as power switches. The first work on Vacuum Tube based VSC was reported in early 1930s. Then, with the invention of Bipolar Junction Transistor (BJT) and then Silicon Controlled Rectifiers (SCRs), the Current Source Converter topology become dominant. Until late 1980s, the CSC dominated in most of industrial applications, such as Variable Speed Drives and high-power grid connected converters. With the invention of the Metal Oxide Silicon Field Effect Transistors (MOSFETs) in late 1970s and the Insulated Gate Bipolar Transistors (IGBTs) in late 1980, the Voltage Source Converters become again dominant, especially in low-medium voltage and low-medium power applications. Today, majority of power conversion applications are based on PWM VSC with MOSFETs, IGBTs or IGCTs, depending on the voltage and power rating. In recent years we have seen strong intertest in PWM Current Source Converters (CSCs). It can be proven that in some applications the CSCs could be superior over the VSCs. However, so far, there is not significant penetration of CSCs into real applications such as industry, renewables, automotive and ICT. The main issue is the fact that until today there is not available switch with Bi-Directional voltage blocking capability. In this tutorial, the CSCs will be analyzed in details. The tutorial will start with a short introduction and comparison of Voltage and Current Source Converters. Then, One-Quadrant (1Q) and Multi-Quadrant (2Q &4Q) CSCs will be presented and analyzed in the 2nd and 3rd chapter. Detailed analysis of CSC cell and design guideline will be given in the 4th chapter of the tutorial. Three-phase single-cell and multi-cell interleaved CSCs will be intensively discussed in the 5th and 6th chapter. Power semiconductor switches with Bi-Directional voltage blocking capability, in particular Monolithic Bi-Directional GaN switch will be addressed in the 7th chapter. Finally, the tutorial will be concluded with several real-life case studies and design examples. This tutorial is aimed at power electronics engineers, professionals and graduate students who want to improve their knowledge and understanding of advanced concepts of power conversion, such as PWM Current Source Converters and their applications.

T4 | Design of the Magnetic Components: Key Aspects, Approach, and Practice

Room 122A

Marcio Magri Kimpara, *Oak Ridge National Laboratory*
Rafal Wojda, *Oak Ridge National Laboratory*
Vandana Rallabandi, *Oak Ridge National Laboratory*

This tutorial is oriented on designing of high-frequency power magnetic components for power conversion. It is intended for graduate-level students that seeks the know-how and best practices to design high efficiency converters with efficient and reliable magnetic components. The tutorial is divided into three parts:

- Theory part, which includes: magnetic materials applications, winding types applications, and insulation coordination,
- Design part, where medium-frequency and high-power transformer will be modeled and simulated. The simulation models, as well as design procedures, will be provided for participants use.
- Verification part, where simulation results are verified with the design assumptions and requirements.

T5 | Methods to Identify & Control Highly Non-Linear Three-Phase Machines

Room 122B

Alexander Oerder, *Karlsruhe Institute of Technology (KIT)*
Andreas Liske, *Karlsruhe Institute of Technology (KIT)*
Benedikt Schmitz-Rode, *Karlsruhe Institute of Technology (KIT)*
Johannes Stoss, *Karlsruhe Institute of Technology (KIT)*

Highly utilized three-phase machines show a highly nonlinear electro-magnetic behavior, making it very challenging or even impossible to control them using standard control-algorithms. One very appropriate and well-proven method to cope with this nonlinearity is the measurement of multi-dimensional flux linkage maps for each possible operating point of the given machine. During operation a look-up-table is used to adjust the gain of the used control-algorithm to the actual differential inductance in each given operating point. The flux maps are also used in non-linear model predictive control (MPC) schemes to enhance dynamics. And besides machine-control the flux maps are implemented in high accuracy simulations to test new control algorithms. So with this method, the nonlinearities are stored in flux linkage maps and are fed-forward to the controller in each control cycle. To obtain the flux linkage maps, several methods are described in literature. One of the most common methods is the steady-state method in which the device-under-test (DUT) is mounted in a hardware test-bench together with a load-machine. The load machine is speed-controlled and guarantees constant rotational speed, whereas the DUT is current controlled, enabling to drive it to every operation point in the dq-current plane. The downside to this method is the need of a real-power hardware test-bench, which is quite a cost factor and general effort. The other well-known method is the locked-rotor test in which the DUT's rotor is locked and hence the rotational speed is zero. Here, no load machine is necessary but other restrictions apply, for example that no speed-dependent effects can be measured. In state-of-the-art implementations, the flux maps depend on the rotor-oriented direct and quadrature current components, considering the major nonlinearity-effects of magnetic saturation and cross-saturation. To be able to also consider nonlinearities that are due to the rotor and stator geometry, the dependency on the rotor angle must be taken into account as well. With these angle-dependent flux linkage maps, the angle-dependent error can be fed-forward e.g. in repetitive control schemes, enhancing control quality significantly.

In this tutorial different methods to obtain multi-dimensional flux maps of permanent magnet synchronous machines (PMSM), synchronous reluctance machines (SynRM), electrically excited synchronous machines (EESM) and induction machines (IM) are presented. This includes steady state-tests, locked-rotor-tests, and a new approach that replaces flux maps with a physics-informed neural network. In addition to the flux-map-identification, also one well-proven control method that makes use of these flux maps and enables for high dynamics is presented. Of course, also hands-on tips from our long-term lab-experience, dealing with several motor test-benches ranging from few hundred Watts (Pedelec/E-Bike motors) to several 100kW (automotive) for over a decade will be given in each of the described topics.

T6 | Bearingless Motors: Fundamentals and Current Status

Room 126A

Eric Severson, *University of Minnesota*
Krishan Kant, *GE Vernova Advance Research Center*
Minkyun Noh, *Korea Advanced Institute of Science and Technology (KAIST)*
Wolfgang Gruber, *Johannes Kepler University*

Magnetically levitated systems are becoming increasingly popular in the pumps, compressor, transportation, process industries etc. Bearingless motors are magnetically levitated systems with combined motor and levitation functions. The goal of this tutorial is to provide the fundamentals of the bearingless motor construction, operation, measurement system and control via lectures and hands on experience. Participants will also learn about the state of the art and recent developments in various conventional and non-conventional bearingless motor configurations. In the first part of the tutorial, we will discuss motivation, fundamental of operation and scaling laws of the bearingless motors. This will include the separate and combined winding configurations for motor and suspension function in bearingless motor. Participants will also learn about the basics of mechatronics surrounding the bearingless motors. The position measurement is an integral part of the bearingless motor, and the unstable nature of the electromagnetic suspension makes it an interesting control problem. We will discuss about the position sensor and control in brief to provide a complete picture to audience. First part of the tutorial will conclude with the state of art with commercially available magnetically levitated systems. In the second part, participants will learn about the variety of bearingless motor configurations. This will include the motors with various conventional and non-conventional topologies, associated working principles and motor configurations for various power levels. This section will cover the recent developments in the bearingless motors such as AC homopolar motor, interior permanent magnet motor, magnetically geared motor, vernier motor, induction motor and flux reversal motor. The non-conventional features of some of these bearingless motors like the geometry, airgap harmonics, etc. allows us to gain some desirable features like ease of control, force independent of rotor angle, reduced power electronics switches etc. This will provide a landscape of the bearingless motor configurations, applications and the research trends in this area. Participants will also learn about the drives for these motors. There are application dependent challenges associated with the bearingless motors. One such challenge is passive stiffness for pump operation and we will discuss the method to enhance passive stiffness in PM motors. The final part of the tutorial is a hands-on exercise. We have a complete experimenter's kit including the bearingless motor, power electronics, measurement system, controller and debugging interface. The kit is reconfigurable to work as various bearingless motor topologies as well as winding reconfigurable as combined winding or separate winding. The participants will learn to commission the motor, tune the suspension and motor controller (will be provided), perform the levitation and test the motor upto 2000 rpm. If time allows, we can test the motor with separate and combined windings as well.

T7 | Direct Current (DC) Distribution Systems: Modeling, Control and Real-World Implementation

Room 123

Kevin Kircher, *Purdue University*
Xiaonan Lu, *Purdue University*

The increasing penetration of inverter-based resources (IBRs) has driven the paradigm shift of modern power systems in the areas of grid architecture, dynamic inverter and system modeling, and stability and resiliency oriented advanced control schemes, among others. As a critical grid section bridging upstream transmission networks and downstream end users, distribution systems play a vital role in grid modernization and serve as the major venue for IBR grid integration. Traditionally, distribution systems are mainly implemented based on AC electricity. Note that the concept of DC systems and DC grids (e.g., DC nano-grids, DC micro-grids, and medium-voltage DC distribution systems) has drawn increasing attention in both academia and industry. The revolutionary transition from AC to DC power grids calls for tremendous development and integration efforts to maximize the potential of DC-coupled systems in terms of energy conversion efficiency enhancement, system cost reduction, and hosting capacity enhancement, among other functions and benefits. Compared to legacy AC distribution systems, the integration of DC sub-grids, or even the implementation of purely DC distribution networks, brings promising and remarkable benefits and potential encompassing the following aspects: 1) flexible interconnection and power flow control with relatively easier synchronization strategies, 2) simplified grid integration scheme of IBRs with DC-coupled power electronic infrastructures, 3) enhanced power transfer capacity via DC distribution feeders nested in conventional AC distribution systems. In this tutorial, a diversified and multi-disciplinary instructor team has been assembled to consolidate the expertise from multiple areas. Various aspects of DC distribution systems will be detailed, including dynamic modeling of individual IBRs and IBR clusters in DC distribution systems, advanced control diagrams for converter operation and system-level coordination, and real-world case studies of DC-coupled systems. It is also noteworthy that for real-world case studies, a live DC house will be showcased with online measurements and real-time control signals, which will demonstrate the actual implementation of DC grid technologies.

T8 | Electrosurgery Power Electronics: A Revolution in the Making

Room 121A

Ankit Mehta, *University of Illinois Chicago*
Congbo Bao, *Hitachi Energy*
Steven Schwaitzberg, *University at Buffalo*
Sudip Mazumder, *University of Illinois Chicago*

This tutorial demonstrates the basic working principles and effects of revolutionary electrosurgery that is enabled by power electronics. It is expected to exemplify an application case of high-frequency inverters, and to motivate more research attention on the electrosurgical topic. The tutorial is mainly divided into 4 parts. It starts with an informative background introduction to electrosurgery, followed by state-of-the-art research and proposed topology. In the second part, the cutting mode is presented together with its ex-vivo and in-vivo verification. Based on that, the power adaptation strategies for reduced tissue damage are further detailed. The third part of the tutorial covers the coagulation mode with enhanced safety. More specifically, the MCU-based coagulation mode is implemented with a nonfixed duty cycle to reduce terminal voltage stress and leakage current. Thereafter, concurrent cutting and coagulation effects are verified with in-vivo trials. Finally, the last part concludes the tutorial.

T9 | Electric Propulsion Systems for Electric Aircraft

Room 124B

Chris Mi, *San Diego State University*
John Kizito, *N.C. A&T State University*

The aviation industry accounts for 9% of greenhouse gas emissions from the transportation sector. To address the emissions, NASA's Subsonic Fixed Wing program has set performance targets at -55dB noise at the airport boundary, -75% NOx, and -70% fuel burn relative to 2006-era technology. Electric aircraft could be the most viable solution to achieve these goals. In addition, electric aircraft can reduce operating costs by using electricity instead of jet fuel and reducing overall energy consumption. However, adopting electric propulsion for the long-haul and large-capacity aircraft may not be realistic due to reasons such as weight, cost, and charging times of the battery. Hence, a more practical entry point for introducing electric propulsion in aviation is on short-haul and vertical takeoff and landing (eVTOL) aircraft. In the meantime, aircraft is employing more electric usage in its auxiliary systems. For example, eVTOLs are quiet, efficient, emission-free, and no runway is required when compared to traditional aircraft and helicopters, hence, are ideal for urban transportation and emergency services. This tutorial will cover the fundamentals of electric systems in more-electric and pure-electric aircraft, including electric propulsion systems and energy storage. We will also discuss a novel single-turn electric motor for electric aircraft applications.

T10 | Advanced Power Electronics for Health-Conscious Fast Charging and Wireless Charging for Future E-Mobility

Room 122C

Deepak Ronanki, *IIT-Madras*
Rick Szymczyk, *Upstartz Energy*
Sheldon Williamson, *Ontario Tech University*

This tutorial will comprehensively explore the pivotal role of advanced power electronics in revolutionizing fast charging and wireless charging technologies with a primary focus on ensuring the health and longevity of EV batteries. Beginning with an overview of the significance of advanced power electronics in the e-mobility landscape, the tutorial will unravel the fundamentals of fast charging, detailing key components and their impact on charging efficiency and battery health. Wireless charging technologies will be comprehensively examined, emphasizing the principles of wireless power transfer and the integration of advanced power electronics in optimizing wireless charging systems. The tutorial will also shed light on health-conscious charging practices, elucidating the importance of battery health and presenting innovative solutions provided by advanced power electronics to strike a balance between rapid charging and prolonged battery life. Through case studies, practical applications, and discussions on future developments, participants will gain insights into the evolving landscape of advanced power electronics, shaping the trajectory of health-conscious fast charging and wireless charging for the future of e-mobility.

T11 | Digital Twin of Renewable Energy Sources: Modernization and Renovation of Overloaded Power Systems

Room 121B

Milan Belik, *University of West Bohemia*
Olena Rubanenko, *Vinnitsya National Technical University*

The tutorial "Digital Twin of Renewable energy sources: modernization and renovation of overloaded power systems" is divided into two consecutive sections. Starting with a short overview of evolution in a Big Picture of Digital Twin (DT) of renewable energy sources (RES), various generations and implementations will be highlighted. DT concepts will be classified and structured for forming the definition DT RES. Practical solutions of existing DT's and areas of implementation will be discussed. The Projects in DT, the solutions provided by well-known companies for DT such as General Electric, Siemens, ETAP, ORAL-TAP and etc. will be presented. General approaches of increasing the RES efficiency in power grid will be discussed. Compensation of instability photovoltaic and wind power plants in power grid will be shown on illustrative examples. Next, features of functioning power grids in modern conditions and during rebuild process will be described. The ways how ensure the balance and reliability in the power system for conditions of high-grade RES integration will be explained. Components of the optimality criterion to control the normal mode parameters of the electric power system with RES will be investigated. Digital transformation helps to decarbonize energy supply, to decrease dependency on fossil fuels and to integrate renewables in power system. The aim of the tutorial is to study the influence and results of the increasing number and power of particular renewable energy sources in electricity networks, their balance and efficiency. Further it develops theoretical and practical methods for optimization of the power costs, redundant electricity utilization and compensation of unstable power production from eolic and photovoltaic systems using the criterion programming and ANN methods. The main task of the second part is to provide knowledge which helps to develop the strategy of smart and efficient usage of newly build RES in preselected communities helping to stabilize the main network and to ensure higher energy resilience of particular municipalities. The speech deals with simulation and optimization of the energy community structure and with proposal of covering the energy needs. The case study is based on the set of preselected locations and shows the optimization process proposing sample photovoltaic system for power supply and high temperature battery for efficient energy storage. Efficient design of modern photovoltaic system using various software tools will be presented. Optimization of the PV system considering technical conditions, degradation, economic analyses and variable self-consumption will be studied. Off-grid and on-grid PV system optimization methods will be demonstrated on practical examples. Invertor topology, battery storage system technology and E-mobility calculations will be described. The last part of the presentation deals with PV system design for energy communities including tiny-houses, shelter city for war refugees, rural properties and green tourism projects. System efficiency and control issues will be also evaluated. Model DT of photovoltaic system will be created step by step including exact 3D visualization, analyses of accumulation system and dependency on load chart and power generation.

Sunday, October 20 1:00PM – 4:30PM

T12 | Practical Considerations for the Application of High Power Si and SiC Modules

Room 129A

Eric Motto, *Mitsubishi Electric US, Inc.*
Mark Steiner, *Mitsubishi Electric US, Inc.*
Michael Rogers, *Mitsubishi Electric US, Inc.*

This seminar will an in-depth lesson targeted at the entry level power electronics engineer which introduces the fundamental elements relevant to the design and application of high-power Silicon IGBTs and SiC MOSFETs. The seminar will focus on the issues a designer must contend with when using large, high power (high current and/or high voltage) IGBT and SiC modules. Topics covered include basic module characteristics, failure modes, reliability, chip and packaging technology, application considerations such as voltage/current ratings, thermal impedance, paralleling, etc. as well as gate driver circuit design, short circuit protection methods, power circuit design such as low inductance busbars, snubbers, etc. including design examples with power loss simulations. Measurement techniques such as double pulse testing will also be covered with specific focus on the new challenges of SiC MOSFET characterization.

T13 | Electromagnetic Compatibility of Switched-Mode Power Supplies

Room 126B

Günter Keller, *Deggendorf Institute of Technology*

The tutorial/workshop "Electromagnetic Compatibility of Switched-Mode Power Supplies" is subdivided into several sections. Starting with a brief overview of legal regulations, like CE mark and Declaration of Conformity, a selection of emission and immunity standards is presented. This includes the description of test set-ups, for example for measuring conducted emissions using conventional or STFFT based test receivers and their detector circuits, as well as test parameters, like frequency ranges, based on European and International standards. Than four coupling mechanisms (impedance, capacitive, magnetic and radiated) are discussed, based on components and PCB structures. Subsequently basic countermeasures are proposed and evaluated according meaningful applicability to switched-mode power supplies. The section signals and characteristics explains common-mode and differential-mode interferences as well as the Fourier Transform in detail with a number of waveforms, like rectangular, triangular and trapezoidal waveforms, which are typically for switched-mode power supplies. In particular switching transients are discussed against the background of wide band gap devices like GaN transistors. One large section discusses the origin of electromagnetic interferences referring to the previous sections. This section addresses some widely used circuits, their operating modes, like continuous conduction mode, discontinuous conduction mode and boundary conduction mode, and also parasitics of passive components, using high frequency equivalent circuits of capacitors, inductors and transformers, and parasitics of active components, like junction capacitances and terminal inductances. A large number of examples is presented in form of results of measurements, simulations or calculations. The second half of the tutorial/workshop deals with EMC design of switched-mode power supplies, also evaluating efficiency and control issues. This section is subdivided into a number of subsections. Firstly the power factor correction is briefly presented. A large subsection addresses EMC filters, which is subdivided into pre filters and post filters. The filter structure is discussed according common-mode and differential-mode attenuation and source and load impedance. Problem solving approaches of the gap between measurements according standards and filter effectiveness are presented. Additionally an outlook to active EMI filters is given. Also design aspects of magnetic components are discussed. Followed by suitable components, which presents for example the impact of start of winding of a magnetic component, suitable circuits with soft-switching principles are compared to hard-switching circuits. After that shielding basics are presented, in particular the impact of holes for cooling purposes on electromagnetic shielding effectiveness. Finally PCB layout structures are evaluated and recommendations are presented. These investigations also address grounding, one of the most discussed topics in PCB design among engineers, as well as component placing and component selection, e. g. based on integrated circuit pin out and return current paths. Most aspects are explained by measured, simulated or calculated examples. Many examples are discussed against the background of electromagnetic compatibility as well as their impact on efficiency, lifetime and costs of the power supply. The tutorial contains on the one hand practical examples and uses on the other hand the basic physics of Maxwell for a principle understanding. Many principles can be transferred to other electronic circuits.

T14 | State-of-the-Art and Future Research Directions for 48V to 0.7V / 2,000A Power Conversion for Future CPU, GPU, FPGA Applications

Room 121C

Don Tan, *Northrop Grumman Space System (NGSS)*
Yan-Fei Liu, *Queen's University*

This tutorial will discuss the challenges and solutions in 48V to 0.7V (2,000A) power converters used in data center / server, as well as AI. Machine learning systems. Two power architectures will be discussed and compared. The first architecture is a two-stage where the 48V is converted to 12V (or another intermediate level) and then the 12V is converted to 0.7V. The second architecture is a "single stage" where the 48V is converted "directly" to 0.7V. With "direct" conversion architecture, no intermediate voltage bus is accessible (visible). After a brief introduction to the background information and the power requirement of an OAM (OCP Accelerator Module), which is used widely in data center, server and others, the tutorial will provide a new understanding to the technologies to reduce the power loss and to increase the power density. The tutorial will at first review the latest technologies of the two-stage architecture and evaluate the advantages and limitations. Then, the tutorial will review the state-of-art technologies of the "single stage" architecture and evaluate the advantages and disadvantages. Based on the above analysis and review, the tutorial will propose and discuss the research directions for 48V to 0.7V (down to 0.3V), 2,000A (or higher), applications that will achieve extremely high efficiency, extremely small size, and current sharing, expandable, fast dynamic response, etc.

T15 | Design & Optimization of High Torque Density Permanent Magnet Synchronous Machines for Traction Applications

Room 122A

Ahmed Shoeb, *Powersys, Inc.*
Dheeraj Bobba, *Powersys, Inc.*
Mohanraj Muthusamy, *Powersys, Inc.*
Vedanadam Mudumbai Acharya, *Powersys, Inc.*

Electric machines play a crucial role in traction applications, with high torque and power density being critical considerations in their design. This tutorial will highlight practical design considerations, trade-offs, and procedures for designing an electric motor to meet specific technical requirements using the JMAG FEA software. The tutorial comprises two main parts. The first part focuses on the foundational design aspects of an electric machine, covering aspects such as slot/pole selection and machine parameter determination, including overall dimensions, magnet specifications, coil configurations, current density, and flux density. A concept level design and analysis will be

performed using JMAG FEA Package. In the second part, custom machine design will be imported / generated using JMAG and various performance metrics such as cogging torque, back EMF, average torque, torque ripple, and characteristic current requirements will be evaluated. Furthermore, efficiency map will be generated and compared. A coupled multi-physics-based optimization, encompassing both electromagnetic and structural considerations, will be performed to enhance motor performance. Finally, a comparison is drawn between the initial and optimized designs, using the JMAG FEA software package.

T16 | Model Predictive Control of Power Electronics – An Intuitive and Simple Concept for the Future

Room 122B

José Rodriguez, *Universidad San Sebastian*
Ralph Kennel, *Technische Universitaet Muenchen*
Zhenbin Zhang, *Shandong University, Jinan, China*

Recent research works have demonstrated that it is possible to use Predictive Control to control electrical energy with the use of power converters, without using modulators and linear controllers. This is a new approach that will have a strong impact on control in power electronics in coming decades.Since around two decades predictive control is investigated in many important Research institutes. Most applications have been dealing with power electronics and electrical drives. This tutorial is going to show the main differences between conventional control and model predictive control. There will be a statement, under which circumstances model predictive control has significant advantages. There will be some examples to emphasize that. Furthermore, the application of predictive control in sensorless operations of AC drives will be explained. As Model Predictive Control is a tool to improve the use of so-called Renewable Energy Sources, this will be discussed in the tutorial as well.

T17 | Artificial Intelligence Applications for Switched Reluctance Motors Drives

Room 126A

Joao Onofre Pereira Pinto, *Oak Ridge National Laboratory*
Marcio Magri Kimpara, *Oak Ridge National Laboratory*
Walter Issamu Suemitsu, *Federal University of Rio de Janeiro (UFRJ)*

Despite the many attractive advantages of Switched Reluctance Motors (SRM) for drive applications, for instance, electric vehicles, home appliances, and other industrial applications, issues related to vibration/noise and torque ripple production in this type of electric machine, remain a challenge. These issues are related to the constructive nature of the machine and its principle of operation. In addition to that, another drawback is the need for a rotor position sensor for the implementation of speed or position control. Artificial Intelligence (AI) can minimize, or even eliminate these drawbacks. The SRM motor drive involves many areas of knowledge, including power electronics, control systems, sensors, signal processing, and electromagnetics, among others. To solve major problems faced with SRM drives and especially, to mitigate their adverse characteristics, one may use control methods, parameter estimation, design optimization, diagnostics, prognostics, and fault tolerance operation, to name a few. Many of these problems are ill-posed and contain uncertainties, and using traditional mathematical modeling approaches may result in time-consuming, and/or lack precision. Therefore, AI techniques-based solutions are becoming more popular. Among them, artificial neural networks (ANN) and fuzzy logic are two powerful techniques and will be presented in this tutorial. After presenting basic concepts of these techniques and the motors' operation, the most common type of problems involving SRMs will be discussed and examples of how to apply AI techniques to minimize or eliminate these problems will be covered. The discussion will be supported by some experimental results and simulation demos. Afterward, two real problems will be addressed in a hands-on approach, i.e., the attendee will receive a dataset and will train, test, validate, and software-implement a neural network. This activity will provide a further basis for the attendees to apply AI techniques in other problems and correlated areas.

T18 | Harvesting Solar Energy: Modeling, Control, and Simulation of Photovoltaic Systems

Room 123

Sabin Carpiuc, *MathWorks*

As the world increasingly turns towards sustainable energy solutions, the role of photovoltaic (PV) systems in harvesting solar energy has become paramount. However, the integration of PV systems into the existing energy infrastructure presents unique challenges, primarily due to the variable nature of solar resources and the need for advanced control strategies to ensure efficiency and reliability. This tutorial aims to delve into the intricacies of modeling, control, and simulation of photovoltaic systems, providing a comprehensive overview of the current state-of-the-art technologies and methodologies. We begin by exploring the fundamental principles of solar energy conversion and the operational characteristics of PV cells and modules, highlighting the importance of accurate modeling to predict performance under varying environmental conditions. We will then discuss various control strategies employed in maximizing the power output of PV systems, including maximum power point tracking (MPPT) algorithms and their implementation in power electronics. The tutorial will also address the simulation aspects so important in the design and analysis of PV systems. These simulations allow for the assessment of system behavior under different scenarios, facilitating the optimization of the entire PV system from individual solar cells to grid integration. Furthermore, we will examine the role of PV systems as part of a larger smart grid, including the challenges associated with grid stability and the potential for PV systems to contribute to ancillary services such as load balancing and frequency regulation. Attention will be given to the integration of storage solutions and the development of hybrid systems that can reliably supply power even during periods of low solar irradiance. Then, we will address the real-time deployment and simulation aspects. We will also present a detailed case study of a PV system, evaluating its performance in terms of energy yield, efficiency, and the provision of grid support services. This case study will be complemented by the presentation of simulation results showing the PV system's impact on overall grid performance. To conclude, we will introduce a range of analytical methods for evaluating the stability and dynamic response of PV systems in the electrical grid. Practical advice for calibrating control systems to ensure seamless integration with other power sources will be provided, along with a discussion on the future direction of PV system technology amidst an ever-changing energy paradigm.

T19 | Underground Mining Fleet Electrification: Challenges and Opportunities

Room 124A

Wen Soong, *University of Adelaide*

Battery electric vehicles (BEVs) are an attractive solution to help the mining industry decarbonise operations while reducing costs. The mining industry contributes approximately 4-7% of greenhouse gas emissions globally, with around 40% of mine site energy use related to diesel-powered mining vehicles. BEVs offer additional advantages for underground mines of reducing exposure of personnel to diesel exhaust fumes, reducing required air ventilation levels and reducing operational costs. While BEVs present a pathway to reduce CO2 emissions and operating costs on the mine site and create world-class ESG outcomes, an in-depth understanding of their performance capability and access to detailed operational data are required for their successful implementation in underground mines.

This tutorial presents results from the Mine Operational Vehicle Electrification (MOVE) project led by the University of Adelaide, funded by the Australian Future Battery Industry Cooperative Research Centre (FBICRC) involving a number of mining industry partners, including BHP and IGO. This project involves case studies on two existing Australian underground nickel mines examining the optimisation of the energy storage sizing and charging infrastructure approach for vehicles. It also covers the renewable energy microgrid design taking into account the electrified fleet charging requirements.

This seminar will consist of four parts:

- Motivation, challenges and opportunities of electrification of mine vehicles: the main advantages include reduced emissions and costs and improved health/safety and monitoring. The main challenges include the size/weight/life of energy storage, the cost/location/power requirements of the charging infrastructure, and effect on mining productivity.
- Design principles for electrification of mine haul trucks: haulage cycles, physical energy requirements, mine vehicle drivetrain configurations, energy storage types, charging technologies, and example commercial electric mine trucks
- Haul truck onboard storage sizing and charging technology design: analysis approach, sizing optimisation for different charging technologies, example results for different haul profiles
- Mine renewable energy microgrid design including electrified mining fleet charging needs: mine electric loads and generation, integration of renewable energy, effect of vehicle electrification on loads, optimisation of scheduling of vehicle charging to maximise use of renewable energy

T20 | Electric Propulsion: Challenges and Opportunities

Room 124B

Bulent Sarlioglu, *University of Wisconsin-Madison*
Jin Wang, *Ohio State University*
John Kizito
Patrick McCluskey, *University of Maryland*

For better fuel economy and carbon oxide reduction, future aircrafts calls for electric propulsion. Though there have been significant developments in electric machines and power electronics in the last few decades, electric propulsion presents significant challenges and opportunities. At the system level, the high power rating of the electric propulsion calls for higher distribution voltage. Currently, the distribution voltage for more electric aircrafts is limited to 540 V because of partial discharge related issues. In the future, where a single aisle commercial aircraft will require more than 10 Megawatt of propulsion power, the electric power distribution voltage is expected to reach as high as 4 kV, which presents a significant challenge in the system architecture and insulation designs. At the sub-system level, to realize high fuel economy, electric machines and power electronics drives are expected to have ultra-high power densities of 14 kW/kg and 25 kW/kg, respectively, which requires significant innovations in material, device, machine structure, power electronic packaging, control and thermal management. This tutorial will start with an introduction of different types of turbo and hybrid propulsion systems and state-of-the-arts of power electronics and electric machines for aircrafts. Then the tutorial will first focus on the partial discharge phenomena at low air pressure and how it will affect the designs of power electronics and electric machines. On the topic of integrated high power density motor drives, the tutorial will first introduce the state of the art high specific power electrical machines for various sectors of the aviation hybrid/electric space. Difference in requirements and challenges for each sector will be discussed. The pros and cons of different machine topologies including various stator structures, winding configurations and rotor configurations will be discussed highlighting key opportunities and challenges. Key factors in terms of achieving high specific power such as advanced thermal management and advanced materials will also be introduced. Then, the development status of SiC devices and megawatt level power converters will be discussed. A case study based on state-of-the-art commercially available SiC power modules will be presented as an example. The high power density partial discharge free design together with test waveforms will be presented. Thermal management of the integrated motor drive for electric propulsion will also be discussed in detail. Specific challenges in thermal designs for aerospace applications will be introduce first. Then multiple advanced thermal design approaches for integrated electric machines and power electronics will be discussed in detail. The last part of the tutorial will provide the final update on the development of the 2-kV 1-MVA integrated motor drive for electric propulsion. Final test results that were achieved at NASA's NEAT facility will be presented. Problems and lessons learned will be discussed too. Though the material presented in this tutorial is aerospace application oriented, the knowledge presented on high power density electric propulsion systems can be extended to many applications where high power rating, high power density and high efficiency are expected.

T21 | Recent Advances in Wireless Power Transfer Technology for Electric Vehicles and Smart Devices

Room 122C

Rim Chun Taek, *GIST*

Recent advances in wireless power transfer (WPT) technologies offer consumers and industries with more convenient, efficient, and intelligent charging of electric vehicles (EVs) and smart devices (SDs) such as smart phones, drones, robots, and IoTs. WPT has been adopted to get free from frequent plug in and out of charging by hand. Heavy and bulky batteries alone cannot solve the energy hungry problem of all mobile things, which should be eventually recharged. In this tutorial, fundamental principles of WPT including inductive power transfer(IPT) are briefly introduced first, and major WPT theories such as coupled coil model, gyrator circuit model, magnetic mirror model, and general unified dynamic phasor model are explained. Advances in WPT for EVs are extensively explained, which are classified into stationary charging electric vehicles (SCEVs) and roadway powered electric vehicles (RPEVs). SCEVs are getting more attraction due to their convenience and safety. Furthermore, due to rapid increase in the market shares of EVs and renewable energies, the interoperability of EVs and grids became of great importance. EVs are no longer simple energy consumers but energy providers to the grids. WPT is a promising solution to connect EVs with grids automatically whenever parked. This is a potential contribution of SCEVs as a flexible means of interoperable power systems. The coil design, large tolerance charging, compensation circuit, and foreign object detection (FOD) issues are addressed in detail. Recent progress in worldwide technology development is summarized as well. RPEVs are free from serious battery problems such as large, heavy, and expensive battery packs and long charging time because they get power directly from a road while moving. The power transfer capacity, efficiency, lateral tolerance, electromagnetic field (EMF), air-gap, size, weight, and cost of the WPTSs have been improved by virtues of innovative semiconductor switches, better coil designs, roadway construction techniques, and higher operating frequency. Recent advances in WPT for RPEVs are introduced. Advances in WPT for SDs are explained, which are quite different from each other depending on operational environments. Smartphones are the most successful applications of WPT, which are now evolving to get more freedom of charge in space. Due to distributed and numerous nature of IoTs, WPT for widespread area is quite challenging. Various drones and robots of different power level and endurance time require fast enough charging speed with freedom of position. Recent technology developments are explained. Future of WPT issues are addressed, which includes interoperable wireless EVs, longer distance IPT, 3D wireless chargers, and synthesized magnetic field focusing (SMF).

T22 | Hardware-in-the-Loop Systems for Power Electronics Engineers: From Theory to Applications

Room 121B

Arnab Acharya, *Arizona State University*
Bryan Lieblick, *Plexim Inc.*

Real-time embedded systems such as microprocessors and FPGAs are a key component of modern power conversion systems. The embedded systems implement sophisticated control algorithms to ensure reliability under stringent operational requirements, particularly under extreme conditions. Engineers often must implement and test the embedded control logic without the physical power converter due to parallel development timelines and time-to-market pressures.

Hardware-in-the-loop (HIL) systems are increasingly used in the design and validation of complex embedded real-time systems to address these concerns. Dynamic models of the power converter are implemented on a specialized digital real-time simulator (DRTS). The controller is connected to the DRTS through electrical signal interfaces representing feedback from the virtual plant, such that the DRTS mimics the behavior of the power stage. The fast dynamics and non-linear characteristics of power conversion systems require special modeling techniques for accurate real-time models. Technology drivers are pushing the switching frequency into the MHz range and reducing the electrical time constants further. A high-fidelity model of the converter, fast update rate for calculations, and low loop-back latency are required for meaningful simulation models.

This tutorial aims to equip participants with a deep understanding of HIL systems, enabling them to navigate challenges, leverage emerging technologies, and effectively apply these advancements in real-world power electronics applications. A key focus of the tutorial is on the critical importance of understanding simulation algorithms and switch models within the HIL simulation. This approach empowers users to optimize their simulation tool chain, extract maximum fidelity from their models, and gain a deeper understanding of the simulation results. The tutorial has three main sections.

The first section is an introduction to fundamental HIL concepts and applications including a discussion of hard real-time systems and a comparison of different computational technologies. We explore the impact of market forces, such as Silicon Carbide (SiC) and Gallium Nitride (GaN), on shaping the next generation of HIL requirements. This section serves as a foundation for understanding the evolving landscape of HIL technologies and the hurdles that must be overcome in their implementation for power electronics.

The second section of this tutorial, focused on theory, addresses numerical modeling of power converters in the HIL context with two main focuses: switch modeling and system-level modeling. Attendees will learn about modeling approaches for electrical switches in a real-time context. This will include an introduction to sub-cycle average switch models, distinctions between ideal and non-ideal switch models, and specialized modeling techniques for high-frequency DC/DC converters. The theory section will continue with different system-level modeling topics spanning continuous and discrete simulation methods, the impact of simulation step size, loop-back latency, and heterogenous computation systems.

The third section is application focused and will include an interactive demonstration translating the theoretical foundations into practical applications, showcasing HIL models used in industry and academia. This includes a detailed walk-through of a system model, emphasizing various switch modeling approaches within the application. Participants gain insights into system timing, discretization times for different sub-systems, HIL I/O configuration, and control system deployment. This final section serves as a bridge between theory and practical application, empowering participants to effectively leverage HIL systems in their specific power electronics applications.

T23 | Reflective Surge Voltage Mitigation for Fast-Switching Motor-Drive Systems

Room 125AB

Hui "Helen" Li, *Florida State University, USA*
JiangBiao He, *University of Tennessee, Knoxville*
Ranga Tallam, *Rockwell Automation*
Yu Zhang, *Xidian University*

Wide bandgap (WBG) switches such as Silicon Carbide (SiC) or Gallium Nitride (GaN) devices enable motor-drive systems with higher efficiency and higher power density, which is very beneficial for efficiency sensitive or weight/volume sensitive industry sectors such as electric vehicles. However, for many other applications with longer cables interconnected between the motors and inverters (e.g., electric ship and electric aircraft), the overvoltage at motor terminals due to reflected wave phenomenon (RWP) becomes more challenging due to higher dv/dt of WBG semiconductor devices and higher voltage levels of the high-power systems (e.g., MVDC or HVDC). On the other hand, stator winding insulation failures are the most common failures in electric machines, especially for medium-voltage or high-voltage systems operating at high altitude. Thus, it is indispensable to develop effective solutions for surge voltage mitigation in fast-switching long-cable-fed motor-drive systems. This seminar provides in-depth coverage of RWP mitigation methods from industry and academia to suppress the high-frequency overvoltage in long-cable-fed motor drive applications. The seminar begins with an introduction to the fundamental operating principles of RWP, traditional mitigation methods for Silicon IGBT motor drives and challenges for WBG motor drives. The latest advancements in mitigation for WBG motor drives is overviewed including passive filter methods and active filter methods. Furthermore, two promising methods for SiC motor drives will be presented in detail, including an optimization design of passive dv/dt filter and a compact design of active reflected wave canceller (ARWC). The principles, key design aspects and power loss in specific design scenarios will be discussed in detail respectively. Finally, various mitigation solutions in Rockwell industrial variable-frequency drives will be presented. This academic-industrial joint seminar is very suitable for electrical engineers and researchers who are developing motor drives for various applications, not only using WBG devices but also Si devices, since these new techniques can also be applied to conventional IGBT-based motor drives.

T24 | Battery States Monitoring and Estimation Using Impedance Identification Techniques

Room 128AB

Daniel-Ioan Stroe, *Aalborg University*
Jussi Sihvo, *Aalborg University*
Tomi Roinila, *Tampere University*

Accurate state of charge (SOC) estimation, state of health (SOH) estimation and temperature monitoring are required in order to ensure a safe, reliable, and degradation-aware battery operation. Nowadays, the algorithms developed for these purposes heavily rely on complete or partial battery capacity measurements, which are both costly and impractical during daily battery operation. The AC impedance of batteries can be a viable alternative as the measurement times are shorter than for capacity measurements. Furthermore, the impedance offers plentiful information about the battery's physico-chemical properties at any moment. Thus, in this tutorial, after introducing the status of the lithium-ion battery technology, we will focus on presenting different battery impedance identification techniques (both AC and DC techniques). Since, traditional impedance identification techniques, such as DC pulses or electrochemical impedance spectroscopy, face technical and economic challenges when they need to be performed on-board, impedance identification techniques using broadband signals have emerged as a viable solution. In this tutorial, we will introduce various

broadband signals that can be used to identify impedance. We will discuss in detail the procedures for designing the signals and exemplify their hardware implementation. Finally, in the last part of the tutorial, we will provide examples and illustrate the performance of broadband signals for measuring the impedance and subsequently estimating and monitoring the battery states', including SOC, SOH, and temperature; lastly, we will discuss and prove the usefulness of these impedance identification techniques for clustering and sorting batteries for use in second-life applications.

T25 | Identifying & Analyzing Total Lifecycle Energy Footprints in Large & Small Systems

Room 121A

Brian Zahnstecher, *PowerRox*

Sustainability is something we see getting increased attention these days and hopefully for motivation to drive actionable solutions toward more energy-efficient systems and reducing carbon footprints as opposed to simply paying lip service to the need to be more "green" or even mere carbon neutrality (a.k.a. – net zero). It seems most analyses of system energy consumption, whether it be systems physically constrained to a box (big and small from wireless sensor networks and internet of things devices, or WSN/IoT, to large-scale supercomputers) or even widely distributed across geographies (i.e. – cellular networks or utility distributions), tends to focus more on the first-order energy footprint typically associated with the application lifetime, which is very closely related to the operational expenditures (OPEX) of the application use case. Being green from an energy perspective is now becoming green in the economic sense, which is helping to drive massive investment and the switch to a net-zero mentality toward macro energy utilization. If global climate change and the fear of eventual, mass extinction is not motivating enough, then at least cost savings are. A first-order emphasis on system energy consumption is flawed in numerous ways from improper provisioning of resources, both upstream and downstream from main system usage, to inaccurate calculations of energy footprints and therefore a general misunderstanding of the true, lifecycle energy footprint (LEF, a.k.a. – embodied energy) that not only went into producing the system, but also the energy required to support the system at end of life (EOL), whether it be disposal, recycling, or both. Not to mention the miscalculation of energy footprints will also lead to direct errors in calculations for carbon footprints and the "mathematical neutralization" of these real emissions with offsets and credits. This half-day tutorial will first provide some terminology, metrics, and general assessment philosophies for defining the true energy footprint of a design and what aspects must be taken into account to fully and comprehensively articulate the complete embodied energy of a system from cradle to grave. Many different use cases and applications will be explored using examples from a variety of systems from the micro to the macro scale. Once a firm foundation has been set on understanding the true constraints and contributors to the absolute LEF, time will be spent exploring how some commonly disregarded contributors to LEF can be more dramatic than may seem on the surface and review some suggested methodologies for working these factors into more pragmatic analyses. The remaining half of the tutorial will concentrate on defining and applying a systems-of-systems (SoS) model to the assessment of energy footprints. A black-box methodology for incorporating any constituents of a power value chain (PVC) and translating the outputs to a "common currency" of energy (and related) metrics is proposed. This methodology contains an entire modeling/simulation framework for assessing any combination of hardware, software, utilization, regulatory, and even non-technical aspects to translate what may seem like an impossible scenario of contributors into a common optimization of a system, seen exclusively through the lens of energy efficiency.

Thursday, Ocotber 24 4:10PM – 5:40PM

T26 | Latest Development and New Technology Trends in Solid State Transformer

Room 124AB

Alex Huang, *The University of Texas at Austin*
Levy Costa, *Eindhoven University of Technology*
Marco Liserre, *Kiel University*
Zhicheng Guo, *Arizona State University*

The Solid-state transformer (SST) technology has been involved considerably in the last years thanks to the new semiconductors technology, the large efforts to improve magnetics designs, and intensive research in power converter design optimization. Moreover, new applications and trends have emerged for SST This tutorial will cover the latest developments in SST from the system level (power converter topologies and architectures) to the components level (power semiconductor technology, and magnetic components), in which the technology status and the actual state of the art will be emphasized. Besides, the latest work about IEEE standards for SST and the SST projects utilized in clean energy and next-generation flexible and adaptable large power transformers will be discussed.

T27 | From "PM" to "PM+X": Novel Variable Flux Machines for Wide-Speed-Range Applications

Room 129AB

Hui Yang, Southeast University, China
Yiming Shen, *Nanyang Technological University, Singapore*

This tutorial will begin by addressing the current challenges encountered by existing permanent magnet (PM) machines in wide-speed-range applications, with a specific focus on the restricted constant power speed range and diminished efficiency in the high-speed region. To overcome these challenges, a series of recently developed variable-flux PM (VFPM) machines will be introduced and examined, placing particular emphasis on recent advancements, future trends, and potential applications. Furthermore, this tutorial will introduce the innovative "PM+X" concept, which entails the application of additional DC field excitation and variable flux magnets to conventional constant-flux PM machines. It will delve into the topology features, working principles, and control strategies of various types of new VFPM machines. Subsequently, the tutorial will delve into the challenges, opportunities, and potential applications of VFPM machines and drives. This tutorial aims to provide a comprehensive introduction to the research and development of VFPM machines for researchers within academic communities. Moreover, it is anticipated that our research will have an immediate, direct impact on non-academic beneficiaries, including industry practitioners and motor manufacturers.

Monday, October 21 12:50PM – 2:30PM

Oral Session 1 | Converters for Renewable Grid Integration

Room 121A
Chairs: Vikram Roy Chowdhury, Rahul Mallik

12:50PM | High Gain Single-phase Three-level Boost AC-DC Converter with Inherent Output Voltage Balancing [#353]
The Tien Nguyen, Caisheng Wang, Yuqi Wang and Jianghai (Ocean) Xiao
Wayne State University, United States; The ISF Academy, Hong Kong

1:10PM | A Novel Transformerless Buck-Boost Inverter with Coupled Inductor for Photovoltaic Systems [#371]
Yunfeng Xu, Weimin Wu, Houqing Wang, Frede Blaabjerg, Mohamed Orabi and Liang Yuan
Shanghai Maritime University, China; Anhui University of Science and Technology, China; University of Arkansas, China; Aalborg University, Denmark; Aswan University, Egypt

1:30PM | A SHE-TPWM Scheme for High-Power Medium-Voltage Current Source Converters [#447]
Martti Muzyka, Zijian Wang, Qiang Wei and Navid Zargari
Lakehead University, Canada; Rockwell Automation, Canada

1:50PM | Novel Single-Phase High Boost Common-Ground Inverter [#456]
Frederick Nana Oppong, Ashraf Ali Khan, Hafiz Ahmed and Quaicoe John
Memorial University of Newfoundland, Canada; National Sun Yat-sen University, Taiwan

2:10PM | Soft-switched Single-stage Single-phase Resonant DC-AC Converter operated at Fixed Switching Frequency [#1400]
Sanjeet Singh, Anirban Pal and Kaushik Basu
Indian Institute of Science, Bengaluru, India; GE Aerospace, India

Oral Session 2 | Grid-Forming Technologies I

Room 121B
Chairs: Behrooz Mirafzal, Joseph Benzaquen

12:50PM | Capacity Optimized Grid-Forming Control: A Framework for AC Grid-Forming under Hardware and Source Constraints [#887]
Ma Awal, Siye Cen, David Michaud and Iqbal Husain
EPC Power Corporation, United States; North Carolina State University, United States

1:10PM | Output Impedance Shaping of GFM Inverters Using Robust H-infinity 2-DOF Controllers [#1006]
Bijit Dey, Deeapk Ramasubramanian, Sairaj Dhople and Murti Salapaka
University of Minnesota, Twin cities, United States; Electric Power Research Institute, United States; University of Minnesota, Twin Cities, United States

1:30PM | Analysis and Transient Stability Enhancement of Capacity-Constrained Grid-Forming Control in Inverter Dominated Networks [#454]
Siye Cen, Ma Awal, Rahul Chakraborty and Iqbal Husain
North Carolina State University, United States; EPC Power Corporation, United States; Dominion Energy Virginia, United States

1:50PM | Investigation of Control Parameters Impact on Damping Property of Grid-Forming Converters [#946]
Kavian Kamalinejad, Anant Narula, Massimo Bongiorno, Mebtu Bihonegn Beza and Jan R. Svensson
Chalmers University of Technology, Sweden; Hitachi Energy, Sweden

2:10PM | Power Angle Region Partitioning for Fault Recovery Analysis of Grid-Forming Inverters [#1113]
Rui Liu, Zhiheng Lin and Yunwei Ryan Li
University of Alberta, Canada

Oral Session 3 | Design Automation, Digital Twins, and Condition Monitoring

Room 121C
Chairs: Taesic Kim, Jinan Zhang

12:50PM | PowerSynth: Automated Power Converter Layout Synthesis with Custo... [#618]
WITHDRAWN
Mehran Sanjabiasasi... and Yarui Peng
University of Arkansas, United States

1:10PM | An ML-enhanced Digital Twin Model of Photovoltaic Inverter for Estimating Component Degradation [#544]
Sukanta Roy, Arif Sarwat, Milad Behnamfar, Anjan Debnath, Mohd Tariq and Patrick McCluskey
Florida International University, United States; University of Maryland, United States

1:30PM | Automation for Grid Interconnected-Laboratory Emulation [#1529]
Phani R V Marthi, Suman Debnath, Marshall McDonnell, Sebastian A Soto, Harry Hughes, Steven Hahn, Jongchan Choi, Anees Al Najjar, Nageswara Rao and Ben Mintz
Oak Ridge National Laboratory, United States; OPAL-RT, Canada

1:50PM | Enhancing Solar Farm Operations: Machine Learning for Equipment Fault Detection and Classification [#511]
Ali Hamza, Zunaib Ali, Sandra Dudley-Mcevoy, Komal Saleem and Nicholas Christofides
London South Bank University, United Kingdom; Univeristy of East London, United Kingdom; Frederick University, Cyprus, Cyprus

2:10PM | Applications of Machine Learning to Condition Monitoring of DC-Link Capacitors [#1654]
Viktoriia Sysoeva, Chi-Hao Cheng and Mark Scott
Miami University, United States

Oral Session 4 | Inductive Wireless Power Transfer for Transportation

Room 122A
Chairs: Thomas Luo, Deepak Ronanki

12:50PM | A Hybrid Rectifier Mode Control for Communication-Free Wireless Power Transfer [#3]
Gangwei Zhu, Jianning Dong and Pavol Bauer
Delft University of Technology, Netherlands

1:10PM | A 3D-Spiral Sensing Coil for Foreign Object Detection in EV Wireless Charging Applications [#904]
Ali Ramezani, Matthew Perry and Sepehr Semsar
eLeapPower, Canada

1:30PM | Analytical Efficiency Maximization with Constant-kQ Optimal Coupler Design for Inductive Wireless Power Transfer Systems [#1622]
Ronaq Nazir and Sreyam Sinha
Indian Institute of Technology Delhi, India

1:50PM | Design of High-Power Polyphase PCB Coil Systems for Wireless Power Transfer [#933]
Donovin D. Lewis, Lucas Gastineau, Omer Onar, Malcolm McCulloch, John F. Eastham and Dan M. Ionel
SPARK Lab., ECE Dept., University of Kentucky, United States; Vehicle Power Electronics Research Group, Oak Ridge National Laboratory, United States; EPG, Dept. of Engineering Science, University of Oxford, United Kingdom; Dept. of Electronic and Electrical Engineering, University of Bath, United Kingdom

2:10PM | On Balancing of Dynamic Wireless Power Transfer System in the Presence of Misalignment and Load Variation [#1552]
Mohammad Rastegar, Mohammad Hassan Ghaderi and Milad Bahrami Fard
The University of Texas at Dallas, United States

Oral Session 5 | Switched Capacitor Converters

Room 122B
Chairs: Reza Rezaii, Dong Cao

12:50PM | Extended Analysis and Evaluations on a Floating Four-Phase Interleaved Bidirectional DC-DC Converter Utilizing Asymmetric Duty Limit Control [#963]
Shiqiang Liu, Guiyi Dong, Tomokazu Mishima and Ching-Ming Lai
Div. of Marine Technologies and Engineering, Faculty of Oceanology, Kobe University, Japan; Department of Electrical Engineering, National Chung Hsing University, Taiwan

1:10PM | The 48V to 3.3V Matrix Autotransformer Switched Capacitor DC-DC Partial Power Converter for Datacenter Application [#1373]
Zhongshu Sun, Maohang Qiu, Xiaoyan Liu, Haoran Meng and Dong Cao
University of Dayton, United States

1:30PM | Topology Comparison and Dead-Time Optimization for Efficiency Enhancement of Always-Dual-Path Hybrid DC-DC Converter with Soft Charging [#1691]
Katsuhiro Hata, Shinsaku Tanaka, Toru Ashikaga and Yasuhiro Rikiishi
The University of Tokyo, Japan; Sanken Electric Co., Ltd., Japan

1:50PM | Symmetric Series-Capacitor Buck in 48V-to-12V Regulated Conversion for High-Performance Server Boards [#1512]
Xinmiao Xu and Qiang Li
CPES, Virginia Tech, United States

2:10PM | MASC-PoL: A 48V-1V Matrix Autotransformer Switched-Capacitor Point-of-load DC-DC Converter for Data Center Application [#1461]
Haoran Meng, Zhongshu Sun, Maohang Qiu, Xiaoyan Liu, Vafa Marzang and Dong Cao
University of Dayton, United States

Oral Session 6 | DC-DC Converters

Room 129A
Chairs: Jongwon Shin, Mohammed Agamy

12:50PM | A Compact 48-V-to-Sub-1-V Switching Bus Converter with 4.7-mm Height for Processor Vertical Power Delivery [#970]
Yicheng Zhu, Jiarui Zou, Nathan M. Ellis, Sudhir Kudva, Mostafa Mosa, C. Thomas Gray and Robert C. N. Pilawa-Podgurski
University of California, Berkeley, United States; NVIDIA Corporation, United States

1:10PM | Capacitorless DC-DC Buck Converter [#681]
Kanakri Haitham, Euzeli Cipriano Dos Santos Jr and Maher Rizkalla
Purdue University, United States

1:30PM | Design and Testing of an 8: 1 Non-isolated Bus Converter for 48V Data Centers [#686]
Xufu Ren, Jinfeng Zhang, Borong Hu, Pengcheng Xu and Teng Long
University of Cambridge, United Kingdom; EPIC Technology, China

1:50PM | Stability Analysis of Nonisolated DC/DC Converter in BWPTs Considering Inductance and Switching [#84]
Eita Sato, Keiichiro Kondo, Osamu Yamazaki and Kazuaki Yuuki
Waseda University, Japan; Toshiba, Japan

2:10PM | Active Switched-Inductor High-Gain Step-up DC-DC Converter with Reduced Voltage Stress [#349]
Truong-Duy Duong, Jianghai Xiao, Caisheng Wang and Yi-An Liao
Wayne State University, United States; The ISF Academy, Hong Kong; Cranbrook Kingswood, United States

Oral Session 7 | Power Converters for Next-Gen Electricity Grids

Room 122C
Chairs: Liping Guo, Tianqi Hong

12:50PM | Development of Control Algorithm for Medium Voltage AC to Multi-port Low Voltage DC converters for Utility-scale Grid Integration of Solar and Storage [#1579]
Surjakanta Mazumder, Harisyam Pv and Kaushik Basu
Indian Institute of Science, Bengaluru, India, India

1:10PM | Comprehensive Input Voltage Sharing Analysis for a Novel Partially Modular SST Topology [#1209]
Chen Chen, Mafu Zhang and Alex Huang
The University of Texas at Austin, United States; The University of Texas at Austin, United States

1:30PM | Model Predictive Control of a Wide Voltage Range Battery Charger for G2V and V2G Applications [#940]
Harish Karneddi, Deepak Ronanki and Jose Rodriguez
Indian Institute of Technology Madras, India; Universidad San Sebastian, Chile

1:50PM | Distributed Control System with UPS Mode for CHB-Based Photovoltaic Solid State Transformer (PV-SST) Utilizing LCL Filter [#43]
Saleh Farzamkia, Mafu Zhang, Huanghaohe Zou and Alex Q. Huang
University of Texas at Austin, United States

2:10PM | Indirect Sliding Mode Control of a MIMO Modular Converter for DC Microgrids: a ROV Case Study [#1343]
Giovanni Garraffa, Angelo Accetta, Massimiliano Luna, Marcello Pucci, Francesco Alonge and Antonino Sferlazza
University of Enna Kore – Dept. of Engineering and Architecture, Italy; Institute of Marine Engineering (INM) – National Research Council of Italy (CNR), Italy; Institute of Marine engineering (INM) – CNR, Italy; University of Palermo – Department of Engineering, Italy

Oral Session 8 | Electric Machines for Transportation

Room 123
Chairs: Alireza Fatemi, Gerd Bramerdorfer

12:50PM | Comparison of a Novel Stator Tooth Cooling System with High-Performance Alternatives for e-Motors in Electric Vehicles [#101]
Gokhan Cakal, Alireza Fatemi, Peng Peng, Thomas Nehl and Xiofeng Yang
University of Wisconsin-Madison, United States; General Motors, United States

1:10PM | Effect of Increasing Poles Number for 16000 rpm and 800V Rare-Earth Free Interior Permanent Magnet Traction Motor Equipped with Iron Nitride Magnets [#1723]
Ali Al-Qarni, James Alexander and Ayman EL-Refaie
Marquette University, United States; Spartan Engineering Design, United States

1:30PM | Design of a Novel Rare-Earth-Free Variable Flux Motor Combining Iron-Nitride and AlNiCo Magnets [#540]
Bassam Abdel-Mageed, Benoit Blanchard St-Jacques, Ruisheng Shi and Pragasen Pillay
Concordia University, Canada; Dana TM4 inc., Canada

1:50PM | Modeling and Analysis of Dual-Three-Phase PMSMs for EV Drive Application [#1379]
Peng Peng, Lei Hao, Renato Amorim Torres, Suresh Gopalakrishnan and Thomas Nehl
General Motors, United States

2:10PM | Driving Cycle based Optimisation and Comparison of Variable Flux Permanent Magnet Machines [#813]
Gabriel Weissitsch, Thomas Krainer, Edmund Marth and Gerd Bramerdorfer
Johannes Kepler University Linz, Austria

Oral Session 9 | Induction Motor Drives

Room 124A
Chairs: Di Pan, Arshiah Yusuf Mirza

12:50PM | Robust OEWIM Drive for Optimized EV Powertrain Performance with DTC and ZSV Mitigation [#1138]
Amit Kumar, Sesadri Bhusan Sahoo, Ranjan Kumar Behera, Khalifa Al Hosani and Utkal Ranjan Muduli
IIT Patna, India; Khalifa University, United Arab Emirates

1:10PM | Standstill Parameter Estimation of Induction Motors Using SOGI And Data Fitting from Single-Phase Sinusoidal Excitation [#1523]
Dongyeob Han and Sungmin Kim
Hanyang University, Korea (South), Electronic Engineering, Korea (South)

1:30PM | Model Modulated Speed and Current Predictive Control (M2PC) of Six-Phase Induction Motors including Magnetic Saturation and Iron Losses [#1199]
Angelo Accetta, Maurizio Cirrincione, Massimiliano Luna, Marcello Pucci and Antonino Sferlazza
Institute of Marine Engineering (INM) – National Research Council of Italy (CNR), Italy; University of South Pacific, Fiji; National Research Council of Italy (CNR) – INM, Italy; University of Palermo, Italy

1:50PM | 2D Repetitive PI Control for Enhanced Harmonic Current Suppression in Induction Machines [#177]
Johannes Stoss, Pierre Mader, Stephan Goehner, Leonard Geier, Matthias Brodatzki, Andreas Liske and Marc Hiller
Karlsruhe Institute of Technology, Germany

2:10PM | Predictive Strategies For Mitigation of Common Mode Voltage In Three-Phase Induction Motor [#1133]
Sofia Almeida Dias, Bruna Seibel Gehrke, Nady Rocha and Isaac Freitas
Operador Nacional do Sistema, Brazil; Federal University of Paraiba, Brazil

Oral Session 10 | Gate Drivers

Room 124B
Chairs: Tanya Gachovska, Jessica Boles

12:50PM | Ultra-fast Gate Drivers with Nanosecond Propagation Delays for GaN FETs [#667]
Tan Duy Nguyen, Soham Roy, Elijah M. Macias and Alex J. Hanson
The University of Texas at Austin, United States

1:10PM | A Multilevel Gate Driver Operating with a Single Voltage Supply and Simple Control Signals for Monolithic Integration of Power GaN HEMT [#815]
Takumi Takehisa, Takehiro Takahashi, Jun Furuta, Michihiro Shintani and Kazutoshi Kobayashi
kyoto Institute of Technology, Japan

1:30PM | Wireless Pulse-Width Modulation Control of Power Converters using Ultra-Wideband Technology for Distributed High Voltage Systems [#1140]
Sarwar Islam and Faisal Khan
Researcher II, United States; Chief Researcher – Power Electronics, United States

1:50PM | Natural Active Gate Driving for Breaking Trade-off Between Switching Loss and Current Overshoot Using Ordinary Gate Driver [#328]
Yaogan Liang, Haoxi Zhou, Dibo Zhang, Katsuhiro Hata and Makoto Takamiya
The University of Tokyo, Japan

2:10PM | Optimal Point Derive for SiC MOSFET Switching Ringing Damping with Active Gate Driver Control [#1221]
Liyang Du, Xia Du, Yuxiang Chen, Haodong Yang and Alan Mantooth
University Of Arkansas, United States; University of Arkansas, United States

Oral Session 11 | Emerging Technologies 1

Room 129B
Chairs: David Perreault, Mausamjeet Khatua

12:50PM | 1.5-kV, 1.5-kW, High Voltage Ratio, Bidirectional DC/DC Converters for Power Distribution on the Moon [#1465]
Yuzhou Yao, Junchong Fan, Zhining Zhang, Yifan Shi, Jin Kwon, Pengyu Fu and Jin Wang
The Ohio State University, United States

1:10PM | Modular DCX Blocks with Autonomous Synchronization for Power Distribution Subsystem of Satellites [#922]
Theyllor Oliveira, Abraham Lopez Antuna, Jose Antonio Villarejo Manas, Pablo Miaja and Manuel Arias Perez de Azpeitia
Universidad de Oviedo, Spain; Universidad Politecnica de Cartagena, Spain

1:30PM | Multi-Level Coupled Electronic and Magnetic System for Wide-Gain Constant Power Conversion [#690]
Ian Willows, Sritharini Radhakrishnan and Mike Ranjram
Arizona State University, United States

1:50PM | Development and Demonstration of MW Modular Multilevel Converter based Reconfigurable Load Emulator [#1787]
Jingxin Wang, Yang Xu, Fred Wang and Bob Martin
The University of Tennessee, United States

2:10PM | Small-gain Stability of P-HIL for Evaluating Grid-Connected Converters During Asymmetric Grid Faults [#143]
Sante Pugliese, Md Mohiuddin Al-Mahmud and Marco Liserre
Kiel University, Germany

Post Journal Presentation 1

Room 127C
Chairs: Satish Belkhode, Andrea Formentini

12:50PM | Control of Grid-Forming VSCs: A Perspective of Adaptive Fast/Slow Internal Voltage Source [#1847]
Heng Wu and Xiongfei Wang
Aalborg University, Denmark; KTH Royal Institute of Technology, Sweden

1:10PM | Simplified Virtual Synchronous Compensator with Grid-Forming Capability [#1860]
Radu Bojoi, Vincenzo Mallemaci, Fabio Mandrile and Enrico Carpaneto
Politecnico di Torino, Italy

1:30PM | Virtual Friction Subjected to Communication Delays in a Microgrid of Virtual Synchronous Machines [#1853]
Radu Bojoi, Fabio Mandrile, Vincenzo Mallemaci, George Weiss and Florian Reissner
Politecnico di Torino, Italy; Tel Aviv University, Israel

1:50PM | Lead-Lag Filter-Based Damping of Virtual Synchronous Machines [#1859]
Radu Bojoi, Fabio Mandrile, Vincenzo Mallemaci and Enrico Carpaneto
Politecnico di Torino, Italy

Monday, October 21 3:00PM – 4:40PM

Oral Session 12 | Control for Renewable Energy Systems

Room 121A
Chairs: Jinia Roy, Dinesh Kumar

3:00PM | A Coordinated Start-up Strategy for the DR-MMC Based Offshore Wind Power Transmission System [#53]
Lu Chen, Wenjie Chen, Zhixiang Li, Jinyu Wang, Chenyu Guo, Mengjie Qin, Bobo Zhang and Wenjie Du
Xi'an Jiaotong University, China

3:20PM | Design and Control of a 2-kV/5.5-kVA Three-Phase Four-Level Flying Capacitor Power Factor Correction Using 1.2-kV SiC MOSFETs [#457]
Van-Quy Le, Chi-Yuan Feng, Yao-Cheng Tien, Teng-Qi You, Yun-Yen Chen, Yu-Chen Chang and Huang-Jen Chiu
National Taiwan University of Science and Techno, Taiwan; LITEON Technology, Taiwan; Delta Electronics, Taiwan

3:40PM | Droop-based Decentralized Input Voltage Sharing Control Method For Input-Series output-Parallel DC-DC Converter Station [#1559]
InJe Park, Dong Dong and Sungmin Kim
Hanyang University, Korea (South), Electronic Engineering, Korea (South); Virginia Polytechnic Institute and State University, Electrical and Computer Engineering, United States

4:00PM | Adaptive Current Control in a Multi-Port Converter for Reduced Current Ripple and Improved System Performance in Wave Energy Generation [#1044]
Al Raji Billah, Muhammad Abdelraziq, Zeljko Pantic and Iqbal Husain
North Carolina State University, United States

4:20PM | Active Power Decoupling to Minimize Module Capacitance and Circulating Current in Modular Multilevel Converters [#331]
Rafael Castillo-Sierra and Jinia Roy
Universidad del Norte, Colombia; University of Wisconsin – Madison, United States

Oral Session 13 | DC/Hybrid Solid-State Breakers

Room 121B
Chairs: Zhi Jin Zhang, Reza Rezaii

3:00PM | SCR-based Medium Voltage DC Solid-State Circuit Breaker [#1545]
Rajendra Prasad Kandula and Marcio Luiz Magri Kimpara
Oak Ridge National Laboratory, United States

3:20PM | Electro-Thermal Design: Standardized Hybrid DC Breaker Architecture for Scalable Operation in MVDC Networks [#1046]
Don Shan Jayamaha, Carl Ho and Athula Rajapakse
University of Manitoba, Canada

3:40PM | A SiC MOSFET Based Multi-port Solid State Circuit Breaker for DC Protection [#1057]
Xiaoqing Song, Yannal Nawafleh and Mohammad Dehan Rahman
University of Arkansas, United States

4:00PM | Polarity Reversal Inhibitor Sizing Criteria for Meshed HVDC Grids Equipped with DC Circuit Breakers [#1403]
Francesca Pizzimenti, Stefano Lauria, Fabio Giulii Capponi, Luca Buono and Francesco Palone
Sapienza University of Rome, Italy; Terna S.p.A., Italy

4:20PM | An Improved Fault Current Bypass-Based DC Solid-State Circuit Breaker for DC Microgrid Applications [#1781]
Jiale Zhou, Qiang Mu, Xiuhu Sun, Tiancan Pang, Yao Wang and Tiefu Zhao
University of North Carolina at Charlotte, United States; Hebei University of Technology, China

Oral Session 14 | Grid-Forming Technologies II

Room 129A
Chairs: Joseph Benzaquen, Gab-Su Seo

3:00PM | Two-Time Scale Model Reduction and Voltage Controller Design for Grid-Forming Converters [#1099]
Zicheng Zhang, Jingyang Fang, Chenghui Zhang, Cheng Fu, Huajia Wang and Yan Zhang
Shandong University, China; State Grid Shandong Electric Power Research Institute State Grid Shandong Jinan, China, China

3:20PM | A Virtual Synchronous Machine Based Algorithm for Online Grid Impedance Estimation [#479]
Alessandro Roveri, Vincenzo Mallemaci, Fabio Mandrile and Radu Bojoi
Prima Electro S.p.A., Italy; Politecnico di Torino, Italy

3:40PM | Small-Signal Stability of Grid-Forming Inverters Using Current-Limiting and Frequency Stabilization [#1562]
Bowen Yang, Nathan Baeckeland and Gab-Su Seo
National Renewable Energy Laboratory, United States

4:00PM | Model and Design of a Four-Wire Grid-Connected Grid-Forming Converter Using Describing Functions [#880]
Eliabe Duarte Queiroz, Andre Luiz Marques Leopoldino, Douglas de Assis Ferreira, Igor Alves Maronni, Victor Cordeiro de Arruda, Jose Antenor Pomilio and Joel Filipe Guerreiro
Universidade Estadual de Campinas, Brazil; Eldorado Research Institute, Brazil

4:20PM | Modified Andronov-Hopf Oscillator-based Grid-Forming Converter with Emulated Virtual Cable for Enhanced Power Sharing Performance [#1412]
Vikram Roy Chowdhury, Gab-Su Seo and Barry Mather
National Renewable Energy Laboratory, United States

Oral Session 15 | Battery Management Systems for Transportation

Room 122A
Chairs: Feng Guo, Fnu Nishanth

3:00PM | Effects of Fast Charging of EV Batteries at Low Temperatures Based on Temporary Lithium Plating and Temperature Gradients [#650]
Chandan Chetri and Sheldon Williamson
Ontario Tech University, Canada

3:20PM | Advanced Battery Aging Prediction Through Impedance Spectroscopy Including Thermal Behavior and Degradation Analysis [#611]
Latha Anekal and Sheldon Williamson
Ontario Tech University, Canada

3:40PM | Ultra-Fast Temperature Estimation of Lithium-ion Batteries Through Impedance Measurements [#534]
Minh Tran, Daniel Stroe and Tomi Roinila
Tampere University, Finland; Aalborg University, Denmark

4:00PM | Optimizing Experiments for Accurate Battery Circuit Parameters Estimation: Reduction and Adjustment of Frequency Set Used in Electrochemical Impedance Spectroscopy [#1052]
Vladimir Sovljanski, Mario Paolone, Sylvain Tant and Damien Pierre Sainflou
EPFL, Switzerland; Stellantis, France

4:20PM | EMD-Enhanced Multi-Step Regression: A Practical Approach for Lithium-Ion Battery Remaining Useful Life Prediction [#1577]
Ahnaf Akif Rahman, Philip Korta, Caniggia Viana, Ahmad Ali, Philip Lewoc, Lakshmi Varaha Iyer and Narayan C. Kar
University of Windsor, Canada; Magna International Inc., United States

Oral Session 16 | DAB Based DC-DC Converters

Room 122B
Chairs: Pablo F. Miaja, Dao Zhou

3:00PM | A Low-Complexity Load-Decoupled Talkative Power Conversion Strategy for the Dual-Active-Bridge Converter [#253]
Arkadeb Sengupta, Thiago Antonio Pereira and Marco Liserre
Chair of Power Electronics, Kiel University, Germany

3:20PM | Improved Modulation Scheme for a Dual Active Bridge to Ensure Complete ZVS Operation Utilizing Circular Currents [#186]
Fabian Sommer, Tobias Merz, Ruediger Schwendemann and Marc Hiller
Karlsruhe Institute of Technology, Germany

3:40PM | A Linearised Approach for Voltage Controller Design of Inherent Decoupled Triple Active Bridge Converters [#437]
Nicola Campagna, Giuseppe Bossi, Rosario Miceli and Alfonso Damiano
University of Palermo, Italy; University of Cagliari, Italy

4:00PM | Full-load Range ZVS Achievement by Using Both Burst Mode and PWM With Variable Frequency Modulation for DAB Converters [#1800]
Cheng Huang, Tomoyuki Mannen and Takanori Isobe
University of Tsukuba, Japan

4:20PM | Multi-switch-leg DAB DC-DC Converter with Split Transformer Configuration for MVDC Grid [#968]
Suman Mandal, Ankam Karthik, Anshuman Shukla and Suryanarayana Doolla
Indian Institute of Technology Bombay, India

Oral Session 17 | Advanced Control Algorithm for Grid-Connected Applications

Room 122C
Chairs: Yonghao Gui, Sante Pugliese

3:00PM | Analytical Determination of Harmonic Controller Parameters for High Performance Grid Connected Resonant Current Regulators [#1672]
Grahame Holmes and Brendan McGrath
RMIT University, Australia

3:20PM | Passivity-Based Grid Forming Control for DERs [#1261]
Yonghao Gui, Subedi Sunil and Yaosuo Xue
Oak Ridge National Laboratory, United States

3:40PM | An Improved Control for Grid-Following Inverter with Active Damping and Capacitor Voltage Decoupling [#878]
Amiron Wolff dos Santos Serra, Luiz Antonio de Souza Ribeiro and Mehdi Savaghebi
Federal University of Maranhao/Technical University of Denmark, Brazil; Federal University of Maranhao, Brazil; Technical University of Denmark, Denmark

4:00PM | Equivalent Circuit Model and Stability Analysis of Multi-Paralleled Grid-Tied SiC Inverters with Low Voltage Ride-Through [#952]
Xuli Quan, Xiaofeng Dong, Matthew Bosworth and Hui Li
Florida State University, United States

4:20PM | A Seamless Transition between Grid-Forming and Grid-Following Controls of Inverter-Based Resources [#593]
Heqing Huang, Lizhi Ding, Yuzhang Lin, Xiaonan Lu and Yue Zheng
New York University, United States; Purdue University, United States; Northeastern University, United States

Oral Session 18 | Fault Analysis of Power Converters

Room 121C
Chairs: Mateja Novak, Xiangyu Han

3:00PM | Fault-Tolerant Control Under Switch Short-Circuit and Open-Circuit Faults for Parallel Winding Current Source Inverter [#493]
Yanchao Xiong, Dong Jiang, Yixuan Shuai, Xiangwen Sun, Guangyu Wang and Zicheng Liu
Huazhong University of Science and Technology, China

3:20PM | DC Fault and Switching Device Open-Circuit Fault Protection of the Isolated Modular Multilevel dc-dc Converter [#304]
Shiyuan Yin, Xiangyu Han and Maryam Saeedifard
Georgia Institute of Technology, United States; Tesla, Inc., United States

3:40PM | A Novel use of 1-D Convolutional Transformer Hybrid Model for Switch Open-Circuit fault Detection and Localization in Cascaded H-Bridge Converters [#1696]
Samuela Rokocakau, Giulia Tresca, Behrouz Mohammadzadeh, Pericle Zanchetta, Giansalvo Cirrincione and Maurizio Cirrincione
The University of Pavia, Italy; University of Picardie Jules Verne, France; University of Technology of Belfort Montbeliard, France

4:00PM | An Intelligent Framework for Accurate Identification of Open-Circuit Faults in Asymmetrical Six-Phase Induction Motors [#417]
Khaled Laadjal, Acacio M. R. Amaral, Joao Serra and Antonio J. Marques Cardoso
CISE – Universidade da Beira Interior, Portugal; Polytechnic Institute of Coimbra, Coimbra, Portugal

4:20PM | Fault Diagnosis using 1-D Convolutional Transformer Hybrid Neural Network for Cascaded H-Bridge Converters [#1708]
Samuela Rokocakau, Giulia Tresca, Behrouz Mohammadzadeh, Pericle Zanchetta, Giansalvo Cirrincione and Maurizio Cirrincione
The University of Pavia, Italy; University of Picardie Jules Verne, France; University of Technology of Belfort Montbeliard, France

Oral Session 19 | Induction Machines

Room 123
Chairs: Andrea Cavagnino, Peng Peng

3:00PM | Influence of Stator Damping Coil on High-Frequency Stray Losses and High-Order Electromagnetic Forces of Induction Motors [#370]
Chenbo Wang, Zhen He, Shuyang Xu, Jun Wang, Hongjin Guo, H.Eldeeb Hassan, Ming ji Liu, Guorui Xu and Haisen Zhao
North China Electirc Power University, China; xEV Powertrain and Propuision Systems Controls at Ford Motor Company's Research and Advanced Eng, United States

3:20PM | Design and Analysis of a Single-Sided 2.2kW Axial-Flux Induction Motor [#835]
Zhi Cao, Amin Mahmoudi, Wen L Soong and Solmaz Kahourzade
Flinders University, Australia; The University of Adelaide, Australia; University of South Australia, Australia

3:40PM | Analytical and FE Modeling of a Wound Rotor Induction Motor with Static Inclined Eccentricity [#271]
Solihah Sharief Shiekh and Pragasen Pillay
Concordia University, Canada

4:00PM | Diagnosis of Rotor Asymmetries in Wound Rotor Induction Machines via PSH Analysis of Vibration Transients [#249]
Jose E. Ruiz-Sarrio, Pedro Llovera-Segovia, Carlos Madariaga-Cifuentes, Angela Navarro-Navarro, Vicente Biot-Monterde and Jose Alfonso Antonino-Daviu
Universitat Politecnica de Valencia, Spain; Universitat Politecnica de Vaencia, Spain; University of Concepcion, Chile; Universitat Politecnica de Valencia – ITE, Spain

4:20PM | A Design and Control Method for Pole Changing Induction Machine for Traction Application [#653]
Kan Akatsu, Naoya Kato, Tsurube Masayoshi, Tomonari Mori and Masanori Watahiki
Yokohama National University, Japan; Nidec cooperation, Japan

Oral Session 20 | Axial Flux Machines

Room 129B
Chairs: Matthew C. Gardner, Greg Heins

3:00PM | Non-invasive Bar Breakage Diagnosis of Axial Flux Induction Machines through Steady-State Signal Analysis [#620]
Carlos Madariaga-Cifuentes, Jose E. Ruiz-Sarrio, Jose A. Antonino-Daviu, Cesar Gallardo-Sanchez and Juan A. Tapia-Ladino
University of Concepcion, Chile; Universitat Politecnica de Valencia – ITE, Spain; University of Nottingham, United Kingdom

3:20PM | Active Metal Brazed Windings for Coreless Axial-Flux Permanent-Magnet Machines [#1171]
Federico Marcolini, Guido Rubino, Federico Caricchi and Fabio Giulii Capponi
Sapienza University of Rome, Italy

3:40PM | Axial Laminations for Eddy Current Mitigation in Unlaminated Rotors for Axial Flux Surface Permanent Magnet Synchronous Machines [#1590]
Samuel French, Kelvin Wong, David Klink, Dean Patterson, Greg Heins and Behrooz Bahrani
Monash University, Australia; Regal Rexnord, Australia

4:00PM | A Study on the Performance Improvement of Axial Flux Permanent Magnet Machines Based on Stator and Rotor Design Modifications [#499]
Jangho Yun, Brandon Grainger and Paul Ohodnicki
University of Pittsburgh, United States

4:20PM | Multi-Disk Coreless Axial Flux Permanent Magnet Synchronous Motors with Surface PM and Halbach Array Rotors for Electric Aircraft Propulsion [#960]
Matin Vatani, John F. Eastham and Dan M. Ionel
SPARK Lab, Pigman College of Engineering, University of Kentucky, United States; Department of Electronic and Electrical Engineering, University of Bath, United Kingdom

Oral Session 21 | Control of Electric Drives

Room 124A
Chairs: Sina Vahid, Luigi Danilo Tornello

3:00PM | Sensor-less Drive for Ultra-Low Inductance Non-Salient Pole Machine Using Single-Shunt Sensor [#183]
Jun-Sik Hwang, Min-Seok Chae and Hyeon-Gyu Choi
Incheon National University, Korea, Republic of

3:20PM | Switching Frequency Voltage Injection for Sensorless IPMSM Control Using Current Derivative Measurements [#822]
Byung Ryang Park, Gyu Cheol Lim, Jaehoon Shim and Jung-Ik Ha
Seoul National University, Korea (South)

3:40PM | Volage Feedforward Control and Time Delay Compensation of WFSM for eliminating Current Transient [#1041]
DoHyeon Kim, HanVit Kim, JoonSeok Kim and June-Seok Lee
Dankook University, Korea (South); Dankook university, Korea (South)

4:00PM | Rotating Vector Holder for Wide Band-Gap Based Inverters Switching at Very High Frequency [#702]
Francesco Lelli, Fabio Giulii Capponi and Giulio De Donato
Sapienza University of Rome, Italy

4:20PM | Voltage Balancing in Double Three-Phase NPC Inverters for Powering Two Three-Phase Electric Motors with a Common DC Bus [#1693]
Luca Vancini, Boico Gabriele, Michele Mengoni, Rizzoli Gabriele, Luca Zarri and Angelo Tani
University of Bologna, Italy

Oral Session 22 | Thermal Management in Power Electronics

Room 124B
Chairs: Xiaoqing Song, Shajjad Chowdhury

3:00PM | A Novel Thermal Modeling Analysis for Liquid Cooled High-power EV Chargers [#1103]
Paul Bradford, Aditya Zade, Shubhangi Gurudiwan and Hongjie Wang
Utah State University, United States

3:20PM | Determination of Suitable Heatsink Layout for a High Density Integrated Motor Drive Through an Effective Comparison Method [#654]
Venkata Raghavendra Itte, Yanda Lyu, Fred Wang, Debanjan Chatterjee and Pietro Cairoli
University of Tennessee, United States; University of Tennessee, Oak Ridge National Laboratory, United States; ABB Inc., United States

3:40PM | Heat Pipe Enhanced Thermal Management System for GaN Switches in an Integrated Modular Motor Drive for Aircraft Propulsion [#640]
Towhidul Chowdhury, Salar Koushan, Seyed Iman Hosseini Sabzevari, Armin Ebrahimian, Xuhui Feng, Ayman EL-Refaie and Nathan Weise
Marquette University, United States

4:00PM | Hybrid Solution Based On Ceramic 3D Printing for Thermal Management in Power Application [#892]
Emmanuel Marcault, Lucile Mage, Marie Beaujard and Regis Delsol
CEA, France

4:20PM | Multi-tier Cooling Solution for 10 kV SiC MOSFET Power Module Featuring Stacked Substrates [#1462]
Xiaoling Li, Hari Pandey, Stephen Pierson, Qiang Wu, Ethan Weems, Yuxiang Chen, Sudharsan Chinnaiyan, Hu Han and Alan Mantooth
University of Arkansas, United States; University Of Arkansas, United States

Oral Session 23 | Medium/High-Frequency Transformer Design and Integration

Room 127C
Chairs: Haiguo Li, Dakai Wang

3:00PM | Design and Assembly of a Low-Parasitic-Capacitance Medium-Frequency [illegible]ansformer [#849]
WITHDRAWN
Yan Zhixing, Luan Sh[illegible], Luo Huan and Zhao Hongbo
Aalborg University, Denmark; Sichuan University, China

3:20PM | Insulation Design of A Loosely Coupled High Isolation Medium Frequency Transformer for Medium Voltage Power Converters [#687]
Fei Teng, Andrew Galamb and Srdjan Lukic
North Carolina State University, United States

3:40PM | A 100kHz 15kW Planar DAB Converter Transformer for Medium Voltage Solid State Transformer Applications [#1571]
Mark Nations and Subhashish Bhattacharya
North Carolina State University, United States

4:00PM | LLC Transformer Design with Independent Inductance Tuning and Reduced Winding Loss [#1309]
Zhihao Zhang, Han Cui, Lingxiao Xue, Bo Chen and Yifeng Wang
Tianjin University, China

4:20PM | Design Method of an Integrated Transformer for a Two-phase Interleaved Flyback PFC Rectifier [#442]
Haruki Hirasawa, Karl Raymond Roque, Sihoon Choi, Yu Yonezawa, Jun Imaoka and Masayoshi Yamamoto
Nagoya University, Japan

Tuesday, October 22 8:30AM – 10:10AM

Oral Session 24 | Multiport Converters for Renewable Energy

Room 121A
Chairs: Weihang Yan, Liliana de Lillo

8:30AM | Modeling and Implementation of a Wave Energy Converter Emulator for Testing Multi-port Power Converters in a Marine DC Microgrid [#1122]
Amiya Haque, Zeljko Pantic and Iqbal Husain
North Carolina State University, United States

8:50AM | Enhanced PV-ESS Integration via Triple Active Bridge Interface in Modular Multilevel Converter-Based STATCOM [#1616]
Hamdan Alosaimi, Hadhlul Aladhyani, Osamah Aljumah, Sulaiman Alshammari, Vasishta Burugula and Subhashish Bhattacharya
North Carolina State University, United States

9:10AM | Wye-Asymmetric Extended-Delta Based Three Phase Dual Active Bridge With Expanded Range of Soft Switching Under Triple Phase Shift Control [#1460]
Mohamed Mansour and Olorunfemi Ojo
Tennessee Tech University, United States; Tennessee Tech. University, United States

9:30AM | A Novel Optimized Switch Count and High Voltage Gain Transformerless Inverter for Solar PV Application [#1779]
Phani Kumar Chamarthi, Shailendra Singh, Nicholas Gregory Baltas, Pedro Rodriguez Cortes, Jun Cao and David Pera
Luxembourg Institute of Science and Technology, Luxembourg

9:50AM | Triple-Phase-Shift Modulated Dual Active Bridge based Single-stage Medium Voltage AC to Low Voltage DC Converter [#1378]
Harisyam Pv, Surjakanta Mazumder, Saichand Kasicheyanula, Mathapati Shashidhar and Kaushik Basu
Indian Institute of Science, Bangalore,, India; Delta Electronics, India, India

Oral Session 25 | Grid-Forming Technologies III

Room 121B
Chairs: Gab-Su Seo, Wenzong Wang

8:30AM | Frequency Support from Grid Forming Inverters: A Power-Domain Impedance Perspective [#998]
Anuradha Mudalige, Heng Wu, Marius Langwasser and Marco Liserre
Kiel University, Germany; Aalborg University, Denmark; Kiel University, Fraunhofer Institute for Silicon Technology ISIT, Germany

8:50AM | Interactions of Machines and Grid-Forming PV in Mixed-Source Microgrids [#570]
Amir Afshari, Amirhossein Iraniparast, Dominic Gross, Wenzong Wang and Jacqueline Baum
University of Wisconsin-Madison, United States; Electric Power Research Institute (EPRI), United States

9:10AM | Transient Stability Improvement of Virtual Synchronous Generators under Current Limitation: The Benefits of Virtual Power Feedback [#110]
Alessia Camboni, Vincenzo Mallemaci, Fabio Mandrile and Radu Bojoi
Politecnico di Torino, Italy

9:30AM | Large-Scale Inverter Integration in Bulk Power Grids Using Heterogeneous Grid-Forming Control Strategies [#515]
Xue Lyu, Quan Nguyen, Shuchismita Biswas, Xiaoyuan Fan and Wei Du
Pacific Northwest National Laboratory, United States

9:50AM | Parameter Design of Dual-loop Control for Grid-Forming Inverter Considering Power Oscillation Damping [#799]
Jingying Guan, Hua Lin and Shaojie Li
Huazhong University of Science and Technology, China

Oral Session 26 | Smart Buildings and Behind-the-Meter Technologies

Room 129A
Chairs: Reza Rezaii, Ala Hussein

8:30AM | Enhancing Grid Stability and Reliability with Grid-Supportive Loads: Implementation, Analysis, and Hardware Testing in a Residential Refrigerator [#137]
Yeongrack Son, Nischal Guruwacharya, Vikram Roy Chowdhury, Michael Blonsky and Barry Mather
National Renewable Energy Laboratory, United States

8:50AM | New Loads and Service Factors for Distribution Transformers Following the Transition to High-Efficiency Heat Pumps, Solar PV, and EV Charging [#1115]
Steven Poore, Rosemary Alden, Tim Rooney and Dan Ionel
Department of Electrical and Computer Engineering, University of Kentucky, United States; SPARK Lab, ECE Department, University of KY, United States; AO Smith, United States

9:10AM | Multi-Carrier Home Energy Management System Using Genetic Algorithms and Random Forest Regression Estimations [#78]
Joel Alpizar-Castillo, Aihui Fu, Laura Ramirez-Elizondo, Milos Svetkovic and Pavol Bauer
Delft University of Technology, Netherlands

9:30AM | Optimal Operation of Multi-energy Microgrids: A Hybrid Methodology Using Stochastic Programming and Generalized Nash Bargaining [#342]
Hualong Liu and Wenyuan Tang
North Carolina State University, United States

9:50AM | Architecture Analysis and Stability Evaluation of High Voltage DC-powered Server Racks [#647]
Qing Lin, Rolando Burgos, Dong Dong, Xiong Li, Haoyang Zheng and Mohammad Nair Aalam
CPES, Virginia Tech, United States; Google LLC, United States

Oral Session 27 | Cybersecurity in Power Electronics and Power Systems

Room 121C
Chairs: Jianwu Zeng, Yu Zeng

8:30AM | False Data Injection Cyberattack Detection in Transmission System Based on Deep Learning and Unscented Kalman Filter [#490]
Fatemeh Sharifi and Ali Mehrizi-Sani
PhD student, United States; Associate Professor, United States

8:50AM | PWM-Based Hardware Authentication for Smart Inverters: Detecting Counterfeit Inverter through Transient Response Analysis [#528]
Chanakya Hingu, Xingang Fu, Ramkrishna Mishan and Taesic Kim
University of Nevada,Reno, United States; University of Missouri-Columbia, United States

9:10AM | Resilient PID Controller for Communication Latency in Interconnected Power Systems [#1648]
Deepak Kumar, G. Lloyds Raja, Omar Al Zaabi, Mohamed Alkhatib and Utkal Ranjan Muduli
NIT Patna, India; Khalifa University, United Arab Emirates; UAE University, United Arab Emirates

9:30AM | Multi-scale Robust Mitigation of Side-channel Noise Intrusion in an Solid-State Transformer [#1797]
Sudip Mazumder, Mateo Greidanus, Debotrinya Sur and Shantanu Gupta
University of Illinois Chicago, United States

9:50AM | A Cyber-Attack Targeting HVDC-Connected Offshore Wind Farms Considering Stability of Grid-Following Power Converters [#1667]
Zhi Jin Zhang, Zexian Zeng, Jiuping Pan and Maryam Saeedifard
Georgia Institute of Technology, United States; Hitachi Energy Research, United States

Oral Session 28 | EV Charging Infrastructures

Room 122A
Chairs: Athar Hanif, Thomas Luo

8:30AM | A Comparison of AC and DC Distribution Architectures for Electric Vehicle High Power Charging Facilities [#300]
Derek Jackson, Emin Ucer, Mithat John Kisacikoglu and Alastair Thurlbeck
National Renewable Energy Laboratory, United States

8:50AM | A Low Footprint Multiport Charging Station Based on Transformerless Series Hybrid Converter [#1658]
Jayant Kumar, Ibhan Chand Rath, Nageswara Rao Karaka and Siba Kumar Patro
Indian Institute of Technology Roorkee, India; Indian Institute of Technology Bombay, India

9:10AM | Hybrid Modulation for a SHB-FB Converter Employed in An Integrated On-board Charger and Auxiliary Power Module [#1701]
Ziwei Liang, Rajib Bijukchhe, Liyan Zhu, Hua Bai, Cebanov Evgheni, Samila Myron, Mojtaba Forouzesh and Phillips Headley
Department of EECS, CURENT, UTK, United States; CPES, VT, United States; Department of EECS, UTK, United States; Advanced Engineering & e-Propulsion, Magna Powertrain Inc., Canada

9:30AM | Pulsating Power Processing through Multi-Active Bridge for Electric Vehicle Charging Applications [#1170]
Md Didarul Alam, Mohammad Mahinur Rahman, Ma Awal, Srdjan Lukic and Iqbal Husain
North Carolina State University, United States

9:50AM | Magnetic Gear WPT: EV Charging Prototype [#1110]
Caleb Dunlap, Charles Van Neste and Pingen Chen
Tennessee Technological University, United States

Oral Session 29 | Multi-Phase AC-DC Converters

Room 122B
Chairs: Mahima Gupta, Sridhar Pulikanti

8:30AM | Y-Configuration Solid State Transformer Module [#1440]
Mafu Zhang, Huanghaohe Zou, Saleh Farzamkia, Chen Chen and Alex Huang
The University of Texas at Austin, United States; the University of Texas at Austin, United States

8:50AM | A Practical Carrier-Based Discontinuous PWM Method of Vienna Rectifier Considering Neutral-Point Voltage Fluctuation [#1030]
Juyeon Lee, Suhyeon Kim and June-Seok Lee
Dankook university, Korea (South); Dankook University, Korea (South)

9:10AM | Single-Stage Isolated Bidirectional Extended-Functionality X-Rectifier for EV Chargers with Three/Single-Phase AC Input Capability [#809]
Daifei Zhang, Sven Weihe, Jonas Huber and Johann Walter Kolar
Power Electronic Systems Laboratory, ETH Zurich, Switzerland

9:30AM | Performance analysis of the Dynamic Voltage Balancing using Series-Connected 15kV SiC IGBT and 10kV SiC MOSFET for Medium Voltage 3L-NPC power converter [#1327]
Sanket Parashar, Shubham Rawat and Bhattacharya Subhashish
NCSU, United States

9:50AM | Design and Development of a Compact GaN Based 3-level Flying Capacitor Inverter [#1598]
Xiang Li and Xiaoqing Song
University of Arkansas, United States

Oral Session 30 | Model Predictive Control in Power Electronics

Room 122C
Chairs: Zhang Zhenbin, Petros Karamanakos

8:30AM | Gradient-Based Predictive Pulse Pattern Control with Improved Steady-State and Dynamic Behavior [#89]
Ilari Hilden, Petros Karamanakos, Tobias Geyer and Shirin Rahmanpour
Tampere University, Finland; ABB Systems Drives, Switzerland

8:50AM | A Digital-Twin-Based Monitoring and Predictive Control Technique for Three-Level Back-to-Back Power Converters [#787]
Haoyu Chen, Huimin Huang, Zhen Li, Yimin Zhang and Zhenbin Zhang
Shandong University, China

9:10AM | Real-time Model Predictive Control of a DC-DC Buck Converter [#678]
Kamlesh Sawant, Ryan Caverly, Jason Poon and Sairaj Dhople
University of Minnesota, Twin Cities, United States; Cal Poly, United States

9:30AM | Optimized DSP-FPGA Communication in CHB-STATCOM with Direct MPC [#797]
Francesco Simonetti, Dezhbord Morteza, Mohamadian Sobhan, Cecati Carlo, D'Innocenzo Alessandro and Roberta Di Fonso
Aalborg University, Denmark; University of L'Aquila, Italy

9:50AM | Novel Finite Control Set Model Predictive Control based Overlap-Time Effect Suppression Technique in High-Power CSI Drive under Stand-Alone Mode [#783]
Tahmin Mahmud and Hang Gao
Washington State University-Vancouver, United States

Oral Session 31 | Control of Multilevel Converters I

Room 129B
Chairs: Marco di Benedetto, Apparao Dekka

8:30AM | Inter-bridge Power-Sharing Capabilities in a Single-Phase 5-level Cascaded H-Bridge Inverter [#213]
Pascal Lingom, Emmanuel Agamloh, Annette Von Juanne, Alex Yokochi, Joseph Song-Manguelle and Roland Unruh
Baylor University, United States; University of Quebec at Trois Rivieres, Canada; Paderborn University, Germany

8:50AM | Steady-State Analysis of Switching Cycle Control of Modular Multilevel Converter [#1384]
Haoyang Zheng, Jayesh Kumar Motwani, Biqi Wang, Qing Lin and Rolando Burgos
Virginia Tech, United States

9:10AM | Arm Energy Estimation based Improved Arm Current Sensor-less Circulating Current Control in MMC [#871]
Swamy Jakkula, Poornachandra Rao Nallamatti and Anshuman Shukla
Indian Institute of Technology Bombay, India

9:30AM | Design of a Digital Multi-mode Control Architecture in a Three-level Flying Capacitor Boost Converter for Improved Energy Efficiency and Fast Transient [#855]
Ruturaj Garnayak, Calvin Paul, Santanu Kapat and Chandan Chakraborty
Indian Institute of Technology Kharagpur, India

9:50AM | Modeling and Control Development of a Cost-Effective Hybrid Modular Multilevel Converter [#1646]
Jayesh Motwani, Dushan Boroyevich and Dong Dong
Center for Power Electronics Systems (CPES), Virginia Tech, United States

Oral Session 32 | IPM and Synchronous Reluctance Machines I

Room 123
Chairs: Nicola Bianchi, Gilsu Choi

8:30AM | Development of a PM-Assisted Synchronous Reluctance Machine with Asymmetrical Flux Barriers Using Dy-Free Nd-Bonded Magnets [#1206]
Junichi Asama, Mikito Kawamura and Ryota Sone
Shizuoka University, Japan

8:50AM | Torque Utility Enhancement of Permanent Magnet Assisted Synchronous Reluctance Machine Using Asymmetrical Flux Barriers [#322]
Seyyed Morteza Mousavi Bafrouei, Aliakbar Damaki Aliabad and Ebrahim Amiri
Yazd University, Iran; California State University, Long Beach, United States

9:10AM | Determination of Rotor-Angle Dependent, Differential Inductances of a Synchronous Reluctance Machine for Different Model Structures [#519]
Andre Haspel, Vasken Ketchedjian, Philipp Marx, Joerg Haarer and Joerg Roth-Stielow
University of Stuttgart, Germany

9:30AM | Enhancing Demagnetization Resistance in Non-Rare-Earth PM-Assisted Synchronous Reluctance Machine using Asymmetric Halbach Array [#1231]
Praveen Kumar, Robin Wilson and Ayman EL-Refaie
Marquette University, United States

9:50AM | Investigating the Effects of Iron Ribs in Brushless Doubly Fed Reluctance Machine [#1457]
Fatima Alzahra Mahmoud and Hussain Hussain
Kuwait University, Kuwait

Oral Session 33 | PMSM Drives

Room 124A
Chairs: Roberto Petrella, Mehdi Farasat

8:30AM | Enhanced Harmonic Current Controller Based on Multiple Synchronous Reference Frame considering Saliency and magnetic Flux Saturation of IPMSMs [#796]
Yunjae Lee, Hwigon Kim, Sungho Kang and Youngdoo Yoon
Department of Automotive Engineering Automotive-Computer Convergence, Hanyang University, Korea, Republic of; Department of Electrical and Computer Engineering Seoul National University, Korea, Republic of; Department of Automotive Engineering, Hanyang University, Korea, Republic of

8:50AM | Pulse Pattern Optimization for IPMSM Considering Voltage, Current and Power Harmonics [#1727]
Maria Martinez, Javier Fuente, Michael Saur, Daniel Fernandez, Juan Manuel Guerrero and Fernando Briz
University of Oviedo, Spain; Mercedes-Benz AG, Germany

9:10AM | Modular and Self-Decoupled Torque Control of Multi-Three-Phase Synchronous Motor Drives [#476]
Luisa Tolosano, Sandro Rubino, Eric Armando, Fabio Mandrile and Radu Bojoi
Politecnico di Torino, Italy

9:30AM | Dual Signal Injection-Based Online Parameter Estimation of Surface-mounted PMSMs Under Sensorless Control [#59]
Peng Wang, Ziqiang Zhu, Dawei Liang, Nuno Freire and Ziad Azar
Sheffield University, United Kingdom; Siemens Gamesa, Denmark; Siemens Gamesa, United Kingdom

9:50AM | Error Compensation Strategy in Encoderless Surface Mounted PMSM Drives [#682]
Milad Bahrami Fard, Majid Ghasemi Korrani, Mohammad Rastegar, Poras Balsara and Babak Fahimi
University of Texas at Dallas, United States

Oral Session 34 | GaN Device Modeling and Characterization

Room 124B
Chairs: Jingcun Liu, Shiqi Ji

8:30AM | Evaluation of Crosstalk-Induced Dynamic RON in GaN-on-Si Monolithic Half-Bridge Power IC [#909]
Xin Yang, Matthew Porter, Qihao Song and Yuhao Zhang
Center for Power Electronics Systems, Virginia Tech, United States

8:50AM | Gate Reliability of P-Gate GaN HEMT: New Circuit Characterization and Switching Lifetime Model [#1611]
Bixuan Wang, Qihao Song and Yuhao Zhang
Center for Power Electronics Systems (CPES), Virginia Tech, United States

9:10AM | Modeling of a Novel GaN-on-AlN/SiC HEMT including Thermal Effects for Circuit Simulation [#469]
Xiaomeng Geng, Nick Wieczorek, Mihaela Wolf, Oliver Hilt and Sibylle Dieckerhoff
Technische Universitaet Berlin, Germany; Ferdinand-Braun-Institut, Germany

9:30AM | Enhancing the Stability of GaN HEMT with a Multi-Functional Monolithic Gate Protection Circuit [#1375]
Qihao Song, Xin Yang, Bixuan Wang, Everest Litchford, Yi Sun, Pengju Kong, Qiang Li and Yuhao Zhang
Center for Power Electronics Systems (CPES), Virginia Tech, United States; Innoscience America, United States

9:50AM | Application of 1.2kV Vertical GaN JFET in MHz Buck Converter [#915]
Xin Yang, Qiuzhe Yang, Ruizhe Zhang, Qihao Song, Everest Litchford, Andy Walker, Subhash Pidaparthi and Yuhao Zhang
Center for Power Electronics Systems, Virginia Tech, United States; NexGen Power Systems, United States

Post Journal Presentation 2

Room 127C
Chairs: Hongbo Zhao, Shafiq Odhano

8:30AM | Effects of Airgaps on Parasitic Capacitance of Magnetic Components [#1815]
Shaokang Luan, Zhixing Yan and Hongbo Zhao
Aalborg University, Denmark

8:50AM | Semi-analytical and Data-Driven Models of Electric Field Strength Considering the Actual Structure of Medium Frequency Transformers [#1819]
Chi Li
Tsinghua University, China

9:10AM | Artificial Intelligence Applications in High-Frequency Magnetic Components Design for Power Electronics Systems: An Overview [#1850]
Xiaobing Shen, Yu Zuo and Jiaze Kong
KU Leuven, Belgium

9:30AM | Electromagnetic Side-Channel Noise Intrusion on Solid-State Transformer [#1813]
Mateo Daniel Roig Greidanus
University of Illinois Chicago, United States

Wednesday, October 23 8:30AM – 10:10AM

Oral Session 35 | Energy Storage I

Room 121A
Chairs: Luca Vancini, Behrooz Mirafzal

8:30AM | A Novel Solar Energy ConversionUsing Supercapacitor Swapping Technology [#1073]
Kavishka Dissanayake, Dulsha Kularatna-Abeywardana, Nitish Patel and Nihal Kularatna
University of Auckland, New Zealand; University of Waikato, New Zealand

8:50AM | A Comparison of Battery Charge Controller Technologies for Wave Energy Converters [#1744]
Alec Schnabel and Ben McGilton
National Renewable Energy Laboratory, United States

9:10AM | Current Source Inverter Drive of an Ironless Motor for Flywheel Batteries [#318]
Giada Sala, Mattia Vogni, Claudio Bianchini, Elena Macrelli and Alberto Bellini
University of Modena and Reggio Emilia, Italy; University of Bologna, Italy

9:30AM | Computationally Efficient Formulation of Flywheel Energy Storage System Components for Real-Time Power Systems Simulation [#422]
Damian Vilchis-Rodriguez, Ognjen Marjanovic, Robin Preece and Mike Barnes
The University of Manchester, United Kingdom

9:50AM | Optimal Management of a Modular Second-Life Battery with Optimal Reference Tracking for Three-Phase Grid Energy Storage [#1801]
Dibyendu Khan, Wei Qiao and Liyan Qu
University of Nebraska-Lincoln, United States

Oral Session 36 | Vehicle-to-Grid (V2G) and Grid-to-Vehicle (G2V) Technologies

Room 121B
Chairs: Marius Langwasser, Nidhi Haryani

8:30AM | Three-Phase 50 kW Compact Contactless Connector for Automated EV Charging System Using Multi-Function Integrated Magnetic Coupler [#565]
Koji Shigeuchi, Yasumitsu Osada, Ishigaki Masanori, Yoshinobu Sugiyama, Katsuya Kobayashi, Akira Yoshizumi and Masaki Okamura
Toyota Central R&D Labs., Inc., Japan; Toyota Motor Corporation, Japan

8:50AM | A 240 Degree Clamped Discontinuous PWM Operated Bidirectional High Efficiency EV Charger with Partial Power Operation [#1580]
Chandrima Chatterjee, Adnan Farooq Khan and Soumya Shubhra Nag
Indian Institute of Technology Delhi, India

9:10AM | EVs and the Grid Work Together: a San Diego Based Study [#1013]
Rafael Aranzabal Obieta, Jose Torre-Bueno and Sridhar Seshagiri
Universidad del Pais Vasco, Spain; Center for Community Energy, San Diego, USA, United States; San Diego State University, San Diego USA, United States

9:30AM | Reinforcement Learning-Based Optimization for Electric Vehicle Dispatch in Renewable Energy Integrated Power Systems [#1493]
SAqib Iqbal and Elif Aydin
Queen Mary University of London, United Kingdom

9:50AM | Coordinated Path Planning and Charging Scheduling in a Charging Station System Using Greedy Best-First Search Algorithm [#1371]
Junyan Shao, Baoze Wei, He Qian, C. Vasquez Juan and M. Guerrero Josep
Aalborg university, Denmark

Oral Session 37 | Machine Learning and AI for IBR-Interfaced Grids

Room 121C
Chairs: Yang Wu, Jinan Zhang

8:30AM | Safe Deep Reinforcement Learning Based Volt-VAR Control for Three-Phase Unbalanced Distribution System with PV Integration [#1324]
Fei Liu and Qianwen Xu
KTH Royal Institute of Technology, Sweden

8:50AM | Optimizing Cylindrical Heatsink Design Topology with Feedforward Neural Networks and NSGA II [#882]
Jiaze Kong, Xiaobing Shen and Wilmar Martinez
KU Leuven – EnergyVille, Belgium

9:10AM | Explainable AI for Fault Detection and Classification in Microgrids [#1788]
Oluwadamilola Ajayi, Mohammadreza Mirjafari, Peter B. Idowu and Md Habib Ullah
Schweitzer Engineering Laboratories, United States; Penn State Harrisburg, United States

9:30AM | Analysis of Transfer Learning for Output Impedance Estimation of Power Electronics Converters [#1175]
Andrea Zilio, Nicola Balasso, Alberto Bregantin, Davide Biadene, Tommaso Caldognetto and Paolo Mattavelli
University of Padova, Italy

9:50AM | Machine Learning Based Power Loss Modeling and Fault Diagnostics for Power Transformer and AC Drive System [#1136]
Zhijun Liu, Kadir Liano, Bijan SayyarRodsari, Yujia Cui, Zhuo Liu, Hao Yang, Haihui Lu, Zhongyuan Cheng and Jiangang Hu
Rockwell Automation, United States; Rockwell Automation, China; Rockwell Automation, Canada

Oral Session 38 | Hydrogen Fuel Cell Traction and Infrastructure

Room 122A
Chairs: Deepak Ronanki, Feng Guo

8:30AM | Operation and Control of Fuel Cell Powered Tower Wagon [#1204]
Rajbala Purnima Priya, Siddhartha Vishwanatha, Vinod Kumar Yadav, Amarendra Edpuganti and Prabodh Bajpai
Indian Institute of Technology Kanpur, India

8:50AM | Advanced Ripple Reduction in Interleaved Boost Converter for Fuel Cell Application [#467]
Seungmin Kim, Seungjin Jo, Seungsoo Kim, Chang-Su Shin, Cheol-hee Jo and Dong-Hee Kim
Chonnam National University, Korea, Republic of

9:10AM | Underactuated Control of Multi-Port Systems with Fuel Cells Using Nonlinear Control [#1207]
Felipe Morales, Sanchez-Squella Antonio, Cisneros Rafael, Ortega Romeo and Valdivia-Lefort Patricio
Universidad Tecnica Federico Santa Maria, Chile; Instituto Tecnologico Autonomo de Mexico, Mexico; Universidad de Santiago, Chile

9:30AM | Design and Modeling of Multi-purpose Control System in a Hybrid Converter Considering Coupling Effect [#1560]
Xueshen Zhang and Yeonho Jeong
University of Rhode Island, United States

9:50AM | A Battery Pack Coupling Coefficient for Scaling a Cell Electrical Model for an All Electric Aircraft Application [#674]
Giuseppe Bossi and Alfonso Damiano
University of Cagliari, Italy

Oral Session 39 | LLC Resonant Converters

Room 122B
Chairs: Suyong Chae, Reza Rezaii

8:30AM | A Medium Voltage Bidirectional Modular LLC Converter With An Extendable Stacked-Switches Leg [#1531]
Maria Ashraf Beshara, Ali Masood Cheema and John Lam
York University, Canada; Northern Transformer, Canada

8:50AM | Design and Implementation of Dual Active Bridge DC-DC Resonant Converter with Dual Phase-Shift Controls for Wide Voltage Range Applications [#399]
Te-Wei Peng, Tsorng-Juu Liang, Shih-Ming Chen, Kim Kien Nghiep Huynh, Xue-Yi Chen and Kai-Hui Chen
National Cheng Kung University, Taiwan; National Cheng Kung University, Viet Nam

9:10AM | A Multiport Configuration of Dual Active Bridge CLLLC Resonant Converter for Solar Powered Electric Vehicle Fast Charging [#341]
Md Safayatullah, Reza Rezaii, Mohammad Nilian and Issa Batarseh
Ford Motor Company, United States; University of Central Florida, United States

9:30AM | Optimal Module Count for ISOP LLC Resonant Converters based on an HF Transformer Genetic Algorithm Optimization in Motorsport Applications [#1638]
Andrea Volpini, Giulia Tresca, Salvatore Campailla, Andrea Dappiano and Pericle Zanchetta
University of Pavia, Italy; Marelli Motorsport, Italy; university of Pavia, Italy

9:50AM | Cascaded Voltage and Power Control for Full-Bridge-Fed CLLC Resonant Converter to Expand Output Voltage Range [#109]
Hung-Chi Chen, Ya-Chun Chang, Lin Jia-Liang and Wu Chih-Chiang
National Yang Ming Chiao Tung University (NYCU), Taiwan; Industrial Technology Research Institute (ITRI), Taiwan

Oral Session 40 | High Frequency DC-DC Converters

Room 129A
Chairs: Yeonho Jeong, Mattia Rossi

8:30AM | Dual PWM Three-level Resonant DC/DC with Voltage Balancing for Stacked Capacitors [#590]
Yu Zuo, Xiaobing Shen, Bangli Du and Wilmar Martinez
KU Leuven-Energyville, Belgium

8:50AM | A DC-Bias Elimination Strategy for Maintaining ZVS in Transient Operations of IGCT-Series-DCT [#323]
Yiqing Ma, Jialiang Hu, Bin Cui, Xueteng Tang, Liang Dong, Long Zhang and Biao Zhao
Tsinghua University, China

9:10AM | Efficient Integrated Magnetics with Winding Cancellation Technique to Reduce Common-Mode EMI Noise for A Single Phase CLLC Converter [#731]
Feng Jin, Tianlong Yuan, Ahmed Nabih, Zheqing Li and Qiang Li
CPES of Virginia Tech, United States

9:30AM | Efficiency Improvement of DAB Converter for Double Line Frequency Oscillating Power Operations in SST by Achieving Zero-Voltage Switching in Low Power Operations [#1789]
Yota Suzuki, Cheng Huang, Tomoyuki Mannen and Takanori Isobe
University of Tsukuba, Japan

9:50AM | Design Optimization of a 3.3 V Bus Converter for Vertical Power Delivery in Next-Generation Processors [#1484]
Yan Liang, Pranav Raj Prakash, Ahmed Nabih and Qiang Li
Virginia Tech, United States; NVIDIA Corporation, United States

Oral Session 41 | EMI Design and Considerations in Power Electronics

Room 122C
Chairs: Dong Dong, Subham Sahoo

8:30AM | CM EMI Evaluation of Totem-Pole and HERIC Single-Phase PFC Converters [#921]
Theo Gruber, Franz Vollmaier, Thomas Langbauer, Roberto Petrella and Michael Hartmann
Silicon Austria Labs GmbH, Austria; Graz University of Technology, Austria

8:50AM | Solid State Transformer Design to Reduce Common Mode Conducted EMI [#595]
Colin Ball, Alexander Julian and Giovanna Oriti
Naval Postgraduate School, United States; Independent Researcher and Consultant, United States

9:10AM | Investigation of Conducted EMI Emissions in Auxiliary Circuitry of 10 kV SiC MOSFET Based Power Electronics Building Blocks (PEBB) [#832]
Ashkan Barzkar, He Song, Mamoru Sasaki, Arthur Mendes, Mingze Gao, Rolando Burgos, Vladimir Mitrovic, Dong Dong and Dushan Boroyevich
Virginia Tech, United States

9:30AM | Modeling and Reduction of Radiated Emission Caused by Isolated Gate Drivers in Wide Bandgap Half-bridge-based Power Modules [#726]
Yirui Yang, Yanwen Lai, Huang Qinghui and Wang Shuo
University of Florida, United States

9:50AM | Experimental Investigation of Common Mode Current Generation in a Novel Dual Active Bridge Converter ZVS Modulation Pattern [#1165]
Kubilay Sahin, Jean-Luc Schanen, Sebastien Mariethoz and Yann Cuenin
Bern University of Applied Sciences, Switzerland; Grenoble Alpes University, France; Studer Innotec SA, Switzerland

Oral Session 42 | IPM and Synchronous Reluctance Machines II

Room 123
Chairs: Narges Taran, Gerd Bramerdorfer

8:30AM | Study on Magnet Eddy Current Loss under Voltage Source Inverter Operation and Voltage Pulse Pattern for its Loss Reduction [#668]
Kensuke Sasaki and Kan Akatsu
Nissan Motor Co., Ltd., Japan; Yokohama National University, Japan

8:50AM | MnBi IPMSM and PMASynRM Torque Density Limitations due to Temperature-Dependent Demagnetization [#18]
Ryan Brody, Paul Ohodnicki and Brandon Grainger
University of Pittsburgh, United States

9:10AM | Implementation of adaptive Laser Machining Techniques in Synchronous Reluctance Machine Design [#664]
Alexander Stewart, Nick Simpson and Phil Mellor
University of Bristol, United Kingdom

9:30AM | Performance Derating of Multi-Three-Phase PM-Assisted Synchronous Reluctance Motors in Open-Three-Phase Fault Conditions [#656]
Simone Ferrari, Sandro Rubino, Fabio Mandrile, Andrei Bojoi, Eric Armando and Gianmario Pellegrino
Politecnico di Torino, Italy

9:50AM | A Novel Dual-layer PM Variable Leakage Flux Machine for Electrified Vehicle Applications [#626]
Dabin Liu, Hui Yang, Xing Liu, Rui Tu, Ya Li, Xiping Liu, Shuhua Fang, Yiming Shen and Heyun Lin
Southeast University, China; Anhui University, China; Jiangxi University of Science and Technology, China; Nanyang Technological University, Singapore

Oral Session 43 | Predictive Control of Motor Drives

Room 124A
Chairs: Marcello Pucci, Weiqiang Chen

8:30AM | High-precision Discrete-time Model Free Predictive Control Considering Disturbance Frequency under Low Carrier Ratio [#453]
Zhihao Song, Wenxi Yao, Wuhua Li and Kevin Lee
Zhejiang University, China; Eaton, United States

8:50AM | A Simplified Active Vector Pre-selection Method for Direct and Modulated Predictive Torque Control with Extended Voltage Set in PMSM Drives [#1508]
Sodiq Agoro, Samuel Osei Fobi and Iqbal Husain
ABB Inc., United States; North Carolina State University, United States

9:10AM | Fixed-Switching Frequency Model Predictive Current Control of PMSM: Closed-Form Solution in the Rotating Reference Frame Suitable for Salient Machines [#1764]
Riccardo Breda, Erik Colavitto, Sandro Calligaro, Roberto Petrella and Bulent Sarlioglu
Wisconsin Electric Machines Power Electronics Consortium (WEMPEC) University of Wisconsin-Madiso, United States; University of Udine, Italy

9:30AM | Model Predictive Control for Wound Rotor Synchronous Machines Based on Closed-Form Solution and Fixed Switching Frequency [#1574]
Riccardo Breda, Erik Colavitto, Sandro Calligaro, Roberto Petrella and Bulent Sarlioglu
Wisconsin Electric Machines & Power Electronics Consortium (WEMPEC) University of Wisconsin – Ma, United States; University of Udine, Italy

9:50AM | Simplified Model Predictive Current Control of a Mono-Inverter Dual Parallel Permanent Magnet Synchronous Motors [#133]
Hyung-Woo Lee and Kyo-Beum Lee
Ajou University, Korea, Republic of

Oral Session 44 | Packaging and Integration of WBG Devices

Room 124B
Chairs: Francesco Iannuzzo, Dingrui Li

8:30AM | A Non-Linear Damping Technique for Gate Voltage Oscillation Mitigation In SiC Mosfets Parallel Operation [#1715]
Boyi Zhang, Ruxi Wang, Peter Barbosa and Po-Chun Huang
Delta Electronics (Americas) Ltd., United States; Delta Electronics Inc., United States

8:50AM | Multi-Layer Organic Substrate-Based SiC Full-Bridge Module for a Power Electronics Building Block [#1066]
Narayanan Rajagopal, Taha Moaz, Vladimir Mitrovic, Marie Lawson, Christina DiMarino and Dushan Boroyevich
Virginia Tech, United States

9:10AM | SiC Power Module Design using Flip Chip Configuration to Reduce Common-Mode Noise [#398]
Thiyu Warnakulasooriya, Sihoon Choi, Yu Yonezawa, Koichi Shigematsu, Jun Imaoka and Masayoshi Yamamoto
Nagoya University, Japan

9:30AM | Design of Integrated Gate Drivers for High-Frequency Press-Pack SiC Switch Cells [#1487]
Ekaterina Muravleva, Youssef Abotaleb, Jun Wang and Jerry Hudgins
University of Nebraska-Lincoln, United States

9:50AM | Design and Characterization of 1.2 kV Optically-isolated Half-bridge Modules for High Temperature Operation [#520]
Sudharsan Chinnaiyan, Pengyu Lai, Xiaoling Li, Colin Sim, Salahaldein Ahmed, Md Helal Uddin Maruf, Yuxiang Chen, Zhong Chen, Morgan E. Ware and H. Alan Mantooth
University of Arkansas, Fayetteville, AR,USA, United States

Oral Session 45 | Emerging Technologies 2

Room 129B
Chairs: Ashish Kumar, Hongbo Zhao

8:30AM | Soft Switched MEMS Power Relay Using a Resonant Auxiliary Circuit [#1304]
Mohammed Agamy, Maja Harfman-Todorovic and Ahmed K. Khamis
University at Albany – State University of New York, United States; Menlo Microsystems Inc., United States

8:50AM | Conduction Lead Design and Optimization for Cryogenic Characterization of GaN HEMTs [#1049]
Tian Qiu, Zheyu Zhang and Purushottam Khadka
Rensselaer Polytechnic Institute, United States

9:10AM | Junction Temperature Ripple Modeling and Validation for SiC MOSFETs. [#1107]
Veera Bharath Gandluru and Yuequan Hu
Wolfspeed, United States

9:30AM | Design Considerations for Layout and Testing of SiC Three-level T-type Phase-Leg [#1286]
Jingjie Xu, Youjun Yue, Li Zhang, Jian Yang, Yuhao Wang, Tianxiang Yin and Lei Lin
Huazhong University of Science and Technology, China

9:50AM | A Novel Grounding Resistance Based Active Common-Mode EMI Filter with Enhanced Safety [#414]
Junzhao Zhang, Dong Jiang, Jianrui Liu and Yechi Zhang
Huazhong University of Science and Technology, China; Dalian Maritime University, China

Post Journal Presentation 3

Room 127C
Chairs: AK Arafat, Stefano Bifaretti

8:30AM | Coordinated Charging Scheme for Electric Vehicle Fast-Charging Station with Demand-based Priority [#1856]
Dingsong Cui, David Dorrell and Shuo Wang
Univisity of Leeds, United Kingdom; University of Turku, Finland; Beijing Institute of Technology, China

8:50AM | Bidirectional Onboard Chargers for Electric Vehicles: State-of-the-Art and Future Trends [#1840]
Hans Wouters and Wilmar Martinez
KU Leuven – EnergyVille, Belgium

9:10AM | A Simplified Large-Signal Model-Based Control for Dual Active Bridge Series Resonant Converter to Achieve Uniform Dynamic Response [#1864]
Kousik Ghosh
IIT Madras, India

9:30AM | Data-Light Physics-Informed Modeling for the Modulation Optimization of a Dual-Active-Bridge Converter [#1844]
Xinze Li
Nanyang Technological University, Singapore

Wednesday, October 23 10:40AM – 12:20PM

Oral Session 46 | Hydrogen Applications

Room 121A
Chairs: Rahul Mallik, Dinesh Kumar

10:40AM | Improving PEM Hydrogen Electrolyser Efficiency using AC Excitation [#225]
Thea Larsen, Seho Kim, John Kennedy and Jingjing Liu
The University of Auckland, New Zealand; GNS Science, New Zealand

11:00AM | Comparative Analysis of Distribution Systems in Stand-Alone Wind-to-Hydrogen Plants [#73]
Thibaut Runser and Rik W. De Doncker
Siemens Energy, Germany; E.ON Energy Research Center, Germany

11:20AM | Maximizing Green Hydrogen Production Efficiency for Hybrid Energy Storage and Solar Photovoltaic Systems: A Design Methodology [#807]
Cristian Blanco, Sergio Diaz, Angel Navarro-Rodriguez, Cassiano Rech and Pablo Garcia
LEMUR Research Group. University of Oviedo, Spain; Federal Universtity of Santa Maria (UFSM), Brazil

11:40AM | A Multilevel Current Source Converter with 19kA Output Capacity for Large-Scale Hydrogen Electrolyzer [#987]
Zhou Tianji, Zhao Biao, Lou Yantao, Sun Xiaoping, He An, Yang Liu, Wu Yue and Tang Xueteng
Department of Electrical Engineering, Tsinghua University, China; Department of DC Research, Xi'an Xidian Power System Co., Ltd., China; State Key Laboratory of HVDC, Electric Power Research Institute, China Southern Power Grid, China

12:00PM | Test Platform for Silicon Carbide-based Medium Voltage Electrolysis Converter [#178]
Martin Kjaer, Morten Nielsen, Stig-Munk Nielsen, Florin Iov, Ramkrishan Maheshwari, Prashant Surana, Ankur Srivastava and Thomas Ebel
Aalborg University, Denmark; University of Southern Denmark, Denmark; IIT Roorkee, India

Oral Session 47 | Converters in Renewable Energy Systems I

Room 127C
Chairs: Bowen Yang, Gab-Su Seo

10:40AM | A Hybrid Perturbation Technique for Wideband Online Impedance Spectroscopy Measurements of PV Panels Using a DC-DC Converter [#42]
Awingot Akparibo and Paul Barendse
University of Cape Town, Ashesi University, Ghana; University of Cape Town, South Africa

11:00AM | A Modular Series Bridge Multilevel Converter for Grid Forming Application with Enhanced Current Rating [#1633]
Ajay Singh Negi, Anil Kumar Tiwari and Siba Kumar Patro
Indian Institute of Technology Roorkee, India

11:20AM | A Unified PV-based Control Strategy for Voltage Regulation [#548]
Anjan Debnath, Sukanta Roy, Alexander Stevenson, Temitayo Olowu, Mohd Tariq and Arif Sarwat
Florida International University, United States

11:40AM | Simple and Highly Efficient Distributed Power Flow Controller Based on Partial Power Conversion [#782]
Yian Hu, Reki Soeta, Kenji Natori and Yukihiko Sato
Chiba university, Japan

12:00PM | A Novel Two-Phase Isolated Buck Converter with Increased Inductor Frequency and Low Diode-bridge Stress [#1092]
Jamil Muhammad Khan and Ashraf Ali Khan
Memorial University of Newfoundland, Canada

Oral Session 48 | Grid-Connected Power Converter Control

Room 121B
Chairs: Vikram Roy Chowdhury, Marius Langwasser

10:40AM | Robust All Band Pass Filter Configuration as Orthogonal Signal Generator in Three-Phase Prefilter Based PLL [#1661]
Adeola Balogun, Temiladeola Oladugba, Abdullahi Bamigbade, Sodiq Agoro, Olorunfemi Ojo and Frank Okafor
University of Lagos, Nigeria; New York University, United States; ABB Inc., United States; Tennessee Tech. University, United States

11:00AM | Coupling Quantization Among Control Loops of Parallel Grid-Following and Grid-Forming Inverters [#982]
Zhe Zhang, Yi Xiao, Hao Ruan, Yongheng Yang and Frede Blaabjerg
Zhejiang University, China; Aalborg University, Denmark

11:20AM | Real-Time Digital Simulation, Modeling and Control of a Grid Connected Distributed Energy Storage for Supervisory Control [#955]
Akansha Garg, Peter R Green and Mike Barnes
The University of Manchester, United Kingdom

11:40AM | Linear Quadratic Regulator-based Controller for Control Mode Switching Under Fault Operation of Grid-Connected PV with Supercapacitor System [#543]
Paychuda Kritprajun, Leon Tolbert, Nattapat Praisuwanna, Jingxin Wang, Yunting Liu and Maximiliano Ferrari
The University of Tennessee, Knoxville, United States; The Pennsylvania State University, United States; Oak Ridge National Laboratory, United States

12:00PM | Dynamic Co-Simulation of Distributed Energy Resource Management Systems Utilizing Random Battery Energy Storage and Photovoltaic Penetrations [#1363]
Shaun Duerr
Marquette University, United States

Oral Session 49 | Hybrid and Electric Vehicle Power Electronics

Room 122A
Chairs: Khorshed Alam, Liwei Zhou

10:40AM | A High-Power Compact Segmented Traction Drive Inverter [#1495]
Gui-Jia Su, Jon Wilkins, Clayton Hickey, Cliff White, Burak Ozpineci and Emre Gurpinar
Oak Ridge National Lab, United States

11:00AM | Control of MVDC Bus in Electric Ships Using Multiphase Hybrid Generator [#547]
Mahzad Gholamian, Omid Beik, Wajiha Ateeq and Owais Manzoor
Colorado School of Mines, United States; North Dakota State University, United States

11:20AM | Investigation of 10-kW Cryogenic Bidirectional DC-DC Converter for Electric Aircraft [#1312]
Jiawen Xi, Xianwu Zeng, Peilin Liu, Gowtham Galla, Ravi-Kiran Surapaneni, Ludovic Ybanez and Xiaoze Pei
University of Bath, United Kingdom; Airbus UpNext, Germany; Airbus UpNext, France

11:40AM | A Novel Technical Approach for Battery Self-Heating in Electric Vehicles based on Inherent Resonance [#688]
Feifan Ji, Zihao Chen, Yanjun Li, Cun Wu, Tong Wang and Yan Liu
Hangzhou City University, China; Zhejiang Leapmotor Technology Co., Ltd., China

12:00PM | A 200 kW (62 kW/L) Traction Inverter for Next Generation Electric Vehicles [#819]
Srdjan Srdic, Chi Zhang and Srdjan Lukic
EGSTON Power Electronics, Austria; Delta Electronics, United States; North Carolina State University, United States

Oral Session 50 | AC-DC Converters

Room 122B
Chairs: John Lam, Yeonho Jeong

10:40AM | Quasi-Fixed Frequency Triangular Modulation for Matrix-Type AC-DC Dual Active Bridge Converter with Enhanced Battery Charging [#196]
Priyatosh Jena, Rajeev Kumar Singh and Vivek Nandan Lal
Indian Institute of Technology (BHU) Varanasi, India

11:00AM | Operation Characteristics of an Active Buffer DAB AC-DC Converter with a Wide Output Voltage Range [#224]
Shohei Komeda, Sindisiwe Malanda, Kain Arai, Hiroyasu Kifune, Shunsuke Takuma and Yoshiya Ohnuma
Tokyo Univ. of Marine Science and Technology, Japan; Nagaoka Power Electronics Co., Ltd., Japan

11:20AM | A New Half-Bridge/Dual-Stacked-Switches Structured Electrolytic Capacitor-less AC/DC Bi-Directional On-Board Charger for High Voltage EV Battery [#1438]
Siamak Derakhshan and John Lam
York University, Canada

11:40AM | Comparison between an isolated AC-DC Matrix Converter and a Conventional On-Board Charger Topology for Electric Vehicle Application [#964]
Paulius Pazera, Lee Empringham, Liliana De Lillo and Stewart Marchant
University of Nottingham, United Kingdom

12:00PM | Robust Fixed-Frequency Sliding Mode Control Based on Sequential Control Logic for a Four-level FCML Totem-pole PFC Converter [#746]
Naveed Ishraq and Ayan Mallik
Arizona State University, United States

Oral Session 51 | Single Phase DC-AC Converters

Room 129A
Chairs: Dongbin Hou, Rashmi Prasad

10:40AM | High Power Dense 1-ph 3-port Converter for On-board EV Charging Application [#988]
Suman Mandal, Subhasree Mondal, Anshuman Shukla and Suryanarayana Doolla
Indian Institute of Technology Bombay, India

11:00AM | Partially Variable Switching Frequency Based Soft-Switched Triple-Phase Shift modulation for DC-AC DAB [#758]
Saikat Dey and Ayan Mallik
Arizona State University, United States

11:20AM | A Single-Stage Double-Side LCL Resonant Mode Microinverter for grid-tied PV applications [#1743]
Chenmin Deng, YiHao Wu, Tim Merkin and Alex Hanson
University of Texas at Austin, United States; Texas Instruments, United States

11:40AM | Wireless DC-AC Inverter with Secondary Side SR Duty Cycle Modulation and Unfolding Stage [#117]
Hsin-Che Hsieh, Bryan Gutierrez, Seunghoon Baek and Jih-Sheng Lai
Virginia Tech, United States; Qcells, United States

12:00PM | T-type Inverter in both Continuous and Discontinuous Current Mode for Active Power Decoupling Capability [#879]
Ryohei Higashide, Rintaro Kusui, Hiroki Watanabe, Yuki Nakata and Jun-ichi Itoh
Nagaoka University of Technology, Japan

Oral Session 52 | Modeling and Control of Resonant Converters

Room 122C
Chairs: Petros Karamanakos, Sante Pugliese

10:40AM | A Non-approximated Steady State Model-derived Semiconductor Loss Optimization for Resonant CLLC [#744]
Shubham Mungekar, Ayan Mallik and Akin Akturk
Arizona State University, United States; CoolCAD Electronics, United States

11:00AM | Time Domain Analysis for PWM Mode of CLLLC Converter [#805]
Dohong Lee, Bonggook Kim, Xuanxi Liu and Younghoon Cho
Department of Electrical Engineering, Konkuk University, Korea (South)

11:20AM | Multi-Objective Optimal Design for LLC Converter Based on TDA and Surrogate Model for High Accuracy and Low Computational Burden [#725]
Su-Seong Park, Seon-Ho Yang and Rae-Young Kim
Energy Power Electronics Control System Lab, Hanyang University, Korea (South)

11:40AM | Selective Secondary Phase-Shift Control for High Gain in LLC Converters with Matrix Transformers [#1377]
Pranav Raj Prakash and Qiang Li
Center for Power Electronics Systems, Virginia Tech, United States

12:00PM | A Merged ZCS/ZVS Control Technique for Resonant Switched-Capacitor Converters [#1366]
Haifah B Sambo, Yicheng Zhu and Robert Pilawa-Podgurski
University of California, Berkeley, United States

Oral Session 53 | Machine Learning in Modeling and Control of Power Converters

Room 121C
Chairs: Yonghao Gui, Qianwen Xu

10:40AM | Feedback Control of CLLLC Resonant DC-DC Converters Using Deep Reinforcement Learning [#646]
Oroghene Oboreh-Snapps, Angshuman Sharma, Jonathan Saelens, Arnold A. Fernandes, Sophia A. Strathman, Lauryn Morris, Praneeth Uddarraju and Jonathan W. Kimball
1898 and Co., a Part of Burns and McDonnell, United States; TDK-Lambda Americas, United States; Missouri University of Science and Technology, United States

11:00AM | Digital Twin Based Identification of Passive Parameters of Three-phase Boost Rectifier using a GRU Neural Network [#1301]
Giulia Di Nezio, Giorgia Ghione, Marco di Benedetto, Vincenzo Randazzo and Luca Solero
Roma Tre University, Italy; Politecnico di Torino, Italy

11:20AM | Model Free Reinforcement Learning Based Controller For Grid-tied 9-Level Packed-E-Cell Multi-level Inverter [#145]
Alamera Nouran Alquennah, Abdelbasset Krama, Haitham Abu-Rub, Ali Ghrayeb and Sertac Bayhan
Texas A&M University, United States; Hamad Bin Khalifa University, Qatar; Texas A&M University at Qatar, Qatar

11:40AM | Data-driven Predictive Control for Power Converter with Multi-step Reinforcement Learning [#1349]
Wan Yihao, Zhang Yang and Xu Qianwen
KTH Royal Institute of Technology, Sweden

12:00PM | Deep Learning-Based Dynamic Modeling of Three-Phase Voltage Source Inverters [#1012]
Sunil Subedi, Liang Qiao, Yaosuo Xue, Yonghao Gui, Francis Tuffner and Wei Du
Oak Ridge National Laboratory, United States; University of Tennessee Knoxville, United States; Pacific Northwest National Laboratory, United States

Oral Session 54 | Modeling and Analysis of Electrical Machines I

Room 123
Chairs: Prerit Pramod, Simone Ferrari

10:40AM | Dynamic Models for Electrically Excited Synchronous Machines based on Flux-to-Current and Current-to-Inductance Maps [#610]
Lorenzo Perilli, Federica Graffeo, Sandro Rubino and Silvio Vaschetto
Politecnico di Torino, Italy

11:00AM | A Unified Circuit View of Multiphysics Finite Element Analysis via Discrete Exterior Calculus Part II: 2D Dynamic Fields [#104]
Mehran Keivanimehr and Baoyun Ge
University of Florida, United States; Georgia Institute of Technology, United States

11:20AM | Estimation of Heat Transfer Coefficients on Hairpin Windings for Automotive Traction Motors with Flooded Stator Cooling [#429]
George Batho, Peter Connor, Tianjie Zou, Adam Walker, Liam Portanier Mifsud, Oliver Tweedy, Hailin Huang, Xiang Ren, Chris Gerada and Christian Egger
PEMC Research Group, University of Nottingham, United Kingdom; Corporate Research, Robert Bosch GmbH, Renningen, Germany

11:40AM | Life Cycle Assessment of Electrical Machines – A Case Study [#113]
Rafal Wrobel, Mohammad Ali Rajaeifar and Barrie Mecrow
Newcastle University, United Kingdom

12:00PM | Novel Liquid Cooled Condenser Design for Non-Uniform Loss Distribution in Additively Manufactured Windings With Integrated Heat Pipes [#1769]
Salar Koushan, Towhid Chowdhury, Ali Alqarni and Ayman EL-Refaie
Marquette University, United States

Oral Session 55 | Bearingless and High-Speed Machines

Room 129B
Chairs: Eric Severson, Wolfgang Gruber

10:40AM | Damping Effect of Diamagnetic Bearingless Motor with Highly Oriented Pyrolytic Graphite Rotor [#1348]
Shotaro Meki and Hiroya Sugimoto
Tokyo Denki University, Japan

11:00AM | Scaling of High-Speed Surface PM Bearingless Machines [#1157]
WaiYan Chan, Takahiro Noguchi and Eric Severson
University of Wisconsin-Madison, United States; University of Minnesota-Twin Cities, United States

11:20AM | Voltage Disturbance Compensation for Thrust Suspension Using Zero-Sequence Current in 5-Axis Actively Controlled Bearingless Motor [#1642]
Yusuke Fujii, Kaito Tanaka, Akira Chiba, Kenta Tagami, Takuya Sakuragi, Tatsuya Tonari and Yusuke Irino
Tokyo Institute of Technology, Japan; Daikin Industries, Ltd, Japan

11:40AM | An Innovative Design of a Permanent Magnet-Assisted Synchronous Reluctance Motor to Improve Torque Performance for High Speed Applications [#591]
Md Jabed Hossain, Paxton Schroeder, Josef Frankhouse and Roy A. McCann
University of Arkansas, United States

12:00PM | Capacitive-Coupling Active Damper for LCL-Equipped HSPMSM Drives With Inverter-Current Feedback-Only [#623]
Jiaxin Zhou, Fei Peng, Yunkai Huang and Yu Yao
Southeast University, China; Southeast University, Associate Professor, China; Southeast University, Professor, China; Southeast University, Lecturer, China

Oral Session 56 | Modulation Strategies in Electric Drives

Room 124A
Chairs: Di Zhang, Luca Vancini

10:40AM | Harmonic Voltage Feed-Forward Compensation for Torque Ripple Reduction of PMSMs Operating in Overmodulation Region [#860]
Taehoon Chin, Sungmin Lee, Jae-Sang Lim, Jin-Wook Kang and Younghoon Cho
Department of Electrical Engineering, Konkuk University, Korea (South); Hyundai Motor Company, Korea (South)

11:00AM | Selection of Position Sensor Resolution for Variable Speed Drives Based on Quantization Harmonic Rejection [#1665]
Luigi Danilo Tornello, Giacomo Scelba and Giulio De Donato
University of Catania, Italy; University of Rome La Sapienza, Italy

11:20AM | A Separated Switching PWM Method to Reduce Bearing Currents [#1023]
Kerrie Spaven, Brent Gagas, Brian Gallert and Brian Welchko
General Motors, United States

11:40AM | Optimizing Vector Selection for Model Predictive Direct Torque Control [#1338]
Gustavo Rodrigues Adelino, Nady Rocha, Bruna Seibel Gehrke, Darlan Fernandes and Edison da Silva
Federal University of Paraiba, Brazil

12:00PM | Increasing Inverter Current Capability Utilizing Junction Temperature-Based Discontinuous PWM [#945]
Ujjwal Kumar, Siddharth Ballal and Caleb Secrest
BorgWarner Inc., United States

Oral Session 57 | SiC Device Modeling, Sensing, and Characterization

Room 124B
Chairs: Jose Ortiz Gonzalez, Amy Romero

10:40AM | PINN-Assisted Physical Model of SiC MOSFETs: A Leap in Efficiency and Accuracy [#284]
Xinlian Li, Chong Zhu, Yansong Lu, Xu Lu, Fei Lu and Xi Zhang
Shanghai Jiao Tong University, China; Drexel University, United States

11:00AM | Improvement Turn on Loss Simulation Accuracy by Nonlinear Voltage Dependence Modeling of Gate Source Capacitance [#247]
Takuto Hayashi, Kazuhiro Umetani, Masataka Ishihara, Hiroto Sakai, Yuta Okawauchi, Kotaro Kobashi and Eiji Hiraki
Okayama University, Japan; ROHM Co., Lt, Japan

11:20AM | An Improved di/dt-Based Dynamic Current RC Sensing Method for Paralleled SiC MOSFETs [#862]
Che-Wei Chang, Matthias Spieler, Rolando Burgos, Ayman EL-Refaie, Renato A. Torres and Dong Dong
Virginia Polytechnic Institute and State University, United States; Marquette University, United States; General Motors, United States

11:40AM | A Novel Multi-Stage Ensemble Method for Online Junction Temperature Estimation of SiC MOSFET [#770]
Zekun Li, Puzhen Yu and Bing Ji
University of Leicester, United Kingdom

12:00PM | Performance Evaluation of SiC MOSFET Hybrid Switches with Reverse Conducting IGBTs [#510]
Arkadeep Deb, Jose Ortiz Gonzalez, Saeed Jahdi, Richard McMahon, Ruizhu Wu and Olayiwola Alatise
University of Warwick, United Kingdom; University of Bristol, United Kingdom; Chongqing Jinkang Powertrain New Energy Co., Ltd., China

Wednesday, October 23 2:00PM – 3:40PM

Oral Session 58 | Converters in Renewable Energy Systems II

Room 121A
Chairs: Vikram Roy Chowdhury, Minghui Lu

2:00PM | Design of a 100W 95.7%-Efficient (2.5V-4V)-to-360V Bidirectional Ultra High Gain DC/DC Converter for Cell-integrated Power Electronics [#740]
Writtik Dutta, Naveed Ishraq, Ayan Mallik and Trevor Warren
Arizona State University, United States; HigherWire Inc., United States

2:20PM | Design of a Multi-Mode Input-Parallel-Output-Series Power Optimizer for Wide-Voltage Range Photovoltaic Applications [#273]
Stefano Cerutti, Mario Giuseppe Pavone, Francesco Gennaro, Natale Aiello, Francesco Musolino and Paolo Stefano Crovetti
Politecnico di Torino, Italy; STMicroelectronics, Italy

2:40PM | Non-Isolated High-Gain DC-DC Converter for Hybrid-Inverter Application [#856]
Reza Rezaii, Mohammad Nilian and Issa Batarseh
University of Central Florida, United States; University of Central Florida, United States

3:00PM | Characteristics-based Design of a DC-DC Series Resonant Converter with Voltage Doubler Rectifier for Photovoltaic Applications [#1162]
Kalla Rama Krishna, Utsab Kundu and Vinod John
Indian Institute of Science Bengaluru, India

3:20PM | Flexible High Voltage Gain Converter Based on Switched LC Cells with Common Ground for DC Microgrid [#430]
Sajid Kamal, Motiur Reza, Avneet Kumar, Yichen Zhang, Wei-Jen Lee and Kory Evanson
IIT patna, India; Khalifa University UAE, United Arab Emirates; IIT Patna, India; University of Texas at Arlington, United States; General Electrodynamics Corporation, United States

Oral Session 59 | Grid Enhancing Technologies (GETs)

Room 121B
Chairs: Ma Awal, Giovanni De Carne

2:00PM | E-STATCOM Damping for Secondary Voltage Control of Wind Power Plants Considering Communication Delays [#1034]
Shan He, Behnam Daftary Besheli, Federico Cecati, Liang Huang, Frede Blaabjerg and Marco Liserre
Aalborg University, Denmark; Kiel University, Germany

2:20PM | Voltage Balancing Design, Experiment and Application for High Voltage Converter with Series-Connected IGBTs [#500]
Juanjuan Lu, Yunfei Xu, Weiguo Li, Xianzhe Bao, Qingping Li and Xutao Li
State Grid Smart Grid Research Institute Co., Ltd, China; Electric Power Research Institute of State Grid Ningxia Electric Power Co. Ltd, China

2:40PM | A Third Harmonic Voltage Injection Technique to Improve The Power Transmission Capacity [#716]
Anubrata Das, Fred Wang and Yaosuo Xue
University of Tennessee Knoxville, United States; Oak Ridge National Laboratory, United States

3:00PM | Multiterminal High-Voltage dc Systems with Series-Parallel Valve Group-Based High-Voltage dc Substations [#872]
Sreenivasa Jaldanki and Suman Debnath
Oak Ridge National Laboraroty, United States

3:20PM | Control Study of Enhanced STATCOM for Supercapacitor Applying Virtual Synchronous Generator Control [#313]
Kaho Nada, Toshiyuki Fujii and Kenichiro Sano
Mitsubishi Electric, Japan; Tokyo Institute of Technology, Japan

Oral Session 60 | Capacitive Wireless Power Transfer for Transportation

Room 122A
Chairs: Shuai Shao, Sina Vahid

2:00PM | Comparison of Air Core versus Ferrite Core Inductors for Capacitive Wireless EV Charging Systems [#1188]
Subhabrata Basak, Utsab Kundu and Loganathan Umanand
Indian Institute of Science, India

2:20PM | A Phase angle Measurement based Approach for Characterization of Capacitive Couplers for Wireless EV Charging [#1271]
Subhabrata Basak, Utsab Kundu and Loganathan Umanand
Indian Institute of Science, India

2:40PM | An Optimized Two-Module Capacitive Wireless Power Transfer System for EV Charging [#1630]
Ayush Dixit and Sreyam Sinha
Indian Institute of Technology Delhi, India

3:00PM | Design of Vertical Aligned Capacitive Couplers for Wireless Charging Applications [#465]
Gyanendra Tiwari and Deepak Ronanki
Indian Institute of Technology Madras, India

3:20PM | Self-Resonant Capacitive Power Transfer System Leveraging Printed-Circuit-Board Coupler with Integrated Compensation Inductance [#147]
Yao Wang, Kaiyuan Wang, Kerui Li, Yun Yang and Shu Yuen Ron Hui
Nanyang Technological University, Singapore; The University of Hong Kong, Hong Kong

Oral Session 61 | On-board Battery Chargers

Room 129B
Chairs: Thomas Luo, Athar Hanif

2:00PM | A New Integrated Onboard Battery Charger for LEVs Featuring FPGA-Enhanced Precision Delay Time Control for Four-Step Switching AC-AC Converter [#1491]
Peng-Hao Huang, Vishwam Raval, Agustin Perez, Abner Mendoza, Neeharika Baireddy and Prasad Enjeti
Texas A&M University, United States

2:20PM | A Three phase 22kW Soft Switching Based Two-stage Onboard Charger [#996]
Gibum Yu, Tianlong Yuan, Xingyu Chen and Qiang Li
Center for Power Electronics Systems, Virginia Polytechnic Institute and State University, United States

2:40PM | Planar Transformer with High Leakage Inductance Integration for Resonant Converters [#1409]
Liyan Zhu and Qiang Li
Virginia Tech, United States

3:00PM | Basic Study on Onboard Wireless Power Transfer System Integrating Auxiliary Battery Charger [#1184]
Ryosuke Ota and Haruto Miyake
Tokyo Metropolitan University, Japan

3:20PM | 22kW High-Efficiency High-Power-Density Bidirectional DCDC Converter with Surface Mount SiC MOSFETs for OBCs [#226]
Hailin Wang, Yuequan Hu and Zongzeng Hu
Wolfspeed, China; Wolfspeed, United States

Oral Session 62 | Modular Power Converters

Room 122B
Chairs: Todd Monson, Luca Tarisciotti

2:00PM | 3.3kV SiC-Based Local Power Supply for Modular Solid State Transformer Applications [#1592]
Pranit Pawar, Wensong Yu, Ali Shahabi, Jonathan Hoffman and Cam Pham
NC State University, United States; Microchip Technology, United States

2:20PM | A Bidirectional Single-Inductor Multiple-Output (SIMO) Buck-Boost Converter for Multi-Coil Wireless Power Transfer Applications [#258]
Chuyue Ji, Albert Ting Leung Lee, Jiayang Wu, Yunhe Hou and Ngai Wong
The University of Hong Kong, Hong Kong

2:40PM | Advanced Control for Modularized Bridge Rectifier Solid-State Transformers in MVAC-LVDC Applications [#1757]
Giacomo Andrioli, Sandro Calligaro, Jonas Huber, Johann W. Kolar and Roberto Petrella
PEMD Lab, DPIA, University of Udine, Italy; Power Electronic Systems Laboratory, ETH Zurich, Switzerland

3:00PM | A Modular Commutated Converter With DC-Fault Ride-Through Capability for Overhead-Line-Based VSC-HVDC Application [#496]
Ruihang Bai, Biao Zhao, Xueyin Zhang, Lin Wang, Zhanqing Yu and Rong Zeng
Tsinghua University, China; Tsinghua Sichuan Energy Internet Research Institute, China

3:20PM | A Modular, Non-Resonant Multi-Output Inverter for Use in Flexible Cooking Surfaces [#877]
Felix Rehm, Jan Philipp Klein, Hector Sarnago, Ruediger Schwendemann and Marc Hiller
Karlsruhe Institute of Technology (KIT), Germany; University of Zaragoza, Spain

Oral Session 63 | Topology of Multi-Level Converters

Room 129A
Chairs: Philippe Gray, Slavko Mocevic

2:00PM | A Three-Level Improved NPC (3L-INPC) Topology with Higher Voltage Gain [#896]
Marif Daula Siddique, Prasanth Sundararajan, Mrutyunjaya Sahani and Sanjib Kumar Panda
National University of Singapore, Singapore

2:20PM | Nonlinear Capacitance-based Accurate ZVS Analysis for Full-Bridge T-Type-based Resonant Converters [#1501]
Shubhangi Gurudiwan, Aditya Zade, Hongjie Wang and Regan Zane
Utah State University, United States

2:40PM | Investigation of Pole-to-Pole DC Voltage and Circulating Current on Design Requirements of Full-Bridge Modular Multilevel Converter [#944]
Sohrab Mohtat, Massimo Bongiorno, Mebtu Bihonegn Beza and Jan R Svensson
Chalmers University of Technology, Sweden; Hitachi Energy, Sweden

3:00PM | A Single-Phase MMC-based Solid-State Transformer Suitable for EV Charging [#1079]
Xi Lan and Peter Lehn
University of Toronto, Canada

3:20PM | Development of a 13.8 kV, 22 kV DC, 1.1 MVA, 7-Level Multi-Cell Converter based on 10 kV SiC MOSFETs [#1519]
David Nam, Arthur Mendes, Ning Yan, Mingze Gao, Mitrovic Vladimir, Joshua Stewart, Xiang Lin, Dong Dong and Rolando Burgos
Virginia Tech, CPES, United States; The Aerospace Corporation, United States; TESLA, United States

Oral Session 64 | Control of Power Converters I

Room 122C
Chairs: Wenzong Wang, Andrea Formentini

2:00PM | Deadbeat Control of Three-Phase Sinusoidal Output Y-Inverter for Automotive Powertrains [#420]
Federico Campanelli, Fabio Mandrile, Sandro Rubino, Eric Armando and Radu Bojoi
Politecnico di Torino, Italy

2:20PM | Model Free Predictive Control of a Triple Active Bridge for High Dynamic Performance Without the Decoupling Matrix [#1229]
Md Didarul Alam, Samuel Osei Fobi, Wensong Yu, Srdjan Lukic and Iqbal Husain
North Carolina State University, United States

2:40PM | Virtual Input Dampers of Dual Active Bridge Converter [#720]
Lunbo Deng, Guohua Zhou, Wenjun Zeng and Nengmou Xu
Southwest Jiaotong Univerisity, China

3:00PM | A Method for Stabilizing Dual Active Bridge – Based Energy Storage Systems [#1387]
Bhanu Shankar Babaiahgari and Md Habib Ullah
Assistant Professor, United States

3:20PM | Digital Control of a Multilevel Interleaved DC-DC GaN Converter for Fuel Cell Traction Applications [#890]
Stefano Savio, Simone Giuffrida, Fabio Mandrile, Fausto Stella, Eric Armando and Radu Bojoi
Politecnico di Torino, Italy

Oral Session 65 | Reliability and Diagnostics of Power Converters

Room 121C
Chairs: Dominik Koch, Mateja Novak

2:00PM | A Modulation Scheme for Dynamic AC Power Cycling Based on the Opposition Method [#403]
Tobias Fink, Kevin Munoz Baron, Jeremy Nuzzo, Ruben Schnitzler, Dominik Koch and Ingmar Kallfass
University of Stuttgart, Germany

2:20PM | Impact of Environmental Conditions on the Remaining Useful Lifetime of SiC MOSFET [#1664]
Md Zakir Hasan, Ashik Amin, Md Moniruzzaman, Seungdeog Choi, Prashant Singh and Chun-Hung Liu
Mississippi state university, United States; University of Tennessee, United States

2:40PM | Online Estimation of MOSFET Ron Through Extended Kalman Filter [#507]
Miguel Fernandez-Costales, Jose Antonio Fernandez-Alvarez, Manuel Arias Perez de Azpeitia, Pablo F. Miaja and Jesus Oliver
University of Oviedo, Spain; Universidad de Oviedo, Spain; European Space Agency, Spain

3:00PM | A Novel Method for Locating Open-circuit Fault of Three-level FC Converters without Additional Sensors [#446]
Jiewei He, Zicheng Liu, Dong Jiang, Xuan Zhao, Xiangwen Sun and Ronghai Qu
Huazhong University of Science and Technology, China

3:20PM | Thermal Stress Analysis of Dual Active Bridge DC-DC Converter Under Battery Pulsed Current Charging Strategy [#375]
Erdem Akboy, Muhammad Usman Tahir, Ariya Sangwongwanich, Daniel Ioan Stroe and Frede Blaabjerg
D. of Electrical Eng Yildiz Technical University, Turkey; Department of Energy, Aalborg University, Denmark

Oral Session 66 Modeling and Analysis of Electrical Machines II

Room 123
Chairs: Shanelle Foster, Bingnan Wang

2:00PM | Design and Analysis of Asymmetric Flux Reversal Permanent Magnet Linear Machine with Halbach PM Array [#1306]
Yiming Shen, Yanlei Yu, Xuhui Zhu and Christopher Lee
Nanyang Technological University, Singapore; Nantong University, China

2:20PM | Electric Drive System Analysis and Control Optimization with IPM Machines in Overmodulation and Six-Step Region [#1048]
Le Chang, Cheng Gong, Song He, Daniel Berry and Mohammad Anwar
General Motors, United States

2:40PM | Tensor Representation of Electric Machine Windings and its Connection with Winding Functions [#584]
Dillon Vann and Baoyun Ge
University of Florida, United States; Georgia Institute of Technology, United States

3:00PM | Implementation of Highly Non-linear, Flux-based Unified Machine Models on a Rapid Prototyping Controller-Hardware-in-the-Loop System [#930]
Benedikt Schmitz-Rode, Leonard Geier, Lukas Stefanski, Sophie Knierim, Andreas Liske and Marc Hiller
Karlsruhe Institute of Technology (KIT), Germany

3:20PM | Hybrid Thermal Network Identification for Sensorless Temperature Monitoring of a PMSM Considering Speed-Dependent Cooling Effects [#1153]
Thomas Krainer, Gerd Bramerdorfer, Daniel Woeckinger and Stephen Chukwulobe
Johannes Kepler University Linz, Austria; Hanning Elektro-Werke GmbH & Co. KG, Germany

Oral Session 67 | Electric Drives General

Room 124A
Chairs: Rashmi Prasad, Ali Bazzi

2:00PM | Power Compensation Strategy for Dual Inverter with Small Capacitors Driven by Single-Phase Power to Extend Motor Operating Region [#413]
Taiju Sakurai and Haga Hitoshi
Shizuoka University, Japan

2:20PM | Extended MTPA Control of Adjustable Field Permanent Magnet Synchronous Motor Using Zero-Sequence Current [#359]
Kiyohiro Iwama, Yutaro Hiyoshi and Toshihiko Noguchi
Shizuoka University, Japan

2:40PM | Improved Single Active Vector PWM for Low Carrier Ratios to Achieve Linear Gain over the Entire Modulation Region [#488]
Wenjing Zhang, Wenxi Yao, Shan Li and Grahame Holmes
Zhejiang University, China; RMIT University, Australia

3:00PM | Comprehensive Flux-Weakening and Analytical Extended MTPA Control Featuring Transient Torque Compensation for Hybrid Excited Synchronous Machines [#1736]
Riccardo Breda, Nicola Andreon, Sandro Calligaro and Roberto Petrella
DPIA – University of Udine, Italy

3:20PM | Copper-Loss-Minimizing Strategy based on Single Look-Up Table for Wound Field Synchronous Machine [#838]
Joon-Seok Kim, DoHyeon Kim, June-Hee Lee and June-Seok Lee
Dankook University, Korea (South); Korea Railroad Research Institute, Korea (South)

Oral Session 68 | PCB-Based Components and Integration

Room 124B
Chairs: Dong Dong, Xin Zan

2:00PM | Millimeter Thick Magnetic Print Circuit Boards with a High Relative Permeability of 50 to 150 and Related Devices [#1372]
Xiaoling Shi, Hwaider Lin, Hui Lu, Rui Huang and Nian X. Sun
Winchester Technologies, LLC, United States; Northeastern University, United States; Northeastern Univeristy, United States

2:20PM | Design and Modelling of a Mega-Hertz PCB Resonator with Hybrid Inductive and Capacitive Wireless Power Transfer Capability [#494]
Kerui Li, Jiayang Wu, Siew Chong Tan and Ron Hui
The University of Hong Kong, Hong Kong

2:40PM | Winding Loss Analysis of PCB Winding Litz Wire [#1596]
Zhangwei Xiang, Zheqing Li, Jung-Soo Bae and Qiang Li
Virginia Polytechnic Institute and State University, United States

3:00PM | The Standard Cell SiC Die Embedding High Performance and Scalable Power Electronics Integration Approach [#1730]
Ameer Janabi, Luke Shillaber, Wucheng Ying, Wei Mu, Borong Hu, Xufu Ren and Teng Long
University of Cambridge, United Kingdom

3:20PM | A SiC Power Module in PCB-DBC Hybrid Packaging for Ultra-Low Parasitics and Flexible Integration [#700]
Jinpeng Cheng, Liyu Yao, Hao Feng and Li Ran
Chongqing University, China; University of Warwick, United Kingdom

Post Journal Presentation 4

Room 127C
Chairs: Minghui Lu, Francesco Iannuzzo

2:00PM | Comprehensive Modeling of a Back-to-Back Diodes-Based Linear Variable Capacitor [#1845]
Ujjwal Pratik and Zeljko Pantic
North Carolina State University, United States

2:20PM | Minimizing Output Capacitance Loss in GaN Power HEMT [#1821]
Qihao Song
Center for Power Electronics (CPES), Virginia Tech, United States

2:40PM | Integrated Common-Mode Filter for GaN Power Module With Improved High-Frequency EMI Performance [#1826]
Niu Jia and Xingyue Tian
University of Tennessee, United States

3:00PM | Design Considerations, Development, and Experimental Validation of a 3.3 kV SiC-Based Reverse Voltage Blocking Half Bridge Module for Current Source Inverter Application [#1867]
Sneha Narasimhan and Subhashish Bhattacharya
North Carolina State University, United States

Wednesday, October 23 4:10PM – 5:50PM

Oral Session 69 | Photovoltaic Systems

Room 121A
Chairs: Cristina Terlizzi, Behrooz Mirafzal

4:10PM | A High-Gain Medium-Voltage Transformerless CSI for Photovoltaic Systems [#684]
Mohammadjavad Hassani and Qiang Wei
Lakehead University, Canada

4:30PM | Steady-State Analysis of the Constant Power Region in Distributed Maximum Power Point Tracking Architecture with Photovoltaic Applications [#254]
Guanying Chu, Qinglei Bu and Meilin Yang
Xi'an Jiaotong-Liverpool University, China

4:50PM | Optimal DC-DC MIC Selection for a Series Stack of PV Modules Connected to the Grid Through a Variable DC Voltage Inverter [#865]
Morteza Esteki, Mohammad Daryaei and Ali Khajehoddin
University of Alberta, Canada

5:10PM | Beta-Particle-Filter Method for Sensorless Solar Tracking Systems under Partial Shading Conditions [#498]
Ming Huang, Jieming Ma, Ka Lok Man, Steven Guan and Xue Zhang
Xi'an Jiaotong-Liverpool University, China; University of Liverpool, United Kingdom

5:30PM | Energy Self-Sufficiency Assessment of a Novel Low-Light Enhanced Photovoltaic Model in the Residential Sector [#297]
Alexis Aguilar Celis, Hongjian Sun, Christopher Groves and Pratik Harsh
Durham University, United Kingdom

Oral Session 70 | Grid Stability and Power Quality

Room 121B
Chairs: Wenzong Wang, Matthew Storm

4:10PM | Switching between MPPT and VSG Controls for Utility-Scale Photovoltaic Plants to Mitigate Power System Oscillations [#983]
Rajan Ratnakumar and Ganesh Kumar Venayagamoorthy
Clemson University, United States

4:30PM | Partitioning of Large-Scale Power Electronics-Based Power Systems for Small-Signal Stability Analysis [#1780]
Nupur Nupur, Yaosuo Xue and Fred Wang
University of Tennessee Knoxville, United States; Oak Ridge National Laboratory, United States

4:50PM | Virtual Resistor Control for Inverter-Based Resource with Long Underground Cables [#1628]
Bokang Zhou, Jinli Zhu, Yuchen He, Yuan Li and Fang Peng
ABB Inc., United States; Florida State University, United States

5:10PM | Effective Stability Contribution of Reactive Power from Grid-Following and Grid-Forming Converters [#810]
Hao Ruan, Yi Xiao, Guang Hu, Yongheng Yang, Haoze Luo and Marta Molinas
Zhejiang University, China; Norwegian University of Science and Technology, Norway

5:30PM | Control of Green Hydrogen Production on Isolated Hybrid Solar Plants Considering the Effect of Communications [#1288]
Daniel del Rivero, Angel Navarro-Rodriguez, Carlos Gomez-Aleixandre, Cristian Blanco, Pablo Garcia and Pedro Rodriguez
University of Oviedo, Spain; Luxembourg Institute of Science and Technology (LIST), Luxembourg

Oral Session 71 | Applications of Electric Traction and Propulsion

Room 122A
Chairs: AK Arafat, Sina Vahid

4:10PM | Design of Grid-Forming Control for AC-AC Modular Multilevel Converter in Railway Traction System [#1230]
Yang Zhang, Kamil Swiderski and Qianwen Xu
KTH Royal Institute of Technology, Sweden

4:30PM | Optimization-Based Comparative System Evaluation of Single and Dual Traction Inverters with Focus on Partial Load Efficiency and Chip Area [#518]
Christoph Sachs, Fabian Stamer, Jan Allgeier, Martin Neuburger and Duleepa Thrimawithana
Esslingen University of Applied Sciences, Germany; Robert Bosch GmbH, Germany; The University of Auckland, New Zealand

4:50PM | Design of a 75kW Three-Level DC/DC GaN Converter for Automotive Fuel-cell Application [#381]
Simone Giuffrida, Stefano Savio, Fabio Mandrile, Fausto Stella, Eric Armando and Radu Bojoi
Politecnico di Torino, Italy

5:10PM | A Three Phase Unfolding Based Solid-State Traction Transformer for Railway Application [#821]
Adnan Farooq Khan, Soumya Shubhra Nag and Bhim Singh
Indian Institute of Technology Delhi, India

5:30PM | 800V, 500kW High Power Density SiC Traction Inverter for Electric Vehicles [#1155]
Rashmi Prasad, Muhammad Alvi, Ronald Grover, Suresh Gopalakrishnan, Mohamed Kamel and Chunhao Lee
General Motors, United States

Oral Session 72 | Control of DC-AC Converters

Room 122B
Chairs: Shuo Wang, Wenkang Huang

4:10PM | High Frequency Three-Phase CRM Inverter with Integrated Magnetics for Auxiliary Power Supply in Railway Applications [#1239]
Xingyu Chen, Gibong Son, Zhengrong Huang, Feng Jin and Qiang Li
Virginia Tech, United States; Tesla, United States; Analog Devices Inc., United States

4:30PM | A Buck-Boost Current-Controlled Permanent Magnet Synchronous Motor Drive with Stiff Motor Terminal Voltage and Current Waveforms [#1429]
Daisy Delgado-Zaragoza and Mahima Gupta
Portland State University, United States; University of Wisconsin-Madison, United States

4:50PM | A Novel Soft-Switching Scheme for Three-Phase DC/AC Universal Minimal Converters (UMC) [#1536]
Ruomu Hao, Satish Belkhode, Joseph Benzaquen and Deepak Divan
Georgia Institute of Technology, United States

5:10PM | Implementation of Advanced Grid Support Functionalities by Smart Operation of Residential Loads with Low Cost Converter Interface [#1402]
Vikram Roy Chowdhury, Yeongrack Son, Nischal Guruwacharya, Michael Blonsky and Barry Mather
National Renewable Energy Laboratory, United States

5:30PM | On The Analysis of the Losses of the Resonant Inductor in ARCP Inverters [#1000]
Eddy Aeloiza, Bernhard Wunsch, Stanislav Skibin, Francisco Canales and Weiqiang Chen
ABB, United States; ABB, Switzerland

Oral Session 73 | Resonant and Soft Switched Converters

Room 129A
Chairs: Anshuman Shukla, Xin Zan

4:10PM | A High-Frequency Soft Switched Inverter with a Low-Loss and Low Device Stress Auxiliary ZVT Circuit for High-Voltage Applications [#1621]
Arnab Acharya, Vivek Thomas Chacko and Raja Ayyanar
Arizona State University, United States

4:30PM | 500-kHz Operated Three-Phase Grid-Tied Inverter Using GaN-HEMTs Enabled by DCM-Based ZVS Control Utilizing Device Parasitic Capacitance [#1700]
Takeru Yoshizato, Cheng Huang, Tomoyuki Mannen and Takanori Isobe
University of Tsukuba, Japan

4:50PM | Design and Development of A Family of Non-Isolated Three-Port DC-DC Converters for Hybrid Energy Systems Application [#159]
Pouya Zolfi, Sina Vahid and Ayman EL-Refaie
Marquette University, United States

5:10PM | Analysis and Performance Improvement of Hybrid DAB over Wide Operating Region with a Novel Optimized Modulation Scheme [#1008]
Nikhil Suresh Patil and Anshuman Shukla
Indian Institute of Technology Bombay, India

5:30PM | High-Performance Wide Operating Range Impedance Control Network-based Single-Stage Onboard Electric Vehicle Charger Using Reconfigurable Active Bridges [#1318]
Dheeraj Etta, Firehiwot Gurara and Khurram K. Afridi
Cornell University, United States

Oral Session 74 | Stability Aspects in Power Electronics Systems

Room 122C
Chairs: Sewan Choi, Heng Wu

4:10PM | Physical Interpretation of Synchronization Stability of Grid-Following Inverters from Two Reference Frames Perspective [#197]
Liang Huang, Chao Wu, Dao Zhou, Frede Blaabjerg, Sanjay Chaudhary and Shan He
Aalborg University, Denmark; Shanghai Jiao Tong University, China

4:30PM | Capacitor Current Feedback Active Damping with Generalized Integrator-Based Differentiator for LCL-type Inverters [#1163]
Deokyong Woo and Sungmin Kim
Hanyang University, ERICA campus, Korea (South)

4:50PM | Robust Stability Analysis of P-HIL in Power Converters Testing Under Asymmetrical Grid Faults [#141]
Riccardo Sancio, Sante Pugliese, Marco Liserre and Finn Bathel
Kiel University, Germany; nttb GmbH, Germany

5:10PM | Comprehensive Modeling and Measurement of the Control Influence on Impedance at Critical LCL Frequencies for a 50 kHz SiC Converter [#603]
Dominik Schulz, Ruediger Schwendemann, Andreas Liske and Marc Hiller
Karlsruhe Institute of Technology (KIT), ETI, Germany

5:30PM | Stability Analysis of Grid-connected VSC-HVDC Systems with Compensated dq Domain Time Delay Models [#10]
Shuai Wang, Robin Preece and Mike Barnes
The University of Manchester, United Kingdom

Oral Session 75 | Control of Power Converters II

Room 121C
Chairs: Wensong Yu, Minghui Lu

4:10PM | Split-Phase Inverter with Hybrid ZCS-ZVS Modulation for the DC-Link Voltage Balancer [#1087]
Md Tanvir Ahammed and Wensong Yu
North Carolina State University, United States; NC State University, United States

4:30PM | A Single-Sensor Balancing Technique for Flying-Capacitor Odd-Level Converters [#502]
Siddharth Iyer, Sayan Paul, Dragan Maksimovic and Luca Corradini
University of Colorado Boulder, United States

4:50PM | Sensorless Oriented Control of PWM Rectifier using Kalman Filter and Proportional-Resonant Regulators [#605]
Federico Centi, Andrea Credo, Giuseppe Fabri, Francesco Parasiliti Collazzo and Marco Tursini
University of L'Aquila, Italy

5:10PM | Frequency Domain Design Techniques in Voltage Mode Controlled Series Capacitor Buck Converters for Fast Dynamic Performance [#854]
Prantik Majumder, Anirban Nanda, Santanu Kapat and Debaprasad Kastha
Indian Institute of Technology Kharagpur, India

5:30PM | A Constant Current Control Method for Primary Side-Regulation Flyback Converter without Low Frequency Ripple and Sub-Harmonic Oscillation [#418]
Chong Wang, Xu Wang, Hao Cheng, Daying Sun and Wenhua Gu
Nanjing University of Science& Technology, China

Oral Session 76 | Materials, Losses, Thermal and Manufacturing Issues I

Room 123
Chairs: Takashi Kato, Md Sariful Islam

4:10PM | Reduction of the Circulating Current for Concentrated Winding Electrical Machines with Multi-Parallel Strands by Bundle Inversion [#1112]
Junichi Asama, Takumi Kono and Hiroshi Shida
Shizuoka University, Japan; Innovative Motor Design, Co., Ltd., Japan

4:30PM | A Comparison of the Electrical Endurance of Plasma Sprayed Aluminum Oxide to Existing Insulation Materials [#709]
Brian Wolhaupter, Anjana Samarakoon and Kiruba Haran
University of Illinois at Urbana-Champaign, United States

4:50PM | Computation of PWM Induced Winding AC Loss in Closely Integrated Motor Drives [#1399]
Philp Mellor, Andrew Hopkins and Nick Simpson
University of Bristol, United Kingdom

5:10PM | Slot Wall Extensions for Improved Thermal Performance of Electric Machines [#150]
Gokhan Cakal, Thomas M. Jahns and Bulent Sarlioglu
University of Wisconsin-Madison, United States

5:30PM | Comparison of Core Loss Characteristics of Interior PM and Flux-Switching PM Machines for EV Applications [#1267]
Jaesung Choi, Gwan-Hui Jang, Jungmoon Kang, Gilsu Choi, Christoph Dobler and Gerd Bramerdorfer
Inha University, Korea (South); Johannes Kepler University, Austria

Oral Session 77 | Switched Reluctance and Flux Switching Machines

Room 129B
Chairs: Kyohei Kiyota, Udochukwu B. Akuru

4:10PM | An Analytical Lumped Parameter Model for the Bearingless Separated-Stator Flux-Switching Slice Motor [#1398]
Stefan Mallinger and Wolfgang Gruber
Johannes Kepler University Linz, Austria

4:30PM | A Novel Switched Reluctance Motor with Semi-Hard Material in Rotor for High-Speed Applications [#1260]
Aydin Yousefi Javid, Alireza Sohrabzadeh, Hossein Torkaman, Solmaz Kahourzade, Amin Mahmoudi and Wen Soong
Department of Electrical Engineering, Islamic Azad University, Iran; Faculty of Electrical Engineering, Shahid Beheshti University, Iran; Shahid Beheshti University, Iran; University of South Australia, Australia; Flinders University, Australia; University of Adelaide, Australia

4:50PM | Proposal of 12-Pole 20-Slot Five-Phase Multi-Mode Reluctance Motor [#1489]
Ryo Kokubu and Kyohei Kiyota
Tokyo Institute of Technology, Japan, Japan

5:10PM | High-power Density Wound-Field Flux-Switching Machine with Modular Rotor Design for Traction Applications [#986]
Mostafa Fereydoonian and Woongkul Lee
Purdue University, United States

5:30PM | Analysis and Design of Synchronous Machines with Reluctance Rotor and PM Stator Combined Excitation [#1005]
Oluwaseun A. Badewa and Dan M. Ionel
SPARK Lab, ECE Dept., University of Kentucky, United States; SPARK Lab, ECE Department, University of KY, United States

Oral Session 78 | Traction and Aircraft Drives

Room 124A
Chairs: Chen-Yen Yu, Ahmed Hembel

4:10PM | Direct Flux Vector Control of Electrically Excited Synchronous Machines for Electrical Vehicles [#419]
Alessandro Ionta, Sandro Rubino, Fabio Mandrile, Federica Graffeo, Radu Bojoi and Eric Armando
Politecnico di Torino, Italy

4:30PM | Nonlinear, Bidirectional Control of Three-Stage Aircraft Generators [#64]
Jonathan Hall, Ethan Kowalski, Jose Del Castillo and Julia Zhang
The Ohio State University, United States; University of Wisconsin-Madison, United States; Safran Electrical and Power, United States

4:50PM | Current Ripple Reduction Control for Ultra-multipole Permanent Magnet Synchronous Motors for Electric Vehicle Traction Motors [#14]
Takafumi Hara, Toshifumi Sakai, Shun Taniguchi, Toshiyuki Ajima, Makoto Ito, Tetsuya Suto and Akeshi Takahashi
Hitachi, Ltd., Japan

5:10PM | Development and Testing of a Fault-Tolerant Modular Motor Drive using a PM Machine with Isolated Modules [#1557]
Pengkun Tian, Xiaoyuan Zhang, Ken Chen, Thomas Jahns and Bulent Sarlioglu
University of Wisconsin-Madison, United States

5:30PM | Fault-ride Through in a Dual-lane Fault Tolerant PMSM Drive [#190]
Stephen McDonald, Barrie Mecrow, Dave Winterborne and Maamar Benarous
Newcastle University, United Kingdom; Newcastle Univeresity, United Kingdom; Collins Aerospace, United Kingdom

Oral Session 79 | Monitoring and State Estimation of Electric Drives

Room 127C
Chairs: Siddharth Ballal, Huangjie Gong

4:10PM | Online Detection of Resistance in Each Phase of Multi-Sector PMSM for Condition Monitoring [#961]
Shusen Ni, Yuzhi Chen, Chaohui Liu and Zedong Zheng
Tsinghua University, China; ational New Energy Vehicle Technology Innovation Center, China

4:30PM | Flux Observer based Demagnetization Detection Inaccuracy under Position Sensor Faults [#15]
Ramitha Dissanayake and Sandun Kuruppu
Western Michigan University, United States

4:50PM | A Novel 1D-CNN Open Circuit Fault Diagnosis for PMSM Drives Using Normalized Current Space Vector Sorting [#286]
Weiqian Li, Huanyu Li, Xiao Chen, Antonio Griffo and Xiangyu Sun
University of Sheffield, United Kingdom

5:10PM | Inverter-fed Based Electrical Machine Stator Winding Moisture Condensation Detection [#1796]
F. Laborda Diego, Orviz Zapico Marcos, G-A. Tiemblo Javier, Lee Sang Bin, Faizan Muhammad Shaikh and Reigosa David
Universidad de Oviedo, Spain; Korea University, Korea (South)

5:30PM | Natural Fault-Tolerant Model Predictive Voltage Control for Symmetrical Six-Phase Vernier Permanent Magnet Motor with Open-Phase Fault [#817]
Wenbo Dai, Xianglin Li, Jun Dai, Yujian Zhao, Chen Tang and Kai Wang
Qingdao Universitv, China; Ningbo Geely Luoyou Engine Parts Co., LTD, China; Southeast University, China; Nanjing University of Aeronautics and Astronautics, China

Oral Session 80 | Loss Characterization and Modeling for Active and Magnetic Components

Room 124B
Chairs: Han Cui, Ruirui Chen

4:10PM | Calorimetric Evaluation of Soft-Switching Mechanisms in MOSFET-based Converters [#1070]
Antonios Mavromatakis, Konstantinos Manos and Antonios Antonopoulos
National Technical University of Athens, Greece

4:30PM | Load Test Method for High-Frequency Transformers Using Two Power Supplies and a Capacitor [#1775]
Koji Orikawa, Shion Soeda and Ogasawara Satoshi
Hokkaido University, Japan; Nagoya University, Japan

4:50PM | Magnetization Mechanism-Inspired Neural Network for Core Loss Estimation [#649]
Qiujie Huang, Yang Li, Jianguo Zhu and Sinan Li
University of Sydney, Australia; Tsinghua University, China

5:10PM | Extrapolation Ability for Generative Adversarial Network Based High-Frequency Inductor Iron Loss Model with DC Bias [#578]
Xiaobing Shen, Yu Zuo, Diego Bernal Cobaleda, Jiaze Kong and Wilmar Martinez
KU Leuven – EnergyVille, Belgium

5:30PM | Beyond Two-Dimensional Losses in Solenoidal Inductors with Distributed Gaps [#1043]
Rajaie Nassar, Qingrui Yuchi, Aakash Kamalapur, Mark Cairnie, Guo-Quan Lu, Christina DiMarino and Khai Ngo
Center for Power Electronics Systems (CPES), The Bradley Department of ECE, Virginia Tech, United States

Thursday, October 24 8:30AM – 10:10AM

Oral Session 81 | Wind Energy Grid Integration

Room 121A
Chairs: Weihang Yan, Liliana de Lillo

8:30AM | A Platform-less Voltage Sourced HVDC Collection System for Offshore Windfarms using Series-Connected Distributed Diode Rectifiers [#234]
Sakshi Singh, Dheeman Chatterjee and Tanmoy Bhattacharya
Indian Institute of Technology, Kharagpur, India

8:50AM | Active structural Control of Floating Offshore Wind Turbine Based on PID Controller and Resonant Filter [#1425]
Rene Descartes Olimpio Pereira, Clauson Sales do Nascimento Rios, Juan Pedro Reboucas Moreira, Felipe Teles do Nascimento, Marcio Venicio Ramos Limaverde, Thyago Chrystiann da Silva Lopes, Marcus Vinicius Silverio Costa, Victor de Paula Brandao Aguiar and Ricardo Silva The Pontes
Federal Rural University of the Semi-arid Region, Brazil; Federal Institute of Education, Science and Technology of Ceara, Brazil; Federal University of Ceara, Brazil

9:10AM | Automated Testing of Step-up Transformers in Solar and Wind Power Generation Systems [#160]
Byambasuren Battulga, Muhamad Faizan Shaikh, Sang Bin Lee and Mohamed Osama
Korea University, Korea (South); General Electric, Germany

9:30AM | Modeling and Power-hardware-in-the-loop Validation of Synchronous Wind: An Inverterless Grid-Forming Wind Power Plant [#1749]
Weihang Yan, Vahan Gevorgian, Przemyslaw Koralewicz, Robb Wallen, S M Shafiul Alam, Tanveer Hussain and Juan Gallego-Calderon
National Renewable Energy Laboratory, United States; Idaho National Laboratory, United States

9:50AM | Critical Evaluation of Dual-Speed Grid-Strengthening Synchronous Wind Generators [#929]
Ryno Gerber and Maarten Jan Kamper
Stellenbosch University, Department of Electrical and Electronic Engineering, South Africa

Oral Session 82 | Solid-State Transformers

Room 121B
Chairs: Joseph Benzaquen, Rajendra Prasad Kandula

8:30AM | Improved DC Link Voltage Balancing in an MV-Compliant Solid-State Transformer [#707]
Vasishta Burugula, Mark Nations, Osamah Aljumah, Shrivatsal Sharma, Shubham Dhiman, Subhashish Bhattacharya and Yos Prabowo
North Carolina State University, United States; Ion Mobility, Indonesia

8:50AM | Design and Validation of A 2MW 10KV Medium-voltage Solid State Transformer [#840]
Jianxiong Yu, Cheng Luo, Jiajie Duan, Cheng Wang, Rui Lu, Antonio Trujillo, Chushan Li and Wuhua Li
Eaton, China; Eaton, United States; Zhejiang University, China

9:10AM | Development of a Solid State Transformer for HEMP/GMD Common Mode Current Mitigation [#291]
Timothy Donnelly and Lee Rashkin
Sandia National Laboratories, United States

9:30AM | A QAB-Based SST DC Charging System for Light Rail Transit Trains [#436]
Mei-Fang Wang and Tzung-Lin Lee
National Sun Yat-sen University, Taiwan

9:50AM | Asymmetrical Bidirectional DC-DC Converter for Economical Solid-State Transformer [#927]
Zuo Chen, Xiang'er Shen, Hanbing Xiao, Jianjun Ma and Miao Zhu
Shanghai Jiao Tong University, China

Oral Session 83 | DC Microgrids

Room 127C
Chairs: Vikram Roy Chowdhury, Zhi Jin Zhang

8:30AM | Beating Frequency Analysis for Feedforward-Controlled Converters in DC Microgrids [#120]
Debora Pereira Damasceno, Mateus Pinheiro Dias, Jose Carlos Ugaz Pena, Paolo Sbabo, Kaihang Zhang, Jose Antenor Pomilio and Paolo Mattavelli
University of Campinas -UNICAMP, Brazil; University of Padua-UNIPD, Italy; CPFL Energia, Brazil

8:50AM | Prescribed Performance Based Distributed Fixed-time Economic Dispatch for Islanded DC Microgrids [#357]
Mohamed Zaery, Syed Amrr, Suhail Hussain and Mohammad Abido
King Fahd University of Petroleum and Minerals, Saudi Arabia

9:10AM | Bipolar Current-Fed Triple Active Bridge for Resilient Power Supply in DC Microgrid [#861]
Xiang'er Shen, Zuo Chen, Jianjun Ma and Miao Zhu
Shanghai Jiao Tong University, China

9:30AM | Output Voltage Control-based Soft Pre-charging for Downstream Capacitors in LVDC Microgrids [#697]
Laura Bayerdoerffer, Julius Maximilian Placzek, Sebastian Brueske and Marius Langwasser
Kiel University, Germany; Maschinenfabrik Reinhausen, Germany

9:50AM | Data-Driven Observer Based Detection for Series Arc Fault in DC Microgrids [#1446]
Ge Yang, Luis Herrera and Xiu Yao
University at Buffalo, United States

Oral Session 84 | Multiphysics and Physics-based Modeling and Design

Room 121C
Chairs: Pengxiang Huang, Mateo Greidanus

8:30AM | A Novel Approach to Dynamic State Estimation Through DMD and Adjacency Matrices in Power Converter Dominated Power Grids [#1772]
Nicholas Gregory Baltas, Shailendra Singh, Jun Cao, Phani Chamarthi and Pedro Rodriguez
Luxembourg Institute of Science and Technology, Luxembourg

8:50AM | Machine Learning-aided Design of Switched-mode Power Converters [#1022]
Skye Reese, Bailey Sauter, Abhinav Kumar, Shoudong Hu, Vignesh Iyer and Dragan Maksimovic
University of Colorado Boulder, United States

9:10AM | Enhancing Arc Fault Detection Performance through Data Augmentation with Artificial Intelligence Technology: An Approach to Time Series Dataset Enlargement [#514]
Shangze Chen, Kamal Chandra Paul and Tiefu Zhao
University of North Carolina at Charlotte, United States

9:30AM | A Secure Fast Charging Control Based on A Machine Learning-Aided Electrothermal Model for Lithium-ion Batteries [#45]
Yajie Jiang, Junxiang Yang, Jiayang Wu, Kerui Li, Yun Yang and Siew-Chong Tan
Nanyang Technological University, Singapore; The University of Hong Kong, Hong Kong

9:50AM | On Noise Resiliency of Neuromorphic Inferential Communication in Microgrids [#883]
Yubo Song, Subham Sahoo and Xiaoguang Diao
Aalborg University, Denmark; Hubei University of Technology, China

Oral Session 85 | Electric Aircraft Propulsion Technologies

Room 122A
Chairs: Tao Yang, Shuai Shao

8:30AM | Model Predictive Control of 5L-ANPC Inverter Fed AFPM Motor with Mitigated Common-Mode Voltage in Electric Aircraft Propulsion [#1143]
Farzad Yaghoobi Notash, Matin Vatani, JiangBiao He and Dan Ionel
University of Kentucky, United States

8:50AM | Electro-Thermal Design Characterization of a High Power SiC based ANPC Inverter for EV / Aerospace Applications [#1466]
Ankit Vivek Deshpande, Erick Pool-Mazun, Enrique Garza-Arias, Shaozhe Wang, Rolando Sandoval, Malone Nathan, Prasad Enjeti and Felts Jonathan
Texas A & M University, United States; School of Engineering and Sciences of Tecnologico de Monterrey, Mexico

9:10AM | Application of Optimized Pulse Pattern Modulation to 1 MVA Three-Level Aerospace Inverters [#1123]
Gilvan Silva, Battur Batkhishig, Di Wang, Giorgio Pietrini, Piranavan Suntharalingam and Ali Emadi
McMaster Automotive Resource Centre, McMaster University, Canada; Eaton Research Labs, Eaton Corp, United States

9:30AM | Online Power Cycling Lifetime Extension for SiC ANPC Multilevel Converters [#1662]
Victor Logan and JiangBiao He
University of Kentucky, United States

9:50AM | Fault-Tolerant Topologies with Halbach Array and PM-Free Multi-Stage Multi-Module Electric Machines for Electric Aircraft Propulsion [#936]
Donovin D. Lewis, David R. Stewart, Matin Vatani, Oluwaseun A. Badewa, Ali Mohammadi and Dan M. Ionel
SPARK Lab., ECE Dept., University of Kentucky, United States; SPARK Lab, ECE Dept., University of Kentucky, United States

Oral Session 86 | Control of Multi-Level Converters II

Room 122B
Chairs: Qichen Yang, Zhou Dong

8:30AM | FCS-MPC with Computational Efficiency and dv/dt Mitigation in Multilevel Converters [#1731]
Cristian Castillo, Cristian Garcia, Daniel Sanchez, Baldomero Araya, Chenwei Ma, Bo Long, S. Alireza Davari and Jose Rodriguez
Universidad de Talca, Chile; Southwest Jiaotong University, China; University of Electronic Science and Technology of China, China; Universidad Andres Bello, Chile; Universidad San Sebastian, Chile

8:50AM | A Novel Control Strategy for a Four-Level ANPC-Based DAB Converter to Achieve Soft Switching in Full Power Range [#1586]
Jupeng Pang, Wei Zhou, Kui Wang, Zedong Zheng and Yongdong Li
Tsinghua University, China

9:10AM | An Analytical Closed-Loop Steady-State Model for Modular Multilevel Converters [#140]
Zhixiang Li, Yunqing Pei, Lu Chen and Laili Wang
Xi'an Jiaotong University, China

9:30AM | FPGA Based Space Vector Modulation Strategy for the Three-Phase 7-Level Multiplexed Converter [#1180]
Nicolas Eugenio Lima Baschera, Marco di Benedetto, Alessandro Lidozzi and Luca Solero
Roma Tre University, Italy

9:50AM | Comprehensive AI-based System for Control, Sensor Estimation, and Fault Detection of Cascaded Multilevel Inverters [#1584]
Renata Rezende da Costa Reis Kimpara, Marcio Magri Kimpara, Pedro Ribeiro, Joao Pereira Pinto and Burak Ozpineci
Oak Ridge National Laboratory, United States

Oral Session 87 | Converter Power Quality

Room 122C
Chairs: Subham Sahoo, Ricardo Aguilera

8:30AM | Real-time Computation of Optimized Pulse Patterns for Compensation of Estimated Grid Voltage Harmonics [#362]
Ellis G. Tsekouras, Ricardo P. Aguilera and Tobias Geyer
University of Technology Sydney, Australia; ABB Corporate Research, Switzerland

8:50AM | Selective Harmonic Elimination Model Predictive Control for a 3 level Flying Capacitor Converter [#1524]
Cristian Castillo, Victor Cabezas, Cristian Garcia, Santiago Maure, Pablo Acuna and Ricardo P. Aguilera
Universidad de Talca, Chile; University of Technology Sydney, Australia

9:10AM | Transient Stability Analysis and Optimized Coordination Control Method for Multi-Parallel PLL-synchronized Inverters under Grid Fault [#1238]
Zhiheng Lin, Rui Liu and Yunwei Li
University of Alberta, Canada

9:30AM | Multi-Frequency State-Feedback Current Control for Active Power Filters [#1141]
Lidia Sanchez, David Reigosa, Tuure Nurminen, Rayane Mourouvin, Marko Hinkkanen and Fernando Briz
Universidad de Oviedo, Spain; Aalto University, Finland

9:50AM | A Transformerless Unified Power Quality Conditioner Based on Four-Leg Converter [#977]
Jean Torelli Cardoso, Cursino Brandao Jacobina, Alan Santana Felinto, Ademar Alves dos Santos Junior and Alexandre Cunha Oliveira
Federal University of Campina Grande, Brazil; Federal Institute of Mato Grosso do Sul, Brazil

Oral Session 88 | Diagnostics, Noise and Vibration in Electric Machines

Room 123
Chairs: Jose Antonino-Daviu, Antonio J. Marques Cardoso

8:30AM | Unsupervised Anomaly Detection of Reciprocating Compressors using Auto-Encoder [#601]
Minha Kim, Jaehoon Shim, Juwon Lee, JongHyun Shin and Jung-Ik Ha
Seoul National University, Korea, Republic of; Samsung Electronics Company, Korea, Republic of

8:50AM | Power Hardware-in-the-Loop Emulation of Induction Machine Stator Inter-turn Fault using an Improved Mathematical Model [#61]
Koteswara Rao Alla and Pragasen Pillay
Concordia University, Canada

9:10AM | Two-Phase Direct Vibration Modal Control of Ultrasonic Motors Based on Active Disturbance Rejection Observer [#290]
Bingxin Xu, Long Jin, Zhike Xu, Zhan Shen and Peiwen Tan
Southeast University, China

9:30AM | Detection of Trailing Edge Demagnetization in Surface PM Synchronous Machines based on High Frequency Equivalent Impedance [#217]
YeEun Yoon, Marcos Orviz, Javier Gomez-Aleixandre Tiemblo, Kibok Lee, David Reigosa, Chaewoong Lim and Sang Bin Lee
Korea University, Korea (South); University of Oviedo, Spain; SN Heavy Industry Company, Korea (South)

9:50AM | Novel Online Static Eccentricity Detection and Evaluation in Permanent Magnet Generators [#1778]
Konstantinos N. Gyftakis, Stefanos Karampas, Georgios Skarmoutsos and Markus Mueller
Technical University of Crete, Greece; University of Edinburgh, United Kingdom

Oral Session 89 | Additive Manufacturing and Other Advanced Manufacturing Thecnologies in Electric Machines

Room 129B
Chairs: Rafal Wrobel, Silvio Vaschetto

8:30AM | A Double Three-Phase Axial-Flux Synchronous Relectance Motor [#1142]
Nicola Bianchi, Giada Sala and Claudio Bianchini
University of Padova, Italy; University of Modena and Reggio Emilia, Italy

8:50AM | Topology Optimization of Motor Windings for Coreless Electrical Machines [#11]
Adrien Thabuis, Xiaotao Ren and Yves Perriard
EPFL, Switzerland

9:10AM | Efficient Processes and Tools for Twisting of Flat Wires in Hairpin Motors [#23]
Alexander Kuehl
Friedrich-Alexander-Universitaet Er-N (FAU, Germany

9:30AM | Development of a Conductor Shaping Algorithm for Reduced AC loss in Electrical Machines [#1669]
Nick Simpson and Phil Mellor
University of Bristol, United Kingdom

9:50AM | Investigation of Triply Periodic Minimal Surfaces to Lightweight Liquid Cooling Jackets for High-Performance Electrical Machines [#677]
Harrison Mogg-Walls, Aydin Nassehi, Mark Goudswaard and Simpson Nick
University of Bristol, United Kingdom

Oral Session 90 | Motor Drive Reliability

Room 124A
Chairs: Baoyun Ge, Giacomo Scelba

8:30AM | Tracking Insulation Degradation of Railway Traction Induction Motors using High-Frequency Differential Current [#492]
Eduardo Rodriguez Montero, Markus Vogelsberger and Thomas Wolbank
TU Wien, Austria; ALSTOM Transport Austria GmbH, Austria

8:50AM | Enhancing Bearing Reliability in Inverter-Fed IPMSMs Drive: Control Method for Low-Speed Operation [#421]
Sung Jun Lee, Jonghun Choi, Gyu Cheol Lim, Sang Min Kim, Eun Kyung Kim and Jung-Ik Ha
Seoul National University, Korea, Republic of; Ford Motor Company, Korea, Republic of; Hyundai Mobis, Korea, Republic of

9:10AM | Fault-Tolerant Control Method for Modular Four-Unit Permanent Magnet Synchronous Hub Machine Utilizing Current Reconstruction [#354]
Chen Tang, Ying Fan, Yang Zheng, Wei Hua, Xianglin Li and Christopher H. T. Lee
Southeast University, China; Qingdao University, China; Nanyang Technological University, Singapore

9:30AM | Mitigation of DVDT Reflected Wave and Common Mode Current for Industrial Motor Drive System with Long Cable [#1050]
Haider Mohomad A R, Manish Saraf, Paul Baker and Sanela Ligata
Hammond Power Solutions, Canada

9:50AM | Impact of Open-Switch Fault in Five-Phase Three-Level NPC Inverters [#1692]
Luca Vancini, Michele Mengoni, Gabriele Rizzoli, Luca Zarri and Angelo Tani
University of Bologna, Italy

Oral Session 91 | Materials, Modeling, and Characterization for Magnetics and Capacitors

Room 124B
Chairs: Guo-Quan Lu, Zheyu Zhang

8:30AM | A Generalized Physics-Based Circuit Model for Predicting Nonlinear Properties of Magnetic Materials [#1218]
Sadia Binte Sohid, Anwesha Mukhopadhyay, Christian Harmon, Daniel Costinett, Gong Gu and Leon M. Tolbert
University of Tennessee Knoxville, United States

8:50AM | Ferrite Shielding for Eddy Current Suppression on Inductors and Transformers Using Ribbon-Based Magnetic Cores [#1763]
Zihan Gao and Fred Wang
University of Tennessee, United States

9:10AM | Ceramic-based Coils for Magnetic Components: Ideas and Challenges [#665]
Zhao Hongbo, Yan Zhixing and Luan Shaokang
Aalborg University, Denmark

9:30AM | An Integrated Magnetics Design in a PWM Active Clamp Cuk Converter to Increase Power Density [#1792]
Sadegh Esmaeili Rad, Amir Hossein Masoumi, Shantanu Gupta and Sudip Mazumder
University of Illinois Chicago, United States

9:50AM | Experimental Validation of Capacitor Damage Accumulation In Varying Operating Conditions [#820]
Mateja Novak, Huai Wang and Frede Blaabjerg
Aalborg University, Denmark

Oral Session 92 | Emerging Technologies 3

Room 129A
Chairs: Dehong Xu, Mausamjeet Khatua

8:30AM | Real-Time Position Sensor Fault Detection with Control Reconfiguration for PMSM Drives [#937]
Shaya Abou Jawdeh, Pengwei Li and Ali Bazzi
University of Connecticut, United States

8:50AM | New Optimum Rotor Flux Model for Field Oriented Control of Induction Motor Drives [#1521]
Abbas Hassan, Ali Bazzi and Sami Karaki
American University of Beirut, Lebanon; University of Connecticut, United States

9:10AM | Emulation of Interturn Short Circuit Faults in Electric Power Steering Motors [#92]
Neetusha Kalarikkal, Mathews Boby, Raja Ramakrishnan and Pragasen Pillay
Concordia University, Canada; Halla Mechantronics, United States

9:30AM | Transformer Application for Power Hardware-In-the-Loop Emulation [#91]
Mathews Boby, Neetusha Kalarikkal and Pragasen Pillay
Concordia Univerisity, Canada

9:50AM | Conducted EMI Modeling and Analysis of Adjustable Speed Drive Systems with DC Chokes [#123]
Kevin Lee and Zhe Zhang
Eaton, United States

Post Journal Presentation 5

Room 125AB
Chairs: Petros Karamanakos, Luca Tarisciotti

8:30AM | Magnetically Controlled Transformer With Variable Turns Ratio and Low Series Inductance: Analysis and Implementation Toward Its Application in SMPS [#1811]
Camilo Suarez and Wilmar Martinez
KU Leuven, Belgium

8:50AM | Sigma-Delta Modulation on a Three-Phase Four-Leg VSI to Eliminate the Common Mode Voltage and Comply With the Military Standards [#1836]
Matthew Storm, Oriti Giovanna and Julian Alexander
Naval Postgraduate School, United States

9:10AM | Model-Free Predictive Control of DC-DC Boost Converters: Sensor Noise Suppression With Hybrid Extended State Observers [#1833]
Oluleke Babayomi, Zhenbin Zhang and Zhen Li
Korea Advanced Institute of Science and Technology, Korea (South); Shandong University, China

9:30AM | Robust Predictive Current Control Using Discrete-Time Integral Action for Induction Motors [#1817]
Igor Oliani and Alfeu Sguarezi-Filho
Federal University of ABC, Brazil

Thursday, October 24 10:40AM – 12:20PM

Oral Session 93 | Energy Storage II

Room 121A
Chairs: Cristina Terlizzi, Jinia Roy

10:40AM | Dynamic Stability Analysis and Grid Frequency Response of Adjustable Speed Pumped Storage Hydropower [#372]
Muhammad Tayyab, Eduard Muljadi and Zerui Dong
Western Area Power Administration (WAPA), United States; Auburn University, AL, United States; OPAL-RT Corporation, United States

11:00AM | BESS Sizing for PV Power Smoothing [#1718]
Uthandi Selvarasu, Mahshid Amirabadi, Yuan Li, Caleb Crow and Brad Lehman
Northeastern University, United States; Florida State University, United States; City of Tallahassee Electric & Gas Utility, United States

11:20AM | A Bow-Shaped Underwater Piezoelectric Energy Harvester for Broadband Energy Harvesting [#1096]
Yuqi Chen and Han Peng
Huazhong University of Science and Technology, China

11:40AM | Degradation Analysis of Lithium-ion Capacitors based on Electrochemical Impedance Spectroscopy [#789]
Tarek Ibrahim, Muhammad Usman Tahir, Vaclav Knap and Daniel-Ioan Stroe
Department of Energy, Aalborg University, Denmark; Department of Electrotechnology Czech Technical University, Czech Republic

12:00PM | A Helical Magnet Torsion Spring with a 130 Degrees Stroke Length [#1424]
Dawei Che, Bertrand Dechant, Colton Bruce, Sean Sevier, Payam Emami, Gozde Sivka and Jonathan Bird
Portland State University, United States; Fluxmagic. Inc, United States

Oral Session 94 | Grid-Forming Technologies IV

Room 121B
Chairs: Jay Sawant, Sanket Parashar

10:40AM | Experimental Benchmarking of Voltage Controllers for Grid-Forming Inverters [#967]
Yi Xiao, Hao Ruan, Yongheng Yang, Hao Luo and Frede Blaabjerg
Zhejiang University, China; Aalborg University, Denmark

11:00AM | Transient Performance of Grid-Forming VSCs with High-Switching-Frequency Power Devices [#1069]
Zhao Liang and Wang Xiongfei
KTH Royal Institute of Technology, Sweden

11:20AM | Performance Evaluation of a Single-Phase Grid-Forming Inverter Through Hardware Experiments [#1214]
Jing Wang, Subhankar Ganguly, Soham Chakraborty, Fuhong Xie and Benjamin Kroposki
NREL, United States

11:40AM | A Nonlinear MPC-Based Adaptive Inertia Strategy for Andronov-Hopf Oscillator Controlled Grid-forming Inverters [#1273]
Shaokun Niu, Tong Liu, Wei Wang, Jiao Du, Guanguan Zhang, Alian Chen, Gang Zhang and Yu Chen
Shandong University, China; State grid shandong electric power company, China

12:00PM | Transient Stability Analysis of Grid Forming MMC with Current Limitation based on Junction Temperature [#943]
Federico Cecati, Nidhi Bisht, Debi Prasad Nayak, Venkata Yoganand Konda and Marco Liserre
Kiel University, Germany; Fraunhofer ISIT, Germany; Fraunhofer ISIT, Kiel University, Germany

Oral Session 95 | Other Topics in Transportation Electrification

Room 122A
Chairs: AK Arafat, Fnu Nishanth

10:40AM | Reconfigurable Dual Active Bridge Converter with Full Load Range Soft-Switching Capability for Wide Voltage Range EV Charging Applications [#36]
Uddhav Surve, Deepak Ronanki and Srirama Srinivas
Indian Institute of Technology Madras, India

11:00AM | Comparative Analysis of Integrated Onboard Battery Chargers for Zero Charging Torque Using PMSM with and without Neutral Point Access [#1473]
Kamal M. Vaghasiya, Amrutha K Haridas, Wesam Taha, Yicheng Wang, Aniket Anand, Sreejith Chakkalakkal, Ali Emadi and Phil Kollmeyer
McMaster University, Canada; Vitesco Technologies Canada, Inc., Canada

11:20AM | Non-Invasive Approach of Emergency Rescue Assistance Through Vehicle-to-Vehicle AC Charging [#939]
Nagesh Kamma, Srinivas Srirama, Deepak Ronanki, Uddhav Surve and Eswara Rao Siriki
BHEL, India; Indian Institute of Technology Madras, India

11:40AM | Issues and Solutions for a GaN Based Modified Non-Isolated Integrated On-Board Charger Configuration Using Traction Motor [#148]
Kazuki Toda, Shohei Funatsu, Hiroaki Matsumori, Takashi Kosaka, Nobuyuki Matsui, Keisuke Nakamura, Keisuke Ushida, Yutaka Hotta and Saha Subrata
Nagoya Institute of Technology, Japan; Aisin corporation, Japan

12:00PM | Model Predictive Control for Wide Output Voltage Range Integrated Onboard Charger with Inherent Smooth Mode Transition Capability [#938]
Harish Karneddi and Deepak Ronanki
Indian Institute of Technology Madras, India

Oral Session 96 | AC-AC Power Converters

Room 122B
Chairs: Giovanni De Carne, Shuo Wang

10:40AM | Fixed-Off-Time Pulse Coding Modulation for Single-Phase Resonant Direct AC-AC Converter in High-Frequency Induction Heating Systems [#1017]
Guiyi Dong, Shiqiang Liu, Tomokazu Mishima and Ching-Ming Lai
Kobe university, Japan; National Chung Hsing University, Taiwan

11:00AM | Large- and Small-Signal Modelling of a Differential-Mode AC/AC Converter [#1225]
Shantanu Gupta and Sudip Mazumder
University of Illinois Chicago, United States

11:20AM | Current Control of Bidirectional WPT System Using a Matrix Converter [#230]
Masaki Yamamoto and Takaharu Takeshita
Nagoya Institute of Technology, Japan

11:40AM | Three-Phase Transformerless Unified Power Quality Conditioner Based on Six-Leg Converter [#1220]
Lucas Fabricio Medeiros de Lucena, Cursino Brandao Jacobina, Alan Santana Felinto, Jean Torelli Cardoso, Victor Felipe Moura Bezerra Melo and Nady Rocha
Federal University of Campina Grande, Brazil; Federal Institute of Mato Grosso do Sul, Brazil; Federal University of Paraiba, Brazil

12:00PM | A Model Predictive Current Control for a Three-Phase Modular Matrix Converter [#1799]
Mohammad Ali Hosseinzadeh, Maryam Sarebanzadeh, Raplph Kennel, Ebrahim Babaei, Marco Rivera and Patrick Wheeler
Technical University of Munich, Germany; Technical Univeristy of Munich, Germany; University of Tabriz, Iran; Univeristy of Nottingham, United Kingdom

Oral Session 97 | Flying Capacitor Multi-Level Converter

Room 129A
Chairs: Yongsug Suh, Marco di Benedetto

10:40AM | A High Power Density MW-level Medium Voltage Eight-level Flying Capacitor Converter [#1747]
Ruirui Chen, Min Lin, Zihan Gao, Yang Xu, Mohamed AI Sager, Fred Wang, Hua Bai and Leon Tolbert
The University of Tennessee, United States

11:00AM | A Start-up Method for Flying Capacitor Topologies Using the Output Filter with few Additional Components [#468]
Jannik Maier, Burkhard Ulrich, Philipp Czerwenka, Eckhard Hennig and Gernot Schullerus
Reutlingen University, Germany

11:20AM | A Variable Switching Frequency Control Technique for DC-AC Flying Capacitor Multilevel Converters to Improve Efficiency and Inductor Utilization [#1339]
Francesca Giardine, Yixuan Wu and Robert C. N. Pilawa-Podgurski
University of California, Berkeley, United States; KTH Royal Institute of Technology, Sweden

11:40AM | An 840 V-to-120 V Radiation-Tolerant Flying Capacitor Multilevel Converter for Space Robotics [#1790]
Elisa Krause, Samantha Coday, Logan Horowitz and Robert C. N. Pilawa-Podgurski
University of California, Berkeley, United States; Massachusetts Institute of Technology, United States

12:00PM | Fully Soft-Switching Flying-Capacitor-based Quasi-Resonant Buck Converter with Reduced Voltage and Current Stress [#1687]
Kumar Joy Nag, Gianluca Roberts and Aleksandar Prodic
University of Toronto, Canada

Oral Session 98 | Modelling, Design and Optimization for Power Converters

Room 122C
Chairs: Giulia Tresca, Teng Long

10:40AM | A Modelling Method for Grid Filter Topology Optimization [#298]
Tim Lackie, Gopal Mondal, Teng Long and Sebastian Nielebock
University of Cambridge, United Kingdom; Siemens AG, Germany

11:00AM | Model-Free Optimization of Isolated DC-DC Triple Active Bridge Converters for ZVS and Reduced RMS Current Operation [#696]
Ahmed Ibrahim, Tommaso Caldognetto, Davide Biadene and Paolo Mattavelli
University of Padova, Italy

11:20AM | Stability Analysis of the Converter-Interfaced Remote Gas Field Power Generation [#1617]
Wenze Li, Rui Liu and Yunwei (Ryan) Li
University of Alberta, Canada

11:40AM | Design of a Common-mode Inductor for Medium-voltage High-power SiC-based Power Electronics Building Blocks (PEBB) [#1539]
He Song, Joshua Stewart, Ashkan Barzkar, Boran Fan, Rolando Burgos and Dushan Boroyevich
CPES, Virginia Tech, United States

12:00PM | Integrator Design for a Small Footprint Rogowski Coil Based Current Sensor [#1329]
Matthias Spieler, Che-Wei Chang, Dong Dong and Rolando Burgos
Virginia Polytechnic Institute and State University, United States

Oral Session 99 | Control for Power Converters in Electric Vehicles Chargers

Room 121C
Chairs: Mehdi Narimani, Rashmi Prasad

10:40AM | Experimental Implementation of a Fast Direct Power Digital Control Strategy for Single-Phase DAB Converters [#1773]
Linton David James, Richardt Howard Wilkinson, Brendan Peter McGrath, Carlos Alberto Teixeira, Marcos Judewicz, Sergio Gonzalez and Peter Sokolowski
RMIT University, Australia; Universidad Nacional de Mar del Plata, Argentina; The People Project Institute, Australia

11:00AM | State-Plane Control of DAB-based Battery Chargers [#1094]
Matteo Sposito, Nicolas Aguero Meineri, Ignacio Santana and Ignacio Galiano Zurbriggen
University of Calgary, Canada

11:20AM | A New Integrated Battery Charger (IBC) Architecture for 1200V Electric Vehicles [#283]
Sreejth Chakkalakkal, Francisco Juarez-Leon and Mehdi Narimani
McMaster University, Canada

11:40AM | Control and Modulation Method for Leakage Current Mitigation in Single-Phase Non-Isolated EV Charger [#1270]
Juwon Lee, Dongsu Lee, Seongil Lee and Jung-Ik Ha
Seoul National University, Korea, Republic of

12:00PM | Power Ripple Minimization in Off-board Battery Charger using Modified Direct Predictive Power Control [#934]
Deepak Ronanki, Durga Prasad Pilli, Apparao Dekka and Jose Rodriguez
Indian Institute of Technology Madras, India; Lakehead University, Canada; Universidad San Sebastian, Chile

Oral Session 100 | Wound Field and PM Machines

Room 123
Chairs: Fabio Giulii Capponi, Antonio J. Marques Cardoso

10:40AM | Research on Improving the Maximum Efficiency Area According to Electric Multi-Stage Shifting of WFSM [#175]
Jun-Hyeok Heo and Jin Hur
Incheon National University, Korea, Republic of

11:00AM | Self-Magnetized Wound Rotor Non-Overlapping Winding Synchronous Wind Generator for MPPT Variable DC Grid System [#577]
Lucky Dube, Maarten Kamper and Karen Garner
Stellenbosch University, South Africa

11:20AM | Analysis and Design of a Self-Excitation Scheme for an Open-end Armature Winding Wound-Rotor Synchronous Machine [#1458]
Ghulam Jawad Sirewal and Gilsu Choi
Department of Electrical Engineering, Inha University, Korea (South)

11:40AM | Topology Based Optimization of Wound Field Synchronous Machine with Hybrid Excitation for Traction Applications [#1760]
Mohanraj Muthusamy, Sainan Xue, Vedanadam Mudumbai Acharya and Dheeraj Bobba
Powersys Inc, Canada; Powersys Inc, United States

12:00PM | Doubly Salient Parallel Path Magnetic Motor: A Novel Doubly Salient Stator Permanent Magnet Brushless Machine [#287]
Maryam Salehi and Madhav Manjrekar
Electrical and Computer Engineering Department, United States

Oral Session 101 | Materials, Losses, Thermal and Manufacturing Issues II

Room 129B
Chairs: Federico Marcolini, Juan Manuel Guerrero

10:40AM | Experimental Evaluation of the Impact of Using Oriented Steel in Proportion to Segmentation on Core Loss of AC Electric Machine Stator [#1534]
Bhuvan Khoshoo, Anmol Aggarwal, John Agapiou and Shanelle Foster
Michigan State University, United States; General Motors, United States

11:00AM | Investigating the Effect of Multi-Level Inverter Excitation on Core Losses in Electromagnetic Devices [#1365]
Hasnain Nisar, Shaya Abou Jawdeh and Ali Bazzi
University of Connecticut, United States

11:20AM | Modifying the Properties of Low Coercive Field Magnets for Improved Performance of Variable Flux Motors [#285]
Bassam Abdel-Mageed, Benoit Blanchard St-Jacques, Ruisheng Shi and Pragasen Pillay
Concordia University, Canada; Dana TM4 inc., Canada

11:40AM | Effects of Eccentricity Faults on Variable Flux Permanent Magnet Synchronous Machines [#39]
Javier Gomez-Aleixandre Tiemblo, Marcos Orviz Zapico, Diego Fernandez Laborda and David Diaz Reigosa
University of Oviedo, Spain

12:00PM | Impact of Cryogenic Temperature on Iron Losses of Interlocked Laminated Stators [#806]
Silvio Vaschetto, Zbigniew Gmyrek, Federica Graffeo and Andrea Cavagnino
Politecnico di Torino, Italy; Lodz University of Technology, Poland

Oral Session 102 | Sensorless Drives

Room 124A
Chairs: Jae Suk Lee, Anitra Wilson

10:40AM | Finite Position Sensorless Predictive Torque and Active Flux Control of IPMSM Using An Enhanced Binary Search [#1657]
Samuel Osei Fobi, Sodiq Agoro, Rajib Mikail and Iqbal Husain
North Carolina State University, United States; ABB Inc., United States

11:00AM | Position Estimation and Sensorless Control of PMSM Using Neural Network in Low-Speed Region [#314]
Jaehoon Shim, Minha Kim, Byung Ryang Park and Jung-Ik Ha
Seoul National University, Korea (South)

11:20AM | Parameter-free Sensorless Control for Permanent Magnet Synchronous Motor [#1228]
Samuel Osei Fobi, Sodiq Agoro, Rajib Mikail and Iqbal Husain
North Carolina State University, United States; ABB Inc., United States

11:40AM | Sensorless Very Low-speed Trajectory Tracking Sliding Mode Controller Based On Identification Back-EMF Parameter for a PMSM [#1643]
Jesus Linares Flores, Arturo Hernandez Mendez, Victor Ortega Garcia, Jose Antonio Juarez Abad and Imer Francisco Castillo Aguilar
Universidad Tecnologica de la Mixteca, Mexico

12:00PM | Seamless Transition to Sensorless Control of EV Traction IPM Motors Using Virtual High-Frequency Voltage Injection [#282]
Andras Holczer, Francisco D. Freijedo and Radu Bojoi
Huawei Technologies Duesseldorf GmbH, Germany; Politecnico di Torino, Italy

Oral Session 103 | Power Modules

Room 124B
Chairs: Christina DiMarino, Christian Shamar

10:40AM | Stacked-Die SiC Half-Bridge Module with Minimum Loop Inductance [#1356]
Pedro Ribeiro, Lingxiao Xue, Burak Ozpineci, Shajjad Chowdhury, Veda Galigekere, Gui-Jia Su and Himel Barua
Oak Ridge National Laboratory, United States; Oak Ridge National laboratory, United States

11:00AM | Design of Experiment for Wedge-to-Wedge Aluminum Wire Bonding Parameters [#1414]
Lester Lopez, Jack Knoll, Narayanan Rajagopal and Christina DiMarino
Center For Power Electronics Systems (CPES), Virginia Tech, United States

11:20AM | Computationally Efficient Approach for Junction Temperature Estimation of SiC Power Modules Based on Temperature-Dependent Lumped Thermal Model [#903]
Yizheng Tang, Lingyu Zhu, Cao Zhan, Weicheng Wang and Shengchang Ji
Xi'an Jiaotong University, China; Virginia Tech, United States

11:40AM | Extraction of Parasitic Inductances in Three-Phase SiC MOSFET Modules Through Enhanced Two-Port-S-Parameter Measurement [#976]
Fanfu Wu and Yunting Liu
Pennsylvania State University, United States

12:00PM | Methodology for Evaluation of Commercial High-Power SiC Modules at Consistent Switching Speeds [#173]
Yikang Xiao, Shiqi Ji, Zhengming Zhao, Wenhao Xie, Mingyu Yang, Chao Sheng and Weitao Yang
Tsinghua University, China; China Southern Power Grid Technology Co. Ltd., China

Post Journal Presentation 6

Room 127C
Chairs: Wenkang Huang, Stefano Bifaretti

10:40AM | A New Class of Modular Multilevel Converter for Direct AC-AC Conversion [#1866]
Gregory Kish, Anjana Wijesekera and Yuan Li
University of Alberta, Canada; AltaLink, Canada

11:00AM | Adaptive Damping Control of MMC to Suppress Harmonic Resonances [#1827]
Pengxiang Huang
National Renewable Energy Laboratory (NREL), United States

11:20AM | A Bidirectional Current-Fed Isolated MMC with Partial Soft-Switching for High Step Ratio DC-DC Applications [#1830]
Noah Hosein, Philippe Gray, Xi Lan and Peter Lehn
University of Toronto, Canada; University of Calgary, Canada

11:40AM | PV-BESS DC-Series Integration for Regulated DC Systems [#1854]
Namwon Kim, Chondon Roy and Babak Parkhideh
Oak Ridge National Laboratory, United States; University of North Carolina at Charlotte, United States

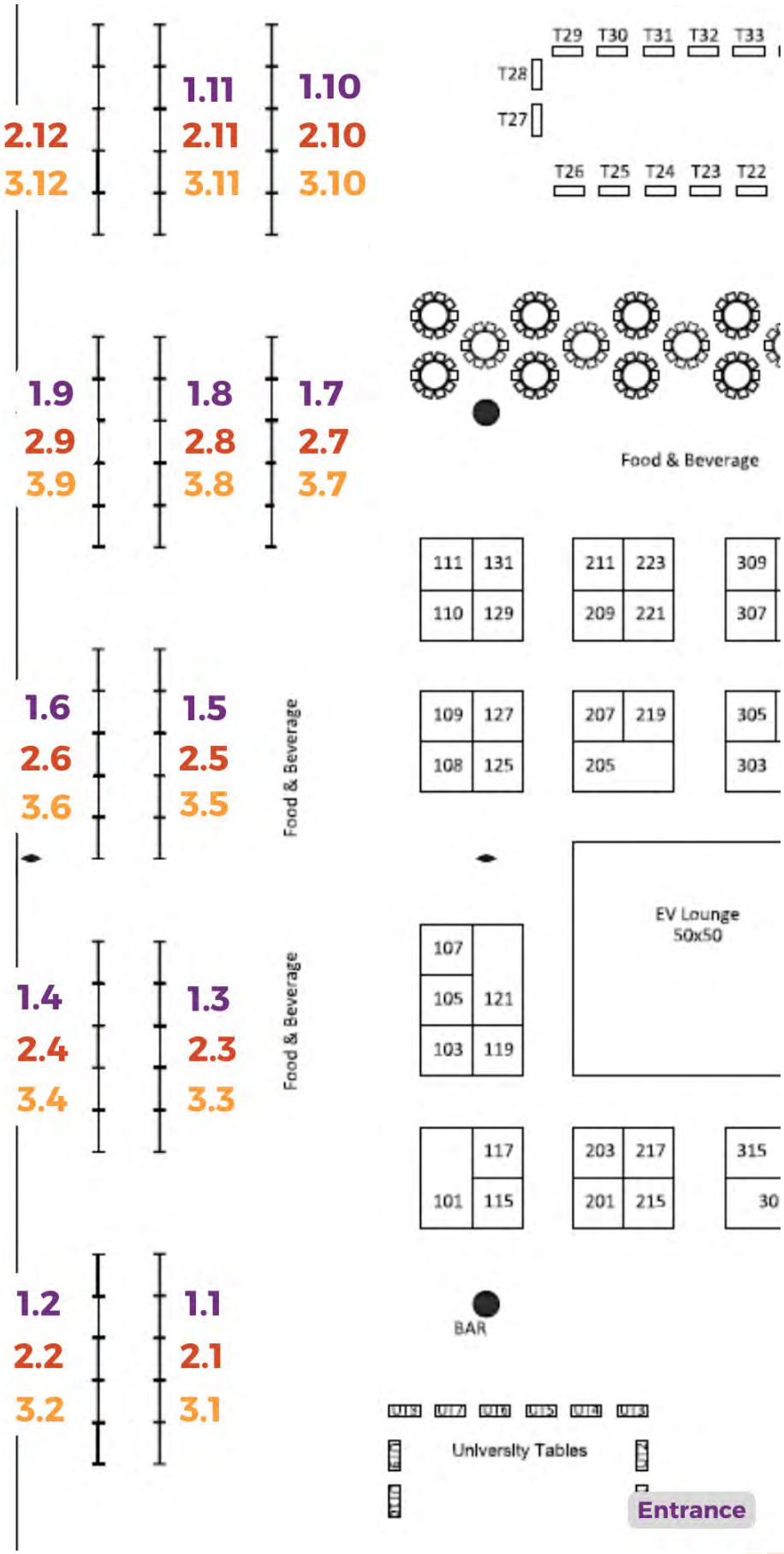
12:00PM | Challenges and Implementation of Online InSitu RDSON Measurement in A Three-Phase Inverter [#1857]
Chondon Roy, Namwon Kim, Daniel Evans, Gafford James and Parkhideh Babak
University of North Carolina at Charlotte, United States

Poster Session 1
Monday, 5:30pm-7:10pm

Poster Session 2
Tuesday, 10:30am-12:10am

Poster Session 3
Tuesday, 2:30pm-4:10pm

Please see program for a detailed list of Poster Sub-sessions



Monday, October 21 5:30PM – 7:30PM

POSTER SESSION 1

Exhibit Hall

1.1 Renewable Energy Integration

Chair: Bowen Yang

#90 | Lifespan Dependence of Power Converters in Wind Energy Systems [1.1 Posterboard 1]
Matias Parra, Carlos Reusser, Abraham Marquez and Samir Kouro
Pontifical Catholic University of Valparaiso, Chile; Universidad de Sevilla, Chile; Federico Santa Maria Technical University, Chile

#339 | DMROGI-mEPLL Based Position Sensorless Disturbance Immune Control of a Wind and Solar Energy Driven Microgrid Amidst Abnormal Grid [1.1 Posterboard 2]
Subhadip Chakraborty, Bhim Singh, Bijaya Ketan Panigrahi, Souvik Das and Suvom Roy
Indian Institute of Technology Delhi, India

#899 | Practical Design and Implementation of PV AC Module Based on Hybrid Microinverter [1.1 Posterboard 3]
Mohammad Nilian, Reza Rezaii and Issa Batarseh
University of Central Florida, United States

#1490 | Photovoltaic Array Mismatch Analysis for Differential Power Processing Systems Using Real-World Data [1.1 Posterboard 4]
Kai En Loo and Katherine A. Kim
National Taiwan University, Taiwan

#1128 | Parameter Extraction Algorithm for PV Panel Using Mid Frequency Data Points [1.1 Posterboard 5]
Kallol Biswas, Iram Sifat, Sung Yeul Park, John Ayers and Alexander Agrios
University of Connecticut, United States

#536 | A GaN based Microinverter with a Hard Switched Full Bridge Sinusoidal Pulse Width Modulated DC-AC Stage [1.1 Posterboard 6]
Harsha Ademane, Rosario Attanasio and Gianni Vitale
STMicroelectronics, United States

#1360 | Power Balancing Strategy for Cascaded H-Bridge PV Inverter with an Auxiliary Module [1.1 Posterboard 7]
Saleh Farzamkia, Houshang Salimian Rizi and Alex Q. Huang
University of Texas at Austin, United States

#448 | An Optimal Control Strategy for Single-Stage Dual-Bridge Series Resonant Microinverters [1.1 Posterboard 8]
Lei Wang, Jinghang Li, Hangyu Wang and Sinan Li
The University of Sydney, Australia

#529 | Single-Phase Grid Forming Control Strategy with Offset elimination for V2X implementation in Smart EV Battery Chargers [1.1 Posterboard 9]
Pantaleon Erick, Tafur Julio and Sal y Rosas Damian
Pontificia Universidad Catolica del Peru, Peru; University of Toulouse, France

#743 | Reactive Power Optimization Approach To Extend the ZVS Range of the DC-DC DABs at Light Load [1.1 Posterboard 10]
Payam Morsali and Ayan Mallik
Arizona State University, United States

#833 | A Multi-port Integrated Topology Architecture for User-side Fuel Cell Microgrid Systems [1.1 Posterboard 11]
Ruixuan Wang, Qiyuan Hu, Shangzhi Pan, Zisen Lin and Xiaoming Zha
Wuhan University, China

#1518 | Symmetric LCL Filter and Zero-Sequence Control for Accurate Filter Current Emulation in Four Quadrant Pump-Back Test [1.1 Posterboard 12]
Haoyu Chen, Hongyu Lin, Chunjiang Jia, Chong Ng, Hao Feng and Li Ran
Chongqing University, China; Offshore House, China; Offshore House, United Kingdom; The University of Warwick, United Kingdom

#1698 | Data-Driven Estimation of Grid Voltage Phase Angle through di/dt Analysis for Hysteresis-Controlled Single Phase Inverter [1.1 Posterboard 13]
Hector Akuta and Yuan Li
Center for Advanced Power Systems Florida State University, United States

#1756 | Modular Design of Solid-State Transformer with High Flexibility [1.1 Posterboard 14]
Zhuxuan Ma, Hui Cao and Yue Zhao
University of Arkansas, United States

#463 | Multi-Agent Reinforcement Learning Control Strategy for a Neutral-Point Clamped Power Converter, Maintaining Reliable Wind Energy Conversion System [1.1 Posterboard 15]
Yazdan H. Tabrizi and Mohammad Nasir Uddin
Lakehead University, Canada

1.2 Distributed Energy Resource (DER) Integration

Chair: Ariya Sangwongwanich

#161 | Reducing Dependency on Imported Electricity: Utilizing Renewable Energy and Minimizing Fossil Fuel Power Plant Operations in West Kalimantan [1.2 Posterboard 1]
Ilham Akbar, Ariesa Budi Zakaria, Eduard Muljadi, Suwarno Suwarno and Nanang Hariyanto
PLN – ITB, Indonesia; Auburn University, United States; Institut Teknologi Bandung (ITB), Indonesia

#352 | Impact of Enhanced Wind Integration on Grid Capacity Expansion [1.2 Posterboard 2]
Zabir Mahmud and Sarah Kurtz
University of California Merced, United States

#948 | Microgrid to Microgrid Synchronization with Grid-Forming Inverters: Challenges and Solution [1.2 Posterboard 3]
Maximiliano Ferrari, Michael Starke, John Smith and Martinez Omar
ORNL, United States; UPRM, United States

#1345 | Impact of Virtual Impedance Based Ripple Mitigation on Microgrid Dynamics [1.2 Posterboard 4]
Shivam Chaturvedi, Mengqi Wang, Shahid Aziz Khan, Duc Dung Le and Wencong Su
University of Michigan Dearborn, United States

#1659 | Optimizing Zero Grid Injection in Hybrid Self-Consumption Installations: Advanced Control Strategies and Simulation Insights [1.2 Posterboard 5]
Jose M. Piedra, Hoang Hua Trinh, Pablo Garcia, Geber Villa and Marcos Cuadrado
Enfasys, Spain; University of Oviedo, Spain

#1741 | Model Predictive Decentralized Control Scheme for Network of Grid-Forming Inverters [1.2 Posterboard 6]
Sally Sajadian and Ola Carlson
Lafayette College, United States; Chalmers University, Sweden

#505 | Controller Hardware-in-the-Loop Evaluation of a Microgrid Controller for a Microgrid System with Multiple Grid-Forming Inverters [1.2 Posterboard 7]
Fuhong Xie, Shashank Singh, Jing Wang, Subhankar Ganguly, Wenzong Wang, Rahul R Jha and Jacqueline Baum
National Renewable Energy Laboratory, United States; Siemens, United States; Electric Power Research Institute, United States; ComEd, United States

#969 | Fault Location for Grid-Forming VSC System Based on Transient Analysis [1.2 Posterboard 8]
Yang Wu, Li Cheng and Xiongfei Wang
Aalborg University, Denmark; KTH Royal Institute of Technology, Sweden

#1009 | Optimizing Hospital Isolated Microgrids in Gaza: Integrating DSS for Sustainable Energy and Resilience [1.2 Posterboard 9]
Bharath Kumar Sugumar, Nafisul Musfiq, Yajuan Guan, Giovanna Oriti, Alexander L. Julian and Norma Anglani
University of Pavia, Italy; Aalborg University, Denmark; Naval Postgraduate School, United States; Independent Researcher and Consultant, United States

#1565 | Distance Relay Performance in IBR Dominated Networks and Improvements with Estimation-Based Protection [1.2 Posterboard 10]
Syed Sohail Feroz Syed Afroz, Emad Abukhousa, Abdulaziz M. Qwbaiban, Fahad Alsaeed and A. P. Sakis Meliopoulos
Georgia Institute of Technology, United States

#1758 | Robust MIMO Controller for Distributed Generation System-based Grid-tied Voltage Sourced Converter [1.2 Posterboard 11]
Francis Mwasilu and Olorunfemi Ojo
University of Dar es Salaam, Tanzania; Tennessee Tech University, United States

#958 | Influence of Fault Clearing Angle on Temporary Over-Voltage at the Terminal of Grid Following Photovoltaic Inverter [1.2 Posterboard 12]
H R Sai Kiran Pandit and Sarasij Das
Indian Institute of Science, Bangalore, India

#1554 | Instant Transformer Energization for Inverter Based Resources Based on Pre-fluxing and Virtual Resistance Control [1.2 Posterboard 13]
Jinli Zhu, Ahmad Fares Abdelhadi, Yuan Li and Fang Z. Peng
Florida State University, United States

#460 | Framework for Battery Depth-of-Discharge Optimization for Maximum Return in Electricity Markets [1.2 Posterboard 14]
Ala Hussein
Prince Mohammad Bin Fahd University, Saudi Arabia

#1235 | Comparative Reliability Analysis of a Microgrid versus Zonal Nanogrids [1.2 Posterboard 15]
Gabrielle Smith, Douglas L. Van Bossuyt, Giovanna Oriti, Mark Vygoder and Richard Alves
US Navy, United States; Naval Postgraduate School, United States; University of Wisconsin – Milwaukee, United States

#1684 | Impact of Supraharmonics on the Reliability of Distribution Transformers [1.2 Posterboard 16]
Reza Ilka and JiangBiao He
University of Kentucky, United States

#1496 | Optimal Planning and Design of Low-Scale Solar DC Microgrids in Centralized and Distributive Environment – A Comparative Analysis [1.2 Posterboard 17]
SAqib Iqbal, Mashood Nasir and Hassan Abbas Khan
Queen Mary University of London, United Kingdom; CISSOID, Belgium; Lahore University of Management Science, Pakistan

#1823 | Discussion on Instability of Current-controlled Inverter with df/dt-type Virtual Inertia Control [1.2 Posterboard 18]
Takumi Ueda, Kenichiro Sano, Daisuke Terazono and Kaho Nada
Institute of Science Tokyo, Japan; Mitsubishi Electric, Japan

#1879 | Retasking Phase Legs in Multiport DC-AC Converters f or Fault Tolerant Operation [1.2 Posterboard 19]
Daniel Bowman and Gregory Kish
University of Alberta, Canada

1.3 Grid-Forming Technologies

Chair: Pranjal Gajare

#466 | A Grid-Forming Converter with Reduced Number of Sensors and Pre-Synchronization Strategy [1.3 Posterboard 1]
Wenrui Li and Jingyang Fang
Shandong University, China

#762 | Singular-perturbation-based Control Design of Single-phase Grid-forming Inverters [1.3 Posterboard 2]
Weiqian Cai, Rahul Mallik and Brian Johnson
The University of Texas at Austin, United States

#1650 | Hardware-in-the-Loop Testing of the Impact of Grid-Following Inverters Control and Momentary Cessation on System Protection [1.3 Posterboard 3]
Stephen Ambe Chengu, Nikolaos Gatsis, Miltiadis Alamaniotis and Sara Ahmed
The University of Texas at San Antonio, United States

#1232 | An Effective Current Limiting Strategy to Enhance Transient Stability of Virtual Synchronous Generator [1.3 Posterboard 4]
Zhao Yifan, Zhang Zhiqian, Xu Ziyang, Zhang Zhenbin and Rodriguez Jose
Shandong university, China; Shanghai jiaotong university, China; Universidad San Sebastian Santiago, Chile

#1755 | Dual-Port Grid-Forming Control in MMC-Based ES-STATCOM for Enhanced Voltage Stability [1.3 Posterboard 5]
Hadhlul Aladhyani, Hamdan Alosaimi, Sulaiman Alshammari and Subhashish Bhattacharya
NC State University, United States

#365 | A Fault Ride-Through Performance Analysis of Prominent Virtual Synchronous Generator Strategies [1.3 Posterboard 6]
Chalitha Buwanidu Liyanage Barana Liyanage, Lasantha Meegahapola and Inam Nutkani
RMIT University, Melbourne Australia, Australia

#839 | Current-based Virtual Impedance for LVRT Capability in VSG for Predominantly Resistive Distribution Networks [1.3 Posterboard 7]
Salil Madhav Dubey, Zakir Hussain Rather and Suryanarayana Doolla
IIT Bombay, India

#1132 | Phase-Locked Loop vs Synchronous Machine Emulation: A Comparative Study of Phase-Angle Determination Dynamics [1.3 Posterboard 8]
Prithwiraj Roy Chowdhury, Ehab Shoubaki and Madhav Manjrekar
Department of ECE, University of North Carolina at Charlotte, United States

#1656 | Black Starting Microgrids using Inverter Based Distributed Energy Resources [1.3 Posterboard 9]
Jay Sawant, Arundhuti Haldar, Rishabh Jain and Ben Luck
National Renewable Energy Laboratory, United States; Holy Cross Energy, United States

#278 | The Implementation of Physical Parameters and Frequency Modulation in the Grid-forming Converter with Energy Storage System [1.3 Posterboard 10]
Minxuan Peng, Neng Peng, Yi Wang, Shuangyin Dai, Kaihsun Chuang, Xiaoming Zha and Jianjun Sun
Wuhan University, China; State Grid Henan Electric Power Company, China

#714 | Seamless Transition Strategies of MMC-Based Grid Forming/Following Inverter Systems for Critical Loads [1.3 Posterboard 11]
Anupam Nigam and Dong-Choon Lee
Yeungnam University, Korea (South)

#837 | Observer-Based Direct Power and Voltage Magnitude Control of Grid-Forming Converters [1.3 Posterboard 12]
Tuure Nurminen, Rayane Mourouvin, Marko Hinkkanen and Jarno Kukkola
Aalto University, Finland; ABB Oy Drives, Finland

#1244 | Transient Angle and Voltage Stability Joint Analysis of Grid-Forming Converters [1.3 Posterboard 13]
Wenjia Si and Jingyang Fang
School of Control Science and Engineering, Shandong University, China

#1725 | Small-signal Modeling and Parameter Design for DC-link Voltage Synchronous Grid-Forming Converter with Decoupled Virtual Admittance [1.3 Posterboard 14]
Pan Feng, Zhen Tian, Meng Huang, Xiaoming Zha and Xin Ma
Wuhan University, China; Power Research Institute of State Grid Ningxia Electric Power Co., Ltd., China

#1752 | Comparative Analysis of Grid-Forming Inverters: Influence of Control Parameters and Grid Conditions on Transient Stability [1.3 Posterboard 15]
Hansi Wijayalath Arachchilage, Nabil Mohammed and Behrooz Bahrani
Monash University, Australia; King Abdullah University of Science and Technology, Saudi Arabia

1.4 Transportation Electrification I

Chair: Ashik Amin

#12 | High Power Density Integrated Power Electronics Unit for Small Mobility Applications [1.4 Posterboard 1]
Shahid Aziz Khan, Feng Zhou, Mengqi Wang, Shivam Chaturvedi and DucDung Le
University of Michigan, United States; Toyota Research Institute of North America, United States

#96 | A Novel Multiple Parameters Identification Method for the Wireless Power Transfer System [1.4 Posterboard 2]
Wang Xiaosheng, Ren Sheng, Mo LiPing, Jiang Chaoqiang, Zhou Jiayu and Chen Chen
City University of HongKong, Hong Kong

#326 | Thermal Distribution Optimization Method for Inductive Power Transfer System Utilizing Nanocrystalline Flake Ribbon Core [1.4 Posterboard 3]
Chen Chen, Zhang Ben, Ren Sheng, Mo Liping, Guo Weisheng, Wang Xiaosheng and Jiang C. Q.
City University of Hong Kong, Hong Kong

#424 | Design of Wireless Charging Pad for EV Power Seats Considering Surrounding Structures [1.4 Posterboard 4]
Chang-su Shin, Seungmin Kim, Junchen Xie, So jeong Kang, Geun Wan Koo and Dong-hee Kim
Chonnam National University, Korea (South); Korea Automotive Technology Institute, Korea (South)

#612 | A Novel Misalignment Tolerant DSSq Receiver Pad for Wireless EV Charging Applications [1.4 Posterboard 5]
Rajanikant Rajanikant and Vivek Agarwal
Indian Institute of Technology Bombay, India

#1326 | Output Current Estimation an Control in Primary Side LCC Secondary Side Series Compensated Wireless Power Transfer System without Secondary Side Sensors [1.4 Posterboard 6]
Subhajyoti Mukherjee and Omer Onar
UT Battelle, United States

#1547 | Optimization of WPT-Based Snubber Circuit via Coupled-Mode Theory to Eliminate Switching Oscillations [1.4 Posterboard 7]
Bowang Zhang, Wei Han, Youhao Hu, Weikang Hu, Binhong Cao and Xuxing Duan
HKUST(GZ), China; Hong Kong University of Science and Technology, China

#329 | Multifunctional 22kW Bidirectional Integrated Charger with 2.01kW/L High-Power Density [1.4 Posterboard 8]
Jaeyeon Lee, Kyunghoon Nam, Jihoon Park, Dohyun Kim, Donghyuk Yang and Heonhee Kim
Hyundai Mobis Co.,Ltd, Korea (South)

#708 | A Modified S-S Wireless Charging Circuit With Single-stage Voltage Regulation Capability [1.4 Posterboard 9]
Wenzheng Xu, Mingyue Zheng, Jingjing Qi, Long Jing and Xuezhi Wu
Beijing Jiaotong University, China; Tsinghua University, China

#1666 | Excitation SiC Converter for Electrically Excited Traction Synchronous Motor Using Rotary Transformer and Field Rotor Current Estimator [1.4 Posterboard 10]
Fausto Stella, Sandro Rubino, Enrico Vico, Radu Bojoi and Eric Armando
Politecnico di Torino, Italy

#142 | Design, Implementation, and Comparison of Multi-MHz Multi-kW H-Bridge Inverters Based on 650V SiC and GaN Devices for High-Frequency WPT [1.4 Posterboard 11]
Yao Wang, Kaiyuan Wang, Yun Yang and Shu Yuen Ron Hui
Nanyang Technological University, Singapore; The University of Hong Kong, Hong Kong

1.5 DC-DC Power Converters

Chair: Jeremy Nuzzo

#167 | A DCM Compatible Fast Transient Pi-Type Dual-Path Hybrid Buck Converter [1.5 Posterboard 1]
Tsai Chieh-ju, Lin Ting-you and Chen Ching-Jan
National-Taiwan-University, Taiwan

#185 | Quasi-Parallel Resonant Switched Capacitor DC-DC Converter with Continuous Voltage Regulation Capability [1.5 Posterboard 2]
Jingjing Qi, Xuezhi Wu, Wenzheng Xu and Kai Sun
Tsinghua University, China; Beijing Jiaotong University, China

#566 | A Beta-type Ultrahigh-Gain Boost Converter [1.5 Posterboard 3]
Hong Li, Peng Sun, Mingbo Wei, Xu Shangguan, Jiangwei Hu and Yangbin Zeng
Beijing Jiaotong University, China; City University of Hong Kong, China

#648 | Averaged Model Based Analysis of Output Resistance of The Resonant Switched-Capacitor Converters [1.5 Posterboard 4]
Liang Jia and Yanchao Li
Google LLC, United States

#694 | Numerical Output Resistance Modeling for Hybrid Switched-Capacitor Converters with LTP Mapping Technique [1.5 Posterboard 5]
Liang Jia and Yanchao Li
Google LLC, United States

#1203 | Novel Burst-mode Control Strategy for Enhanced Light-load Efficiency of DAB Converters [1.5 Posterboard 6]
Byeong-ryeol Na, Jung-su Park, Chanh-Tin Truong and Sung-jin Choi
University of Ulsan, Korea (South)

#1822 | Use of Metamaterial-Based Variable Inductor for Stability Enhancement of DC-DC Converter [1.5 Posterboard 7]
Yuanxi Chen, Henry Shu-hung Chung and Hongjian Lin
City University of Hong Kong, Hong Kong

#1029 | A 48V-2.2V Matrix Autotransformer Switched-Capacitor DC-DC Converter for Data Center Application [1.5 Posterboard 8]
Haoran Meng, Zhongshu Sun, Maohang Qiu, Xiaoyan Liu, Vafa Marzang and Dong Cao
University of Dayton, United States

#305 | A SPICE based Multi-Domain Optimization of a Quasi-Resonant Passive Snubber Circuit for GaN-based DC/DC Converter Applications [1.5 Posterboard 9]
Jeremy Nuzzo, Michael Bosch, Tobias Fink, Dominik Koch, Kevin Munoz Baron and Ingmar Kallfass
Institute of Robust Power Semiconductor Systems, Germany

#995 | Small Signal Modeling of DC-DC SEPIC Converter With Multilevel Flying Capacitor Switching Cell [1.5 Posterboard 10]
Rhavel Morais, Montie Vitorino and Jens Friebe
Federal University of Campina Grande, Brazil; University of Kassel, Germany

#621 | A Control Method for Full Voltage Conversion Ratio for a Zero-Inductor-Voltage Converter [1.5 Posterboard 11]
Sina Salehi Dobakhshari, Aamna Nasir Hameed, Binghui He, Mojtaba Forouzesh and Yan-Fei Liu
Queen's University, Canada

#954 | Comparison of Two-Phase Buck Converters with Two- and Three-Winding Coupled Inductors for Low-Voltage High-Current Charging Applications [1.5 Posterboard 12]
Muhammad Abdelraziq and Zeljko Pantic
North Carolina State University, United States

#57 | A Quasi-Symmetrical Active-Clamp Forward Converter without Output Inductor to Achieve Full Working Range Soft-Switching [1.5 Posterboard 13]
Liting Li, Guo Xu and Mei Su
Central South University, China

#391 | Operation Range Extension Method of DAB Converter Considering ZVS Condition Using Core-Insertable Transformer with Variable Inductance [1.5 Posterboard 14]
Dae-kyong Kim, Cheol-Woong Choi, Jae-Sub Ko and Keun-Yong Yoon
Sunchon National University, Korea (South)

#1652 | Multi-Objective Phase Shift Control Optimization for Dual Active Bridge (DAB) Converters [1.5 Posterboard 15]
Antonella Haro Davila, Syed Imam Hasan, Alper Uzum, Ali Elrayyah and Yilmaz Sozer
University of Akron, United States

#162 | An Ultrawide Input Range LLC Resonant Converter with Multi-Mode Switchable Rectifier [1.5 Posterboard 16]
Wenjie Zhao, Qunfang Wu, Qin Wang, Lan Xiao, Xiaodong Yang and Xinrong Cai
NanjingUniversityof Aeronautics and Astronautics, China; Nanjing University of Science and Technology, China

#181 | A Novel 4kW Output Low-Voltage DC Converter with Integrated Planar Transformer [1.5 Posterboard 17]
Gyeong-Hyun Kwon, Dong-In Lee, Seong-Wook Jeong and Han-Shin Youn
Incheon National University, Korea, Republic of

#1060 | ZVS Operation and Current Ripple Minimization in a Capacitively Blocked Dual Active Half-Bridge Converter [1.5 Posterboard 18]
Nithyadas P v, Utsab Kundu and Vinod John
IISc Bangalore, India

#1825 | Ripple Analysis and Experimental Verification of a Non-Isolated Interleaved DC-DC Converter with Auxiliary H-Bridge Converters for Drastic Minimization of Output Inductor [1.5 Posterboard 19]
Yusuke Sato, Hidemine Obara, Jin Xu and Noboru Shimosato
Yokohama National University, Japan; Myway Plus Corporation, Japan

#1843 | A Static Gain Linearization for a Differential Buck-Boost Inverter Output Voltage THD Reduction [1.5 Posterboard 20]
Ion dos Santos, Hermano Campos and Telles Lazzarin
Federal University of Santa Catarina, Brazil

1.6 AC-DC and DC-AC Power Converters

Chair: Shenghui Cui

#1791 | Submodule Voltage Balancing Methods in Modular Multilevel Converters: A Review [1.6 Posterboard 1]
Shiyuan Fan, Leon M. Tolbert, Xin Xiang and Wuhua Li
University of Tennessee, Knoxville, United States; Zhejiang University, China

#1753 | Design of Load-Independent Class-Phi3 Resonant Inverter [1.6 Posterboard 2]
Yutaro Komiyama, Wenqi Zhu, Akihiro Konishi, Kien Nguyen and Hiroo Sekiya
Chiba University, Japan; Tokyo University of Science, Japan

#1750 | Modulated Model Predictive Control for a Four-Leg Indirect Matrix Converter [1.6 Posterboard 3]
Mohammad Ali Hosseinzadeh, Maryam Sarebanzadeh, Raplph Kennel, Ebrahim Babaei, Marco Rivera and Patrick Wheeler
Technical University of Munich, Germany; Technical Univeristy of Munich, Germany; University of Tabriz, Iran; University of Nottingham, United Kingdom; University of Nottingham, United Kingdom

#1722 | An Adaptive Total Sliding Mode Control for Cascaded H-bridge Multilevel Converters to Suppress Ground Fault in Active Distribution Networks [1.6 Posterboard 4]
Bin-Long Zhang, Mohammadreza Lak, Mou-Fa Guo and Sahel Solemanifard
Yuan Ze University, Taiwan; Fuzhou University, China; National Sun Yat-Sen University, Taiwan

#1668 | Three-phase AC-DC Isolated Rectifier with Single-Transformer Excited by the Common Mode Voltage and ZVS Capability [1.6 Posterboard 5]
Vitor Bezerra, Montie Vitorino, Jean Cardoso and Paulo Praca
Federal University of Campina Grande, Brazil; Federal University of Ceara, Brazil

#1644 | Development of an Ultra Compact Active Clamp Flyback AC/DC Converter with a Wide Input Voltage Range [1.6 Posterboard 6]
Reza Mounesi, Navid Hadifar, Enrico Santi and Adel Nasiri
University of South Carolina, United States

#1631 | Efficiency Considerations of a 3 kW, all SiC Current-Source Converter [1.6 Posterboard 7]
Benedikt Riegler, Yonghwa Lee, Alberto Castellazzi and Michael Hartmann
Graz University of Technology, Austria; Kyoto University of Advanced Science, Japan

#1627 | A Si and SiC Based Enhanced Level Hybrid Converter With Improved Efficiency and Reduced Footprint [1.6 Posterboard 8]
Jayant Kumar, Anil Kumar Tiwari and Siba Kumar Patro
Indian Institute of Technology Roorkee, India

#223 | A Novel digital control strategy for GaN-based Interleaving CrM Totem-pole PFC [1.6 Posterboard 9]
Wenhao Yu, Xuefeng Fan, Tao Wei and Yingchun Xu
Navitas Semiconductor, China

#1509 | Three-Phase PUC5 Multilevel Inverter Fed by a Single DC-Source [1.6 Posterboard 10]
Saul Junior, Edgard Fabricio, Samuel Silva Junior and Darlan Fernandes
UFPB, Brazil; IFPB / UFPB, Brazil; UFCG, Brazil

#1507 | A Review of Challenges in Switching Cycle Control for Modular Multilevel Converters [1.6 Posterboard 11]
Jayesh Kumar Motwani, Boran Fan, Dushan Boroyevich, Dong Dong and Rolando Burgos
Center for Power Electronics Systems (CPES), Virginia Tech, United States

#660 | Capacitor Voltage Balancing Pulsewidth Modulation Method for a Single DC Source Driven Cascaded Three-level Inverter Drive [1.6 Posterboard 12]
Swapnil Tripathi, Uddhav Surve and Srirama Srinivas
Indian Institute of Technology Madras, India

#628 | New Space Vector Modulation to Maintain Unbalanced Flying Capacitor Voltage for Output Current Ripple Reduction [1.6 Posterboard 13]
Shinjiro Shimura and Keisuke Kusaka
Nagaoka University of Technology, Japan

#608 | A DPWM-Based Hybrid Variable Switching Frequency Control for Parallel Interleaved Three-Level T-type Inverter [1.6 Posterboard 14]
Deng Jie, Chen Jianliang and Guo Zhicheng
Arizona State University, China; Hebei University of Technology, China; Arizona State University, United States

#472 | A Novel Fast and High Performance Reconstruction Voltage Predictive Controller for Multilevel Inverters [1.6 Posterboard 15]
Yousefreza Jelodar, Omid Salari, Mohamed Youssef and Alireza Bakhshai
Queen's University, Canada; Sparq Systems, Canada; Ontario Tech University, Canada

#443 | Improved Finite-Control-Set Model Predictive Control of an MMC Converter with Reduced Computational Burden [1.6 Posterboard 16]
Hussein Kadhum, Alan Watson, Marco Rivera, Pericle Zanchetta and Patrick Wheeler
University of Nottingham, United Kingdom

#404 | Study and Implementation of a Three-Phase Three-Level T-Type Inverter with Fault Ride Through Capabilities [1.6 Posterboard 17]
Meng-Shien Tsai, Tsorng-Juu Liang, Xue-Yi Chen, Kim Kien Nghiep Huynh, Kai-Hui Chen and Wen-Chung Chen
National Cheng Kung University, Taiwan; National Cheng Kung University, Viet Nam

1.7 Power Converter Modeling

Chair: Pengxiang Huang

#564 | An Automated Time-Domain Modeling Approach [1.7 Posterboard 1]
Mingbo Wei, Hong Li, Jiangwei Hu, Yanjun Li, Yidi Liang and Jinchang Pan
Beijing Jiaotong University, China

#622 | Analytical and Numerical Output Resistance (Rout) Modeling and Comparison for Direct and Indirect Resonant Switched Capacitor Converters [1.7 Posterboard 2]
Liang Jia, Yanchao Li, Haoquan Zhang and Srikanth Lakshmikanthan
Google LLC, United States

#527 | High-Performance Cascaded Model Predictive Control for Multilevel Inverters [1.7 Posterboard 3]
Apparao Dekka, Hoang Le and Deepak Ronanki
Lakehead University, Canada; Indian Institute of Technology Madras, India

#1215 | Design Optimization Method of High Power-Density Planar Inductor [1.7 Posterboard 4]
Zahra Saadatizadeh and H. Alan Mantooth
University of Arkansas, United States

#1555 | A Study on The Analysis and The Operation of a Single-Input/Double-Output Buck-SEPIC Converter [1.7 Posterboard 5]
Mahdi Ghavaminejad, Mengqi Wang, Sara Sharifizadeh, Ebrahim Afjei and Morteza Kheradmandi
University of Michigan-Dearborn, United States; Shahid Beheshti University, Iran

#1257 | High-Fidelity FEA-Based Circuit Simulation for Multi-Active-Bridge Converter [1.7 Posterboard 6]
Jaekeun Lee, Jonghun Yun, Hwigon Kim and Shenghui Cui
Seoul National University, Korea, Republic of

#1374 | Fundamental Harmonic Approximation based Small-signal Modeling Method of Three-port Three Series Resonant Converters [1.7 Posterboard 7]
Zhijing Ye, Chi Li and Zedong Zheng
Tsinghua University, China

#1861 | Multi-FPGA Co-simulation of SST and DAB in HIL A Case Study for EV Charging Station Application [1.7 Posterboard 8]
Juan Paez ALvarez, Satish Kumar Ancha, Milad Hoseinizadeh and Wei Li
OPAL-RT Technologies, Canada

#1367 | The Average Modeling of Active Neutral Point Clamped (ANPC) Converters [1.7 Posterboard 9]
Ashkan Barzkar, Qing Lin and Rolando Burgos
Virginia Tech, United States

#111 | Analysis of Random Center/Edge Alignment PWM and Its Application to Digital Current Control for Boost DC/DC Converters [1.7 Posterboard 10]
Hung-Chi Chen, Tsai Yi-Fan and Tsai Wen-Cheng
National Yang Ming Chiao Tung University, Taiwan; National Yang Ming Chiao Tung University (NYCU), Taiwan

#512 | Analyzing and Controlling a Triple Active Bridge Converter Using a Small Signal State-Space Model [1.7 Posterboard 11]
Francisco J. Arizaga, Juan M. Ramirez, Janeth A. Alcala and Armando G. Rojas Hernandez
CINVESTAV Guadalajara, Mexico; Universidad de Colima, Mexico; Universidad de Sonora, Mexico

#814 | Event-based Constant On-Time Digital Current Mode Control Techniques in Series Capacitor Buck Converters for Enhanced Stability and Performance [1.7 Posterboard 12]
Prantik Majumder, Teja Golla, Santanu Kapat and Debaprasad Kastha
Indian Institute of Technology Kharagpur, India

#875 | Elemental Real-Time Modeling for High Voltage Low Power Pulse Generators [1.7 Posterboard 13]
Chinara Kuldip and N. Lakshminarasamma
Indian Institute of Technology, Madras, Chennai, India, India

#1542 | Critical Inductance of Multiphase Constant On-Time Controlled Buck Regulators [1.7 Posterboard 14]
Sundaramoorthy Sridhar, Adhistira M. Naradhipa, Shuai Jiang and Qiang Li
Virginia Polytechnic Institute and State University, United States; Google, United States

#957 | Estimating Switching and Conduction Losses During Overmodulation of Three-Phase VSIs [1.7 Posterboard 15]
Ujjwal Kumar, Josiah Haruna and Caleb Secrest
BorgWarner Inc., United States

#63 | Fast Circuit Simulation of Linear Electronic Circuits Using Modified Nodal Analysis [1.7 Posterboard 16]
Nicolas Voyer, Akinu Nakabayashi and Ryota Kondo
Mitsubishi Electric Research Centre Europe, France; Mitsubishi Electric Corporation, Japan

#306 | System Identification of a DC-DC Buck Converter Based on Two-Channel Relay Method [1.7 Posterboard 17]
Ayman AlZawaideh, Hao Tu and Srdjan Lukic
North Carolina State University, United States

#1298 | Modeling and Implementation of High Gain Bi-directional Boost Full Bridge-based Series Resonant Converter [1.7 Posterboard 18]
Nitheesh Rajendran, Lakshminarasamma Narasimhamurthy and Arun Karuppaswamy B
Indian Institute of Technology Madras, India

#1537 | A Ripple-Equivalent Circuit-Based Method for Analyzing Soft-Charging Operation in Hybrid Switched-Capacitor Converters [1.7 Posterboard 19]
Nagesh Patle, Rose A. Abramson, Rahul K. Iyer and Robert C. N. Pilawa-Podgurski
University of California Berkeley, United States

1.8 Advanced Control of Power Converter

Chair: Rui Wang

#1832 | Disturbance Observer-Based Control with Sensor Noise Suppression for DAB Converters [1.8 Posterboard 1]
Oluleke Babayomi, Jongseok Kim and Ki-Bum Park
Korea Advanced Institute of Science and Technology, Korea (South)

#1007 | Additional Feedback Loop for Improved Control Robustness [1.8 Posterboard 2]
Huawei Yuan, Wanrong Li, Yuhan Zhang, Sinan Li, Jianguo Zhu and Shu Yuen Ron Hui
The University of Hong Kong, Hong Kong; The University of Sydney, Australia

#433 | Control method for the cascaded H-bridge converter using cascaded switching frequencies and voltage levels to minimize the high-frequency ripple-current. [1.8 Posterboard 3]
Remco Bonten and Bas Vermulst
Eindhoven University of Technology, Netherlands

#319 | Kalman Filter-Based Model Predictive Control of Grid-Connected 3L-ANPC Inverter with Optimized Space Vector [1.8 Posterboard 4]
Euntaek Nam and Suyong Chae
Pohang University of Science and Technology, Korea (South)

#242 | On Bounding the Junction Temperature by Means of Optimal Modulation with Relaxed Properties [1.8 Posterboard 5]
Isavella Koukoula, Petros Karamanakos and Tobias Geyer
Tampere University, Finland; ABB Systems Drives, Switzerland

#1876 | Enhanced Current-mode Control of DCM/CCM Boundary Boost PFC Provides Low THD in DCM [1.8 Posterboard 6]
Claudio Adragna and Giovanni Gritti
STMicroelectronics, Italy

#752 | A Modified Park Transformation Algorithm for Phase-Locked Loop Applications in Unbalanced Three-Phase Systems [1.8 Posterboard 7]
Hsueh-Ju Wu and Yaow-Ming Chen
National Taiwan University, Taiwan

#790 | Fast Algorithm for Eliminating Common Mode Voltage in Dual Three-phase Inverter [1.8 Posterboard 8]
Xiangyu Sun, Wenjun Zhu, Xiao Chen, Antonio Griffo and Geraint Jewell
University of Sheffield, United Kingdom

#1357 | Sensorless Current Sharing Interleaved Control Strategy for High-current DC/DC Converter [1.8 Posterboard 9]
Cristina Terlizzi, Mohammad Wasiq, Stefano Bifaretti and Alessandro Lampasi
University of Rome Tor Vergata, Rome, Italy, Italy; ENEA and DTT S.C. a r.l., Frascati, Italy, Italy

#588 | A Low Cost Constant Output Current Control Method for PSR Active-Clamp Flyback Converter in DCM and CCM with ADTD Method [1.8 Posterboard 10]
Daying Sun, Jingjing Guo, Yu Yao, Chong Wang and Wenhua Gu
Nanjing University of Science& Technology, China; Nanjing University of Posts and Telecommunications, China

#594 | Indirect Minimization of Common-Mode Voltage with Finite Control-Set Model Predictive Control in a Five-Level Inverter [1.8 Posterboard 11]
Apparao Dekka, Dharmikkumar Prajapati, Deepak Ronanki and Jose Rodriguez
Lakehead University, Canada; Indian Institute of Technology Madras, India; Universidad San Sebastian, Chile

#804 | Performance Analysis of Constant Current LCC Resonant LED Driver [1.8 Posterboard 12]
Arvin Escultero and Carl Michael Odulio
University of the Philippines – Diliman, Philippines

#397 | A Novel Control Scheme for Voltage Regulators with Coupled Inductors and Discrete Inductor [1.8 Posterboard 13]
Wei Dai, Xiaoguo Liang, Alan Wu, Kaladhar Radhakrishnan, Michael Hansen and Rishik Bazaz
Intel Asia Pacific R&D Ltd., China; Intel Canada, Canada; Intel, United States

#379 | Active Power Control Strategy with Load Impedance Estimation Method for IH Cooktop Considering Utilization of Double-bottom Pot [1.8 Posterboard 14]
Man Jae Kwon, Seung Hyun Kang, Yun Seong Hwang, Hyeon Soo Kim, Dong-Wook Yoo and Byoung Kuk Lee
Sungkyunkwan University, Korea (South); Hanyang University, Korea (South)

#671 | Finite-Control-Set Model Predictive Control with Reduced Computational Burden in Cascaded H-Bridge Permanent Magnet Synchronous Motor Drives for EV Applications [1.8 Posterboard 15]
Filippo Gemma, Jacopo Riccio, Giulia Tresca, Andrea Volpini and Pericle Zanchetta
University of Pavia, Italy; University of Nottingham, United Kingdom; university of Pavia, Italy

#586 | Mutual Inductance Extraction and Power Allocation of a Planar Omnidirectional WPT System [1.8 Posterboard 16]
Xipei Yu, Liyan Zhu, Junjie Feng and Qiang Li
Center for Power Electronics Systems, Virginia T, United States

#325 | A Load Insensitive Model Predictive Control for Three-phase Inverter with L-C Filter [1.8 Posterboard 17]
Jianwu Zeng, Taesic Kim and Vincent Winstead
Minnesota State University, Mankato, United States; University of Missouri, Columbia, United States

#124 | Control Strategy of Circulating Currents Mitigation in Paralleled High-Power Adjustable Speed Drives with Independent DC Links [1.8 Posterboard 18]
Kevin Lee, Zhihao Song, Wenxi Yao and Bo Wei
Eaton, United States; Zhejiang University, China

#727 | Sensor-less Current Control Based on Inverse Function for Three-Phase SiC Back-to-Back Inverter Systems [1.8 Posterboard 19]
Tohfa Haque, Wensong Yu and Md Tanvir Ahammed
North Carolina State University, United States

1.9 Electric Machines 1

Chair: Alireza Fatemi

#1697 | A Study on Five-Phase Permanent Magnet Vernier Motor Superimposed Harmonic Current [1.9 Posterboard 1]
Kohei Aiso and Shoji Shimomura
Shibaura Institute of Technology, Japan

#1259 | Cost Efficient Iron Loss Calculation Process of Induction Motors Considering Slot Harmonics Using Scale Method [1.9 Posterboard 2]
Du-Ha Park, Jae-Hyun Kim, Hyun-Su Kim, Jin-Cheol Park, Yun-Jae Won and Myung-Seop Lim
Hanyang University, Korea, Republic of; Yeungnam University, Korea, Republic of

#382 | Bearing Outer Race Fault Detection through the Analysis of Stray Flux Signals via CWT and CNN [1.9 Posterboard 3]
Geovanni Diaz-Saldana, Jonathan Cureno-Osornio, Israel Zamudio-Ramirez, Vicente Biot-Monterde, Roque A Osornio-Rios and Jose Alfonso Antonino-Daviu
Universidad Autonoma de Queretaro, Mexico; Universitat Politecnica de Valencia, Spain

#1430 | Analysis of Frequency-Induced Current Displacement in Dual-Cage Induction Motors for Electromobility [1.9 Posterboard 4]
Felipe Santacruz, Carlos Madariaga, Cesar Gallardo, Juan A. Tapia and Michele Degano
University of Concepcion, Chile; University of Nottingham, United Kingdom

#1019 | A High-Speed Rare-Earth Free IPM with Carbon Composite Wrapped Rotor [1.9 Posterboard 5]
Rahman MD Rashedur, Seungdeog Choi and Han-Gyu Kim
Mississippi state university, United States

#1172 | High-Speed Synchronous Reluctance Motors with Additively Manufactured Rotors [1.9 Posterboard 6]
Yulong Cui, Chiara Gianassi, Alessandro Fortunato, Luca Zarri and Andrea Cavagnino
Politecnico di Torino, Italy; University of Bologna, Italy

#251 | Current and Stray Flux Combined Analysis for the Detection of Misalignments in Synchronous Reluctance Machines [1.9 Posterboard 7]
Angela Navarro-Navarro, Vicente Biot-Monterde, Jose Enrique Ruiz-Sarrio and Jose Alfonso Antonino-Daviu
Universitat Politecnica de Valencia – ITE, Spain

#637 | Torque Ripple Cancelation with 4 Degree-Of-Freedom [1.9 Posterboard 8]
Cheng Gong, Le Chang, Song He, Vinod Peddi and Peng Zhang
General Motors, United States

#87 | Developments of Reliable Analytical Models for Predicting Synchronous Reluctance Motor Operations with Cross-coupling Effects [1.9 Posterboard 9]
Cheng-Tsung Liu, Shih-Ting Hua, Sheng-Chan Yen, Kuan Yang and Pei-Chun Shih
National Sun Yat-sen University, Taiwan; Nidec Taiwan Corporation, Taiwan

#288 | Cogging Torque Minimization in Low-Speed Transverse Flux Permanent Magnet Generator Using Improved Skewing Techniques [1.9 Posterboard 10]
Maryam Salehi, Alireza Omidi, Mohammad Farahzadi, Ahmad Darabi, Mohammad Hoseintabar Marzebali, Vedanadam Mudumbai Acharya and Madhav Manjrekar
Electrical and Computer Engineering Department, United States; Electrical and Computer Engineering Department, Iran; Powersys Inc, United States

#657 | Short-Circuit Model of Synchronous Machines Based on Flux and Loss Maps [1.9 Posterboard 11]
Simone Ferrari, Andrei Bojoi, Maedeh Mirazimi, Paolo Pescetto, Davide Ronchetto, Paolo Cagnetta and Gianmario Pellegrino
Politecnico di Torino, Italy; Avio Aero, Italy

#852 | Estimation of Harmonic Losses and Current Distortion considering Magnetic Saturation and Coupling Inductance for Dual Three-Phase PMSM [1.9 Posterboard 12]
Yena Bai, Junyeol Ryu and Myungseop Lim
Hanyang University, Korea, Republic of; KATECH, Korea, Republic of

#1269 | Dynamic Mechanical Stress Minimization Coupled Optimization of High-Speed 800-V Permanent Magnet-Assisted Synchronous Reluctance Motor with Blended Magnets [1.9 Posterboard 13]
Robin Wilson, Praveen Kumar and Ayman EL-Refaie
Marquette University, United States

#426 | The Speed-Independent Angle Tracking Observer(ATO) Based on second-Order Generalized Integrator(SOGI) filter [1.9 Posterboard 14]
Jang Pooreum, Yang Hyoung-Kyu, Joo Dongmyoung, Hyon Byong Jo and Choi Jun-Hyuk
Korea Electronics Technology Institute, Korea (South)

#659 | Design of 160 kW, 50000 r/min Ultra-High Speed Traction Motor For Enhancing Output Power Density: Comparison of Different Rotor Core Materials [1.9 Posterboard 15]
Masaki Kimura, Ren Tsunata, Masatsugu Takemoto and Jun Imai
Okayama University, Japan

#1315 | Design and Analysis of Single-Phase, Two-Speed, Line-Start Synchronous Reluctance Motor for Ceiling Fan Applications [1.9 Posterboard 16]
Pramod Antony D'sa, Shovan Dey, Amarkumar Kushwaha and Baylon G. Fernandes
Indian Institute of Technology Bombay, India; Indian Institute of Technology Dharwad, India

#1186 | A Transverse-Flux Constant Force Mechanism [1.9 Posterboard 17]
Gozde Sivka, Bertrand Dechant, Colton Bruce and Jonathan Bird
Portland State University, United States; FluxMagic, Inc., United States

#1445 | Minimizing Both Leakage Inductance and Winding Capacitance in a 1:1 High-frequency Transformer Using Fully Interleaved and Interposed Winding [1.9 Posterboard 18]
Annoy Kumar Das and Baylon G. Fernandes
IIT Bombay, India

#93 | Synchronous Electrostatic Machines for Direct Drive Industrial Applications [1.9 Posterboard 19]
Daniel Ludois, Peter Killeen, Aditya Ghule, Stewart Innes and Justin Reed
C-Motive Technologies, United States

1.10 Electric Drives: Control and State Estimation

Chair: Luca Zarri

#911 | A Two-Steps Approach for Full Parameters Identification of Induction Machines at Standstill Operation [1.10 Posterboard 1]
Mojtaba Ayaz Khoshhava, Hamidreza Mosaddegh, Simon Caron, Amir Khazaei and Kamal Al-Haddad
Ecole de technologie superieure (ETS), Canada; Smartd Technologies Inc., Canada; Ecole de Technologie Superieure (ETS), Canada

#523 | Discrete-time Analysis and Use of CVCR and SFBD Type Current Regulators in Saturated Salient AC machines [1.10 Posterboard 2]
Vinod Chowdary Peddi, Anmol Aggarwal and Brent Gagas
General Motors, United States

#243 | An Improved Generalized Multiple-Vector-Based Model Predictive Control with Current Harmonic Suppression for PMSM Drives [1.10 Posterboard 3]
Yubin Wang, Yongchang Zhang, Haitao Yang, Jose Rodriguez, Chenbo Wang, Hongjin Guo, Haisen Zhao and Guorui Xu
North China Electric Power University, China; North China University of Technology, China; Universidad San Sebastian, Chile

#1148 | Improved Power Current Control for Current Ripple Suppression of PMSM Drives under Large DC-Link Voltage Fluctuations [1.10 Posterboard 4]
Jian Xiong, Jianzhong Zhang, Ning Wang, Chen Tang, Yanbo Wang and Hongjun Fu
School of Electrical Engineering, Southeast University, China; Department of Energy Technology, Aalborg University, Denmark; Jiangsu Yuanfang Power Technology co., ltd., China

#604 | Sensorless Control of AC Motor Drives with Adaptive Extended Kalman Filter [1.10 Posterboard 5]
Saverio Rigon, Riccardo Antonello, Paolo Mercorelli and Mauro Zigliotto
University of Padua, Italy; Leuphana University of Lueneburg, Germany

#129 | Initial Rotor Position Detection with Eight Zones for BDCMs with Single Hall Position Sensor [1.10 Posterboard 6]
Hung-Chi Chen, Chun-Ya Chan and Yi-Ping Chao
National Yang Ming Chiao Tung University, Taiwan; National Yang Ming Chiao Tung University (NYCU), Taiwan

#1290 | Analog Accelerated Model Reference Adaptive System-based Speed Estimation for Motor Control [1.10 Posterboard 7]
Henil Shah, Anupama Kowli and Mukul Chandorkar
Indian Institute of Technology Bombay, India; Indian Institute of Technology BOmbay, India

#1452 | Dynamic Current Control of Rare Earth Free Biaxial Excitation Synchronous Machines [1.10 Posterboard 8]
Krishna MPK Namburi, Prerit Pramod, Ion Boldea and Iqbal Husain
Nexteer Automotive Corporation, United States; MicroVision, Inc, United States; Politehnica University, Romania; North Carolina State University, United States

#396 | Implementation of Low Speed Sensorless Control Using ANN on General-Purpose MCU [1.10 Posterboard 9]
Yanyu Xia and Sari Maekawa
Meiji University, Japan

#902 | TLS EXIN Based Sensorless Control of a Synchronous Reluctance Motor [1.10 Posterboard 10]
Angelo Accetta, Maurizio Cirrincione, Massimiliano Luna and Marcello Pucci
Institute of Marine Engineering (INM) – National Research Council of Italy (CNR), Italy; University of South Pacific, Fiji; National Research Council of Italy (CNR) – INM, Italy

#1370 | Active Flux Position Observer for Sensorless Direct-Flux-Vector-Control at Low Speed [1.10 Posterboard 11]
Andrei Bojoi, Paolo Pescetto and Gianmario Pellegrino
Politecnico di Torino, Italy

#923 | Flux Saturation Model and Self-Identification Method of Permanent Magnet Synchronous Motor Considering the Magnetic Flux of Permanent Magnet [1.10 Posterboard 12]
Sung-Ho Kang, Tae-Gyeom Woo, Seung-Cheol Choi, Il-Oun Lee and Young-Doo Yoon
Department of Automotive Engineering Automotive-Computer Convergence, Korea, Republic of; LS ELECTRIC, Korea, Republic of; Department of Electrical Engineering, Myongji University, Korea, Republic of; Department of Automotive Engineering, Hanyang University, Korea, Republic of

#1569 | Rotor Angle Estimation Error Compensation Algorithm Based on Extended Back-EMF Sensorless for Low-Speed Operation in Washing Machines [1.10 Posterboard 13]
Yujin Shin, Jaehyeok Jang, Jung-Yong Lee and Younghoon Cho
Konkuk University, Korea (South)

#1116 | Real-time Estimation of Permanent Magnet Synchronous Motor Stator Winding Resistance and Temperature Reflecting Permanent Magnet Variations [1.10 Posterboard 14]
Areum Kang, JungHyeon Han and Jae Suk Lee
Jeonbuk National University, Korea, Republic of

#1578 | Position Sensorless Drive Improvement for Surface PM Motors base on Flux Linkage Estimation with PWM Voltage Measurement [1.10 Posterboard 15]
Chen-Pei Yi, Yi-En Chen, Chen-Yen Yu, Hsin-Tien Yeh, Cheng-Hsuan Lin and Shih-Chin Yang
National Taiwna University, Taiwan; Archer aviation, Taiwan; Industrial Technology Research Institute, Taiwan

#135 | A Gain Design Strategy for an Active Damping Controller of a MIDP Permanent Magnet Synchronous Motors Drive System [1.10 Posterboard 16]
Gi-Jung Nam, Hyung-Woo Lee and Kyo-Beum Lee
Ajou University, Korea, Republic of

#451 | I-F Startup with Reactive Power-based MRAS for Model Predictive Current Controlled SPMSM Drive [1.10 Posterboard 17]
Hyeonseong Kim, Junhyuk Song and Kibok Lee
Korea University, Korea (South)

#1865 | Extracting Spatial Harmonic Flux Linkages from an Unstructured Measurement of a PMSM [1.10 Posterboard 18]
Alexander Oerder, Stephan Goehner, Andreas Liske and Marc Hiller
Karlsruhe Institute of Technology, Germany

1.11 Packaging

Chair: Jun Wang

#1609 | Spring-Loaded GaN Packaging for Cryogenic Thermal Cycling [1.11 Posterboard 1]
Ching-Hsiang Yang, Shimul K. Dam, Zhou Dong, Dehao Qin, Ruirui Chen, Fred Wang, Hua Bai and Zheyu Zhang
University of Tennessee, Knoxville, United States; ABB US Research Center, Raleigh, United States; Clemson University, United States; Rensselaer Polytechnic Institute, United States

#1439 | Achieving Low Inductance Power Loops on Rigid-Flex Substrates for Efficient MHz Switching in GaN Half-Bridges [1.11 Posterboard 2]
Manuel Ruess, Dominik Koch and Ingmar Kallfass
Institute of Robust Power Semiconductor Systems, University of Stuttgart, Germany, Germany

#705 | A Compact Three-phase Chip-on-Chip SiC Integrated Power module with Low Thermal Resistance and Gate Signal Interference [1.11 Posterboard 3]
Jiaxin Liu, Chenhang Zeng, Heng Zhang, Cai Chen, Yong Kang, Heng Liu, Cheng Liu, Yuwei Zhang and Laifeng Shi
Huazhong University of Science and Technology, China; Huazhong University of Science and technology, China; Dongfeng Motor Corporation, China

#236 | A Wire-bonded Multichip SiC Power Module with Low Parasitic Inductance and High Current Sharing Characteristic [1.11 Posterboard 4]
Heng Zhang, Shuangxi Zhu, Sijia Liu, Zexiang Zheng, Linhao Ren, Jiaxin Liu, Cai Chen, Yong Kang, Zhuanmin Liu, Heng Liu, Cheng Liu, Qinjie Huang and Yahao Zhang
Huazhong University of Science and Technology, China; Dongfeng Motor Corporation Research&Development Institute, China

#1535 | A 1.7 kV Full-SiC Reverse-Blocking Module Enabling Efficient Multiport Operation in Soft-Switching Current Source Converters [1.11 Posterboard 5]
Aniruddh Marellapudi, Mickael Mauger, Joseph Benzaquen and Deepak Divan
Georgia Institute of Technology, United States

#1021 | Double-Side Cooled 3.3 kV, 100 A SiC MOSFET Phase-Leg Modules for Traction Applications [1.11 Posterboard 6]
Qingrui Yuchi, Zichen Zhang, Serge Bontemps, Kaixuan Li, Joshua Gardner and Guo-Quan Lu
Department of Materials Science and Engineering, Virginia Tech, United States; Microchip Technology Inc., United States; Microchip Technology Inc., France

#1680 | Demonstration of a SiC Power Module with Integrated Hexagonal Boron Nitride (h-BN) Substrate for Direct-cooling [1.11 Posterboard 7]
Yunlei Jiang, Wei Mu, Borong Hu, Luke Shillaber and Teng Long
SpaceX, United States; University of Cambridge, United Kingdom

#1443 | Effect of Power Module Architecture on Common Mode Electromagnetic Interference [1.11 Posterboard 8]
Taha Moaz, Christina DiMarino, Narayanan Rajagopal, Richard Zhang, Dushan Boroyevich and Michael Fish
Virginia Polytechnic Institute and State University, United States; Army Research Lab, United States

#1380 | An Equivalent Chip Neighborhood Range Modelling Method for Medium-Voltage SiC MOSFET Power Module Electric Field Analysis [1.11 Posterboard 9]
Peiyuan Sun, Laili Wang, Tianshu Yuan, Dingkun Ma, Lei Li, Jiacheng Guo, Peiyang Ding and Kai Gao
Xi'an Jiaotong University, China; State Grid Shanghai Electric Power Research Institute, China

#27 | A 1200V/400A/2.2mohm SiC Power Module with Insulated Metal Substrate (IMS) and Improved Electromagnetic Interference (EMI) [1.11 Posterboard 10]
Zibo Chen and Alex Q. Huang
The University of Texas at Austin, United States

#1500 | Intelligent Power Module for Optically Triggered Adaptive Zero Voltage Switching [1.11 Posterboard 11]
Borong Hu, Xufu Ren, Liang Wang, Luke Shillaber, Yunlei Jiang, Jiayu Li and Teng Long
University of Cambridge, United Kingdom; Chongqing University, China

Tuesday, October 22 10:30AM – 12:10PM

POSTER SESSION 2

Exhibit Hall

2.1 Converters for Renewable Energy Systems

Chair: Minghui Lu

#307 | Design and Analysis of a High-Gain, Transformerless DC-DC Converter [2.1 Posterboard 1]
Ahmed Allehyani
Electrical and Electronic Engineering Department, University of Jeddah, Saudi Arabia

#738 | Ultra Robust 1MHz Multi-sampling Deadbeat Control for Megawatt-Class Grid-tied Multi-level Inverter with LC type Output Filter Configuration using C-HIL [2.1 Posterboard 2]
Shinnosuke Kubo, Hidayat Kreszens, Kaya Kawashima, Kohsuke Seki, Kenta Yamabe and Tomoki Yokoyama
Tokyo Denki University, Japan; TMEIC, Japan

#237 | Research on Bidirectional Quasi-Z-source Nine-switch Multiport Converter and Control Strategy for Direct-drive Wave Power Generation System [2.1 Posterboard 3]
Huang Lei, Wang Shixiang, Ma Ruiyang, Pan Baoyi, Mou Zihao and Tan Peiwen
Southeast University, China

#1085 | Novel Three-Phase PLL with Per Phase Grid Angle Tracking Capability for Shunt-Connected Solar Microinverter [2.1 Posterboard 4]
Roshan Varadharajan, Avinash Dornala, Kangbeen Lee and Woongkul Lee
Michigan State University, United States; Purdue University, United States

#265 | Hybrid Power Control of Full-Power Converter Variable-Speed Pumped Storage System for Oscillation Suppression [2.1 Posterboard 5]
Kaihsun Chuang, Lijie Ding, Pengyu Pan, Yihang Luan, Xiaoming Zha and Jianjun Sun
Wuhan University, China; State Grid Sichuan Electric Power Company, China

#1855 | Modular LLC Resonant Converters with New Active Voltage Doublers Based Output Voltage Balancers for MVDC Distributed PV Systems [2.1 Posterboard 6]
Kajanan Kanathipan, Mehdi Abbasi, Muhammad Ali Masood Cheema and John Lam
York University, Canada; Northern Transformer, Canada

#730 | Investigating the Effect of Transport Delay on the Grid Current THD of Single-Phase Converters Using Proportional-Resonant Controllers [2.1 Posterboard 7]
Sobhan Mohamadian, Amir Ghasemian, Concettina Buccella and Carlo Cecati
University of L'Aquila, Italy; Polytechnic University of Bari, Italy

#1533 | Modular Multilevel Converter (MMC) Based Direct Tapping Method for High Voltage DC Transmission Networks [2.1 Posterboard 8]
Sulaiman Alshammari, Mohammed Alharbi, Vasishta Burugula, Hamdan Alosaimi, Hadhlul Aladhyani and Subhashish Bhattacharya
North Carolina State University, United States; King Saud University, Saudi Arabia

#533 | Enhanced Startup and Synchronization Transients for Virtual-Oscillator Grid-Tie Inverters Using Predictive Feedback-Based Method [2.1 Posterboard 9]
Shumeng Wang, Uthandi Selvarasu, Mahshid Amirabadi, Yuan Li and Brad Lehman
Northeastern University, United States; Florida State University, United States

#662 | Common Mode Voltage Reduction of a Modified Three-Phase Inverter [2.1 Posterboard 10]
Kotb Tawfiq, Hatem Zein El din, Ahmed Al Durra and Ehab El-Sadaany
Khalifa University, United Arab Emirates

#1196 | Fault Ride-through for Cascaded Inverters Using Mixed Grid-forming and Grid-following Control [2.1 Posterboard 11]
Rahul Mallik, Debjyoti Chatterjee and Brian Johnson
University of Texas at Austin, United States

#1383 | Double Line Frequency Voltage Ripple Reduction Control Strategy for Dual-Active-Bridge in DC/AC System [2.1 Posterboard 12]
Hui Cao, Houqing Wang, Peyman Darvish, Liyang Du, Zhenqi Wang, Yushi Yang, Zhuxuan Ma and Yue Zhao
University of Arkansas, United States; University Of Arkansas, United States

#757 | DC-link Voltages Digital Sampling for Cascaded H-Bridge Rectifiers with Single Voltage Sensor under Hierarchical Model Predictive Control [2.1 Posterboard 13]
Yushi Yang, Hui Cao and Yue Zhao
University of Arkansas, United States

2.2 DC, AC, and Hybrid Microgrids

Chair: Mehrnaz Madadi

#1471 | Decentralized Parameter Estimation of DC Microgrids through Voltage Disturbances [2.2 Posterboard 1]
Chunlei Fu, Chenming Liu and Jingyang Fang
School of Control Science and Engineering, Shandong University, China

#1472 | Estimation-Based Decentralized Secondary Control of DC Microgrids [2.2 Posterboard 2]
Chunlei Fu, Chenming Liu and Jingyang Fang
School of Control Science and Engineering, Shandong University, China

#1149 | Damped Signal to Improve Transient Response Among DG in Microgrid Systems [2.2 Posterboard 3]
Mohammed Alsubaie, Vasishta Burugula, Osamah Aljumah and Subhashish Bhattacharya
North Carolina State University, United States

#625 | A Single-Stage Reduced-Switch AC-DC Interlinking Converter with Integrated Dual DC Ports for Hybrid Microgrids [2.2 Posterboard 4]
Asad Hameed and Gerry Moschopoulos
The University of Western Ontario, Canada

#1442 | Development of a Practical Secondary Control for Hardware Microgrids [2.2 Posterboard 5]
Soham Chakraborty, Jing Wang, Subhankar Ganguly and Benjamin Kroposki
National Renewable Energy Laboratory, United States

#1735 | Energy Router-based Hybrid AC/DC Microgrid Coordinated Control and SOC Balancing Strategies [2.2 Posterboard 6]
Shushan Qiu, Kaushik Rajashekara, Tutan Debnath and Yuanzhuo Qi
University of Houston, United States

#1600 | A Methodology for Assessment of Energy Secure Distribution Systems: An Architectural Comparisons of Zonal Nanogrid Building Blocks of Critical Facilities [2.2 Posterboard 7]
Mark Vygoder, Jacob Gudex, Cuzner Robert and Oriti Giovanna
University of Wisconsin – Milwaukee, United States; Naval Postgraduate School, United States

#1340 | Hybrid Energy Management with Real-Time Control of a High-Power EV Charging Site [2.2 Posterboard 8]
Emin Ucer, Vaibhav Pawaskar, Derek Jackson, Alastair Thurlbeck, Ed Watt and Mithat John Kisacikoglu
National Renewable Energy Laboratory, United States

#1226 | Quantitative Trade-off in Distributed Secondary Control for Autonomous AC Microgrids [2.2 Posterboard 9]
Zhong Liu, Xiaonan Lu, Walter Leon-Salas and Jin Tan
Purdue University, United States; National Renewable Energy Laboratory, United States

#1355 | Reliability Enhancement of DC Space Microgrids Using Ring Distribution Topology [2.2 Posterboard 10]
Leila Chebbo and Ali Bazzi
University of Connecticut, United States

#495 | Event-Triggered Communication Mechanism for DRL Secondary Frequency Compensation in AC Islanded Microgrid [2.2 Posterboard 11]
Sijia Li, Chen Liu, Frede Blaabjerg and Amjad Anvari-Moghaddam
Aalborg University, Denmark; AAU Energy, Aalborg University, Denmark

#1575 | Three Phase High-Frequency-Link-Y-Configuration AC-DC DAB Converter with Monolithic Bidirectional GaN Switch [2.2 Posterboard 12]
Mafu Zhang, Huanghaohe Zou, Saleh Farzamkia, Chen Chen and Alex Huang
The University of Texas at Austin, United States

#1406 | Contrasting Power Consumption and Trading in Residential Microgrids Considering Dynamic Pricing [2.2 Posterboard 13]
Md. Mizanur Rahman, Ankon Babla Sushil and Daniela Wolter Ferreira Touma
University of South Alabama, United States

#532 | Active Controls of a Multi-Frequency Multi-Bus Microgrid Network Using Hamiltonian-Based Techniques [2.2 Posterboard 14]
Connor A. Lehman, Rush D. Robinett III, David G. Wilson and Wayne W. Weaver
Sandia National Labs, United States; Michigan Technical University, United States

#1541 | Enhancing Behind-the-Meter Visibility: Integrating Bolt-On Sensors for Improved Disaggregation Algorithm Accuracy and Cost-Efficiency [2.2 Posterboard 15]
Mehrnaz Madadi and Subhashish Bhattacharya
North Carolina State University, United States

#1352 | Energy Sharing among Hydrogen-based Regional Energy Systems with Multi-Energy Storage [2.2 Posterboard 16]
Dafeng Zhu and Qianwen Xu
KTH Royal Institute of Technology, Sweden

2.3 Transportation Electrification II

Chair: Feng Guo

#363 | Development of a Medium-Voltage Transformerless Multilevel Inductive Power Transfer System [2.3 Posterboard 1]
Hyeonji Hwang, Sumi Park, Myung-Yong Kim, Jaehong Lee and Seung-hwan Lee
University of Seoul, Korea (South); Korea Railroad Research Institute, Korea (South)

#585 | Coil Optimization of a Planar Omnidirectional WPT System [2.3 Posterboard 2]
Xipei Yu, Liyan Zhu, Junjie Feng and Qiang Li
CPES, Virginia Tech, United States

#763 | Frequency-Domain Method to Determine Validity of the Fundamental Harmonic Approximation [2.3 Posterboard 3]
Chenmin Deng, YiHao Wu, Alex Hanson and Tim Merkin
University of Texas at Austin, United States; Texas Instruments, United States

#1287 | A Novel Scheme with Maximum Efficiency and Fast Response for Dynamic Wireless Battery Charging Systems [2.3 Posterboard 4]
Jiayang Wu, Yuan Huawei, Sinan Li, Siew-Chong Tan and Shu-Yuen Ron Hui
The University of Hong Kong, Hong Kong; The University of Sydney, Australia

#1422 | A Bridgeless Single Stage Power Factor Corrected Inductive Wireless Power Transfer Converter [2.3 Posterboard 5]
Saman Rezazade and Mohammed Agamy
University at Albany – State University of New York, United States

#669 | Design and Experimental Test of a High Frequency Rotary Transformer [2.3 Posterboard 6]
Francesco Tripaldi, Manuele Bertoluzzo and Nicola Bianchi
University of Padova, Italy

#337 | A Closed-Loop-Controlled Wireless Motor System with Maximum Efficiency Point Tracking [2.3 Posterboard 7]
Youhao Hu, Wei Han, Bowang Zhang and Weikang Hu
HKUST(GZ), China; HKUST, Hong Kong

#347 | Precise Coil Inductance Prediction with Transfer Learning Improved Deep Neural Networks in WPT Systems [2.3 Posterboard 8]
Yue Wu, Delin Zhao, Yongbin Jiang, Yaohua Li, Xipei Yu, Sicheng Wang, Min Wu, Xiaohua Wang and Yi Tang
Xi'an Jiaotong University, China; Nanyang Technological University, Singapore; CPES, Virginia Tech, United States

#978 | Optimization of Integrated Inductors for Wireless Power Transfer Applications [2.3 Posterboard 9]
Peyman Darvish, Hui Cao, Yue Zhao, Uddin Muhamad Fasih and Houqing Wang
University of Arkansas, United States

#1059 | Range Extension of Robust Wireless Power Transfer Using a Metamaterial-Based Relay Resonator Array [2.3 Posterboard 10]
Jiali Zhou and Chi-Kwan Lee
Department of Electrical and Electronic Engineering, The University of Hong Kong, Hong Kong; School of Electrical and Data Engineering, University of Technology Sydney, Australia

#1739 | A Soft-switching On-board Charger for Electric Vehicle Application [2.3 Posterboard 11]
Anran Wei, Brad Lehman and Mahshid Amirabadi
Northeastern University, United States

#1544 | Opportunities for Improved Cooling of AC Machine Rotors using Centrifugal Heat Pipes [2.3 Posterboard 12]
Seth McElhinney and Thomas Jahns
VerdeGo Aero, United States; University of Wisconsin-Madison, United States

#870 | A Multi-objective Design Optimization Method for Auxiliary Resonant Commutated Pole Inverter [2.3 Posterboard 13]
Nan Lin, Yuheng Wu, Long Wu, Zach Wehri, Yushi Yang, Yue Zhao and Brij Singh
John Deere, United States; University of Arkansas, United States

#1396 | Traction Inverter Integrated On-Board DC Fast Charging through Partial Power Processing [2.3 Posterboard 14]
Ashraf Siddiquee, Alper Uzum, Syed Imam Hasan, Yilmaz Sozer and Mithat J. Kisacikoglu
University of Akron, United States; National Renewable Energy Lab, United States

#401 | A SiC-Based 243 kW 60 kW/L Electric Vehicle Traction Inverter [2.3 Posterboard 15]
Chih Chiang Wu, Uma Sankar Rout, Hsin Ping Chou and Jwu Sheng Hu
Industrial Technology Research Institute, Taiwan; National Yang Ming Chiao Tung University, Taiwan

#49 | An Advanced PWM Strategy with Capacitor Voltage Balancing for Hybrid Five-Level Inner-Paralleled ANPC Traction Inverters in Heavy-Duty Vehicle Applications [2.3 Posterboard 16]
Feng Guo, Fei Diao, Zhuxuan Ma and Yue Zhao
University of Wisconsin-Milwaukee, United States; John Deere Intelligent Solutions Group, United States; University of Arkansas, United States

#1328 | Challenges and Solutions for Uneven Voltage Distribution in SiC-Driven AC Motors [2.3 Posterboard 17]
Milad Sadoughi, Fariba Fateh, Jiangbiao He and Behrooz Mirafzal
Kansas State University / ECE, United States; University of Kentucky / ECE, United States

#444 | Comparative Analysis of Power Semiconductor Devices for Use as a Solid-State Circuit Breaker in a Cryogenically Cooled Electrical Aircraft Propulsion Network [2.3 Posterboard 18]
Reza Khoshniat, Nick Wright, Peter Malkin, Mark Husband and Daniel Malkin
Newcastle University, United Kingdom; GKN Aerospace, United Kingdom

2.4 Resonant Power Converters

Chair: Ralph Kennel

#1134 | A New Control Strategy for a Voltage and Current Fed Multiport DC-DC Converter [2.4 Posterboard 1]
Rupert Power, Udaya Madawala and Akshya Swain
The University of Auckland, New Zealand

#1283 | Architecture of Self-Power-Supplied Auxiliary Power Supply for High-Voltage SiC MOSFET [2.4 Posterboard 2]
Yuan Zhou, Li Zhang, Yilun Chen, Tianxiang Yin and Lei Lin
Huazhong University of Science and Technology, China; Southwest Jiaotong University, China

#1497 | A 5 MHz Capacitor-Isolated Resonant SEPIC DC-DC Converter with a Wide Input Voltage Range [2.4 Posterboard 3]
Ning Yan, Dong Dong, Rolando Burgos, Yehuda Levy, Shimon Khananashvili and Ilan Yoscovich
CPES, Virginia Tech, United States; SolarEdge, Israel

#170 | Attention Mechanism Empowered Dual Active Bridge Converter Performance Modeling with Enhanced Interpretability and Lighter Data [2.4 Posterboard 4]
Weihao Lei, Fanfan Lin, Xinze Li, Xin Zhang, Hao Ma, Rui Li and Lin Xu
Zhejiang University, China; Nanyang Technological University, Singapore; Wuhan Second Ship Design and Research Institute, China

#1433 | Design and Prototyping of Dual Planar Coils for High-Frequency GaN-Based Wireless Power Transfer Converters [2.4 Posterboard 5]
Araz Saleki and Mahima Gupta
University of Wisconsin-Madison, United States

#1227 | Optimal Design of Wide Input Voltage Range LLC Converter in Avionics Application [2.4 Posterboard 6]
Woonjung Hong, Tianyu Zhao, Dong Dong and Rolando Burgos
Virginia Polytechnic Institute and State University, United States

#1130 | A Compact Multilevel Converter with Trapezoidal Modulation for MVdc-LVdc [2.4 Posterboard 7]
Rajat Shahane, Mohd Shadab Ansari, Suman Mandal and Anshuman Shukla
IIT Bombay, India; Hitachi Energy Research Vasteras Sweden, Sweden

#1527 | Fault-Tolerant Control Strategy for Half Bridge ANPC based DAB Converter with Enhancing Reliability [2.4 Posterboard 8]
Piyali Pal, Ranjan Kumar Behera, Khalifa Al Hosani and Utkal Ranjan Muduli
IIT Patna, India; Khalifa University, United Arab Emirates

#275 | Modelling of a Multi-Period Damped Resonant DC-DC Converter with Capacitive Isolation [2.4 Posterboard 9]
Stefano Cerutti, Mario Giuseppe Pavone, Francesco Musolino and Paolo Stefano Crovetti
Politecnico di Torino, Italy; STMicroelectronics, Italy

#914 | Extension of the Series Resonant Converter Topology for Gate Driver Supply with a CM Choke [2.4 Posterboard 10]
Christian Beckemeier and Axel Mertens
Leibniz University Hannover, Germany

#1548 | Input Impedance Modeling and Reshaping Control Strategy for Hybrid Modular DC Transformers in DC Distribution Networks [2.4 Posterboard 11]
Wei Wang, Shijie Cheng, Shaokun Niu, Tong Liu and Alian Chen
Shandong University, China

#327 | Design Considerations for a Three-Phase DAB with Instantaneous Flux and Current Control under Wide Voltage Variation [2.4 Posterboard 12]
Apoorv Agarwal and Subhashish Bhattacharya
North Carolina State University, United States

#1883 | A Photovoltaic Interleaved Boost Integrated CL Resonant Converter for Magnetron Application [2.4 Posterboard 13]
Aref Molaei, Kajanan Kanathipan and John Lam
York University, Canada

#695 | Fast Load Dump Effect in Inductive Wireless Power Transfer System: Analysis and Mitigation [2.4 Posterboard 14]
Yanchao Li, Haoquan Zhang, Liang Jia and Srikanth Lakshmikanthan
Google LLC, United States

#651 | Multi-Agent Deep Reinforcement Learning Aided Active Disturbance Rejection Control of DC Solid-State Transformer in Electric Aircraft [2.4 Posterboard 15]
Yu Zeng, Qingxiang Liu, Josep Pou, Yanlei Yu, Candra Adi Wiguna, Christopher Lee, Wang Ming James, Huanqing(Steven) Sun and Armen Baronian
Nanyang Technological University, Singapore; Eaton Aerospace, China; Eaton Aerospace, Canada

#1101 | A Low-Profile Gate Power Supply for a SiC Phase Leg with Reduced Isolation Capacitance [2.4 Posterboard 16]
Bo Li, Xingchen Zhao, Zichen Zhang, Emmanuel Arriola, Qingrui Yuchi, Guo-Quan Lu, Rolando Burgos and Khai Ngo
Virginia Tech, United States

2.5 Control of Power Converter Applications

Chair: Liang Huang

#633 | Thiran-All-Pass-Filter-Based Repetitive Control for Wide-Variable-Frequency Inverter [2.5 Posterboard 1]
Zhuolin Yang, Qiang Qian, Rui Wu, Shian Guo and Li Zhang
Hohai University, China; Nanjing University of Aeronautics and Astronautics, China

#754 | Hybrid ZCD-Based Critical Conduction Mode Totem-pole PFC [2.5 Posterboard 2]
Gibum Yu, Xingyu Chen, Rahul Rajendran and Qiang Li
Center for Power Electronics Systems, Virginia Polytechnic Institute and State University, United States

#685 | A Modulation Scheme of CLLC Converters for Bidirectional Power Transfer with Reduced Switching Frequency Range [2.5 Posterboard 3]
Leheng Wang, Huan Chen and Kai Sun
Tsinghua University, China

#1181 | Enhanced Model Predictive Control Strategy for the Three-Phase 5-Level Multiplexed Converter [2.5 Posterboard 4]
Marco di Benedetto, Andrea Formentini, Alessandro Lidozzi, Luca Solero and Mario Marchesoni
Roma Tre University, Italy; University of Genoa, Italy

#1185 | Small-Signal Stability Constrained Optimal Power Flow of Inverter-Dominated Power Systems with Flexible Operation Mode Selection [2.5 Posterboard 5]
Lizhi Ding, Yuxi Men, Heqing Huang, Xiaonan Lu, Junjie Qin, Yuzhang Lin and Jin Tan
Purdue University, United States; New York University, United States; National Renewable Energy Laboratory, United States

#1759 | PRACL Converters for Motor Drive Applications [2.5 Posterboard 6]
Farid Naghavi, Guanhua Tao and Hamid Toliyat
Texas A&M University, United States

#1765 | Study of Overmodulation of Solid-State Transformer Under Asymmetric Grid Short-Circuit Faults [2.5 Posterboard 7]
Haoyang Zheng, Qing Lin, Rolando Burgos, Dong Dong and Xiong Li
Virginia Tech, United States; Google, United States

#924 | A Trapezoidal Modulation for Three-level Flying Capacitor Converters [2.5 Posterboard 8]
Jingrui Liu, Zhigang Yao, Julian Zhong Wei Chung and Yi Tang
Nanyang Technological University, School of Electrical & Electronic Engineering, Singapore

#1014 | A Fast Three-Phase Boundary Controller with XY Transform [2.5 Posterboard 9]
Troy Eskilson and Carl Ho
University of Manitoba, Canada

#1216 | Modified Nearest Level PWM under Circulating Current Control in MMC Enabling Unity Modulation Index Operation [2.5 Posterboard 10]
Swamy Jakkula, Poornachandra Rao Nallamatti and Anshuman Shukla
Indian Institute of Technology Bombay, India

#1237 | ZCD Circuit Improvement and Novel Signal Processing Method for GaN-Based CRM PWM Converters [2.5 Posterboard 11]
Xingyu Chen, Gibum Yu and Qiang Li
Virginia Tech, United States

#1334 | High Efficiency Control of AC-DC Matrix Based Buck Converters: DCM Modulation [2.5 Posterboard 12]
Dmytro Rodkin, Andrea Formentini, Massimiliano Passalacqua, Luis Vaccaro and Mario Marchesoni
University of Genova, Italy

#772 | An Effective Predictive Control of PMSG Wind Turbine Systems: A Solution Simultaneously Immune to Model and Feedback Uncertainties [2.5 Posterboard 13]
Sining Li, Zhen Li, Junda Li and Zhenbin Zhang
Shandong University, China

#1841 | A Digital Dual 4-Step Switching for an Isolated 3-Phase AC-DC Matrix Converters in Industrial Computing Applications [2.5 Posterboard 14]
Peng-Hao Huang, Vishwam Raval, Enrique Garza-Arias and Prasad Enjeti
Texas A&M University, United States; Tecnologico de Monterrey, Mexico

#390 | Dual Mode BCM Control for Single-Phase Grid-Connected Inverter [2.5 Posterboard 15]
Chen Liu, Sijia Li, Pooya Davari and Frede Blaabjerg
Aalborg University, Denmark

#462 | Modulated Model Predictive Control for Active Front-End Rectifier [2.5 Posterboard 16]
Mobina Pouresmaeil, Jorma Kyyra and Edris Pouresmaeil
Aalto University, Finland

#1211 | Design of Active Filters for high-current Power Supply [2.5 Posterboard 17]
Mohammad Wasiq, Cristina Terlizzi, Stefano Bifaretti and Alessandro Lampasi
University of Rome Tor Vergata, Rome, Italy, Italy; ENEA, DTT S. C. a r. l., Frascati, Italy, Italy

#1208 | A Fast Model-Based Control for a Double Input Three-Switch Bidirectional DC-DC Converter [2.5 Posterboard 18]
Alessandro Benevieri, Massimiliano Passalacqua, Andrea Formentini, Luis Vaccaro and Mario Marchesoni
University of Genova, Italy

#1198 | A Methodology to Solve the Instability Issue in Decoupled Controller for Current Fed Triple Active Bridge Converter [2.5 Posterboard 19]
Rajat Kumar Shukla, Debasattam Pal, Dipankar Saha and B. G. Fernandes
Indian Institute of Technology Bombay, India

2.6 Reliability, Diagnostics and Fault Analysis of Power Converters

Chair: Sreenivasa Jaldanki

#539 | Switch Open Fault Detection Method for Asymmetric 6-phase Motor Drives Based on Stationary Reference Frame dq-axis Currents [2.6 Posterboard 1]
Soyoung Jun, Myeongjae Kim, Seonhwan Hwang, Kichang Lee and Hui Li
Kyungnam University, Korea, Republic of; Korea Electrotechnology Research Institute, Korea, Republic of; Florida State University, United States

#1289 | A DSP Internal Signal-Based Fault Diagnosis Method For Three-Level TNPC Inverter in PMSM Driver System [2.6 Posterboard 2]
Wei Zhou, Jupeng Pang, Dong Ding, Ling Peng, Kui Wang and Yongdong Li
Tsinghua University, China; Wuhan Institude of Marine Electric Propulsion, China

#1075 | Analyzing the Impact of High-frequency Transient Coupled Noise on Coreless Current Sensing in Power Electronics [2.6 Posterboard 3]
Hossein Niakan, Alireza Omidi, Zachary Matheson and Babak Parkhideh
University of North Carolina at Charlotte, United States

#1061 | Learning High-Dimensional Waveform Features to Identify Partial Discharge Source [2.6 Posterboard 4]
Vedant Tewari, Suaib Al Sufi and Chanyeop Park
University of Wisconsin – Milwaukee, United States; University of Wisconsin-Milwaukee, United States

#134 | Thermal Reduction Method of DC-link Capacitors and SiC MOSFETs in Two-Level Inverters Based on Discontinuous PWM [2.6 Posterboard 5]
Hye-Won Choi and Kyo-Beum Lee
Ajou University, Korea, Republic of

#1011 | Real-time Simulation Study of Switch Open-Circuit Fault Detection and Localization Scheme for MMCs with High Submodule Count [2.6 Posterboard 6]
Haoran Wang, Daniel Bowman, Mikael Schmidtke, Gregory Kish and Qing Zhao
University of Alberta, Canada

#103 | Online Reliability Estimation Technique for Ceramic Capacitors in a 24V-to-1V DC-DC Converter [2.6 Posterboard 7]
Zhaoqing Wang, Suhwan Kim, Nachiket Desai, Mausamjeet Khatua, Ram Krishnamurthy, Xin Zhang and Mingoo Seok
Columbia University, United States; Intel, United States; Columbia University, IBM Research, United States

#615 | Lifetime Prediction of Electrothermally-Stressed Semiconductor Devices in Si/SiC H-ANPC Inverter [2.6 Posterboard 8]
Nanditha Gajanur, Mohammad Abbaszada, Sudip Mazumder, Matt Ursino and Patrick McCluskey
University of Illinois Chicago, United States; Yaskawa-Solectria, United States; University of Maryland at College Park, United States

#1195 | A Bidirectional "C-T-C" DC Solid-State Circuit Breaker (SSCB) for Capacitive DC Bus System [2.6 Posterboard 9]
Yuliang Cao, Dong Dong, Rolando Burgos, Haoyang Zheng, Chunmeng Xu, Pietro Cairoli and Jing Xu
Virginia Tech, United States; ABB, United States

#706 | Internal State Estimation of Multi-Capacitors in DC-Link of 4L-ANPC Inverters Based on Data-Driven Method [2.6 Posterboard 10]
Dyan Puspita Apsari and Dong-Choon Lee
Yeungnam University, Korea (South)

#1160 | A Boost-based Step-up Converter Implementation to Charge Capacitor in an LCC Active Injection Current Circuits for SSCBs [2.6 Posterboard 11]
Elias Nadi, Reza Kheirollahi, Shuyan Zhao and Hua Zhang
Rowan University, United States; Tesla, United States; ABB, United States

#791 | Reliability of Power Devices and DC-link Capacitors of Parallel-NPC Inverters under different PWM Methods [2.6 Posterboard 12]
Lee Dong-Jin and Choi Ui-Min
Seoul National University of Science and Technology, Korea, Republic of

#1449 | Studying the Impact of IBR Modeling on the Commonly Applied Transmission Line Protective Elements [2.6 Posterboard 13]
Soham Chakraborty, Paulo Henrique Pinheiro, Goncalves Bainy Romulo, Hangtian Lei, Brian K. Johnson, Scott Manson, Jing Wang, Rasel Mahmud, Andy Hoke and Cameron J. Kruse
National Renewable Energy Laboratory, United States; University of Idaho, United States; Schweitzer Engineering Laboratories, United States; Kaua'i Island Utility Cooperative, United States

#1246 | Universal Reliability Assessment of Inverters in Photovoltaic Systems Based on Real-Field Mission Profiles [2.6 Posterboard 14]
Qiang Mu, Jiale Zhou, Luocheng Wang and Tiefu Zhao
ECE Department University of North Carolina at Charlotte, United States

#1055 | Analysing the Behavior of Solid State Protection System for Dual Active Bridge in Solid State Transformers Under Short Circuit Faults [2.6 Posterboard 15]
Kushan Lulbadda, Ruvini De Seram, Tarlochan Sidhu and Sheldon Williamson
OntarioTech University, Canada

#792 | Reliability-Oriented Design of DC-Link Capacitor Bank of NPC Inverter in PV Systems [2.6 Posterboard 16]
Yeo Gahyeon and Choi Ui-Min
Seoul National University of Science and Technology, Korea, Republic of

#1874 | An On-line Capacitor Parameter Estimation Method for Parallel DC-DC Converters using Beat Frequency Components [2.6 Posterboard 17]
Yeeun Ko and Suyong Chae
Pohang University of Science and Technology, Korea, Republic of

2.7 Electric Machines 2

Chair: Greg Heins

#1754 | Robust Optimal Design Process for Minimizing the Deviation of Cogging Torque in PMSMs Considering Interaction between Manufacturing Tolerances [2.7 Posterboard 1]
Yun-Jae Won, Jae-Hyun Kim, Soo-Min An and Myung-Seop Lim
Department of Automotive Engineering (Automotive-Computer Convergence), Hanyang University, Korea (South); School of Mechanical Engineering, Yeungnam University, Korea (South)

#321 | 2-D Analytical No-Load Modeling of Consequent-Pole Surface Mounted Permanent Magnet Machines With Outer Rotor Core [2.7 Posterboard 2]
Mohammad Alaei Faradonbeh, Vahid Zamani Faradonbeh and Ebrahim Amiri
Isfahan Universityof Technology, Iran; Shiraz University of Technology, Iran; California State University, Long Beach, United States

#1233 | Axial-Assist Permanent Magnet Synchronous Machine with Halbach Array Magnetic Arrangement [2.7 Posterboard 3]
Soheil Yousefnejad, Ebrahim Amiri and Parviz Rastgoufard
University of New Orleans, United States; California State University, Long Beach, United States

#1795 | Impact of Magnet Shape and Thermal Effects on the Performance of Variable Flux Memory Motors [2.7 Posterboard 4]
Daniel Fernandez, Diego Yanez, Maria Martinez, Juan Guerrero and Fernando Briz
University of Oviedo, Spain

#606 | Two-level Design Optimization of AC Machines with DC Stator Excitation and Minimal Torque Ripple using Reluctance Rotor Profile Shaping [2.7 Posterboard 5]
Ali Mohammadi, Oluwaseun A. Badewa, Yaser Chulaee and Dan M. Ionel
University of Kentucky, United States

#317 | Large Scale Optimization of Permanent Magnet Synchronous Motors Accounting for Switching Harmonics Losses Using Field Oriented Control [2.7 Posterboard 6]
Ahmed Shoeb, Dheeraj Bobba and Vedanadam Mudumbai Acharya
Powersys, United States

#631 | Design of an On-Axis Electrically Excited Synchronous Motor for Heavy Commercial Vehicles [2.7 Posterboard 7]
Fabio Filippini and Nicola Bianchi
University of Padova, Italy

#972 | A Novel Segmented-Rotor Hybrid-Excited Synchronous Motor for In-Wheel Two-Wheeler Applications [2.7 Posterboard 8]
Shovan Dey, Pramod Antony D'sa and Baylon G. Fernandes
Indian Institute of Technology Bombay, India

#1576 | Multi-Wound Axial Flux Generators with Halbach Array Rotors [2.7 Posterboard 9]
Matin Vatani, Yaser Chulaee, John F. Eastham, Xiaoze Pei and Dan M. Ionel
SPARK Lab, Pigman College of Engineering, University of Kentucky, United States; Department of Electronic and Electrical Engineering, University of Bath, United Kingdom

#905 | Analytical and FE Modeling for the Design of Coreless Axial Flux Machines with Halbach Array and Surface PM Rotors [2.7 Posterboard 10]
Matin Vatani, Yaser Chulaee, John F. Eastham and Dan M. Ionel
SPARK Lab, Pigman College of Engineering, University of Kentucky, United States; Department of Electronic and Electrical Engineering, University of Bath, United Kingdom, United Kingdom

#99 | Axial Flux Permanent Magnet Vernier Machine with Advanced Auxiliary Slot Shape [2.7 Posterboard 11]
Jiayue Zhou, Xi Xiao, Haifeng Lu and Jianyun Chai
Tsinghua University, China

#788 | Comparative Study of Axial-Flux Machines Between Double Stator and YASA Structures Regarding Output Power Density and Efficiency in Traction Applications [2.7 Posterboard 12]
Yuki Nakano, Ren Tsunata, Masatsugu Takemoto, Jun Imai, Tatsuya Saito and Tomoyuki Ueno
Okayama University, Japan; Sumitomo Electric Sintered Alloy, Ltd., Japan

#1258 | Iron Loss Calculation Method Considering Slot Harmonic Components for Induction Motor Using Virtual Blocked Rotor and Transfer Learning [2.7 Posterboard 13]
Ji-Hyeon Lee, Hyun-Su Kim, Soo-Hwan Park, Jin-Cheol Park and Myung-Seop Lim
Department of Automotive Engineering (Automotive-Computer Convergence), Hanyang University, Korea, Republic of; Department of Mechanical, Robotics and, Energy Engineering, Dongguk University, Korea, Republic of

#1093 | Simulation of Frequency and Power Control Strategy for Stator-Controlled DFIG Applied for Fractional Frequency Transmission System [2.7 Posterboard 14]
Hongjing Deng, Shaofeng Jia, Zhidong Yuan, Jun Lin and Deliang Liang
Xi'an Jiaotong University, China; Chengdu Power Supply Company, China

#1816 | Automated Testing of Rotor Faults in Wound Field Synchronous Motors for EV Applications [2.7 Posterboard 15]
Seungmin Shin, Namhyuk Byun, Muhamad Faizan Shaikh, Jongwon Kim and Sang Bin Lee
Korea University, Korea, Republic of

2.8 Electric Machines 3

Chair: Simone Ferrari

#1526 | Analysis of Segmented Stator and Rotor Design in PMSM Using A Physics-Based MEC Model [2.8 Posterboard 1]
Bhuvan Khoshoo, Anmol Aggarwal, Morgan Barron and Shanelle Foster
Michigan State University, United States; US Army Ground Vehicle System Center, United States

#1532 | A More Accurate FEA Model for Machines with Segmented Stators Manufactured using Oriented Steel [2.8 Posterboard 2]
Anmol Aggarwal, Bhuvan Khoshoo, John Agapiou and Shanelle Foster
General Motors, United States; Michigan State University, United States

#984 | Impact of Non-Idealities in Position Sensor for Electric Propulsion System [2.8 Posterboard 3]
William Jensen, Ajay Mehta, Brian Gallert, Mazharul Chowdury and Suresh Gopalakrishnan
General Motors, United States

#942 | Inductance Based Lumped Parameter IPM Machine Model for Fast Simulation [2.8 Posterboard 4]
Claudio Bianchini, Giada Sala, Matteo Frigieri, Mattia Vogni, Nicola Giannotta and Alessandro Capitanio
University of Modena and Reggio Emilia, Italy; Raw Power Srl, Italy

#1620 | Effect of Partial Demagnetization on Speed in Permanent Magnet Synchronous Machine [2.8 Posterboard 5]
Abdur Rahman, Rukmi Dutta, Guoyu Chu, Minghao Gao, Dan Xiao and Muhammed Fazlur Rahman
University of New South Wales, Sydney, NSW, Australia; Sungrow Power, Australia

#794 | Electromagnetic-Thermal Bidirectional Coupling Analysis Based on LPTM for Rim-PM Motor [2.8 Posterboard 6]
Haoyu Wang, Xianglin Li, Yongjian Hao, Chaolin Li, Hao Wang and Kai Wang
Qingdao University, China; JieYuan DianQi (Qingdao) Co., LTD, China; Nanjing University of Aeronautics and Astronautics, China

#1321 | Fast Model of a Hybrid Excitation Synchronous Machine Using Equivalent Reluctance Networks for Parameter Design [2.8 Posterboard 7]
Quentin Loeuillet, Christian Chillet, Laurent Gerbaud, Jean-Claude Mipo and Jean-Luc Schanen
Univ. Grenoble Alpes, G2ELAB, France; Valeo Electrical Systems, France

#79 | Efficient Calculation and Mitigation of AC Winding Losses in Axial Flux Permanent Magnet Machine [2.8 Posterboard 8]
Dae Yong Um, Rajesh Kumar, Tushar Batra, Lars Sjoberg and Glynn Atkinson
Gyeongsang National University, Korea, Republic of; Alvier Mechatronics AB, Sweden; Newcastle University, United Kingdom

#573 | Finite Element Analysis Optimization Coupling the Control Simulation to Minimize PWM Loss [2.8 Posterboard 9]
Hiroyuki Sano, Shiro Yano, Tetsuo Ogawa, Kazuki Semba and Takashi Yamada
JSOL Corporation, Japan

#215 | Design of Slotless Permanent Magnet Synchronous Machines considering Harmonic-induced Permanent Magnet Eddy Current Loss [2.8 Posterboard 10]
Junyeong Jung and Iqbal Husain
NC State University, United States

#1031 | Design and Optimization of a Multiphase PMSG for Wind Turbines exploiting different harmonics [2.8 Posterboard 11]
Mouna Oukrid, Nicolas Bernard and Mohamed-Fouad Benkhoris
Nantes University, France

#95 | Modeling and Experimental Analysis of SiC-driven Form Wound Coil Insulation with Defects [2.8 Posterboard 12]
Benjamin Sirizzotti, Emmanuel Agamloh, Annette von Jouanne and Alex Yokochi
Baylor University, United States

#1249 | Multi-physics Coupling Simulation Analysis of DC-link Capacitors under DC Superimposed Multi-harmonic Voltage [2.8 Posterboard 13]
Yingbin Li, Lingyu Zhu, Linzi Zheng, Xinyi Yan and Shengchang Ji
Xi'an Jiaotong University, China

#200 | Voltage-Behind-Reactance Modelling & Emulation of Stator Inter-turn Faults in Induction Machines [2.8 Posterboard 14]
Koteswara Rao Alla and Pragasen Pillay
Concordia University, Canada

#13 | Comparison between Flux Angle Mapping and Cycloidal Magnetic Gears for High Gear Ratio Applications [2.8 Posterboard 15]
Salek Khan, Parisa Afsari and Matthew Gardner
University of Texas at Dallas, United States

#546 | Comparison of NdFeB and Ferrite Radial Flux Focusing Coaxial Magnetic Gears [2.8 Posterboard 16]
Parisa Afsari, Salek Khan and Matthew Gardner
University of Texas at Dallas, United States

#1124 | Vernier Permanent Magnet Motors for Small-Size Servo Drives: A Scalability Study and Discussion [2.8 Posterboard 17]
Laura Homiller, Jixuan Feng and Lei Zhou
University of Wisconsin – Madison, United States; University of Texas at Austin, United States

#1342 | Design and Analysis of Double-Sided Axial Flux Coaxial Magnetic Gears [2.8 Posterboard 18]
Shrikesh Sheshaprasad, Matthew Johnson and Hamid Toliyat
Texas A&M University, United States; Texas A&M Univeristy, United States

#1607 | A Review of Ring Motors with Integrated Loads [2.8 Posterboard 19]
Adonay Asgodom, Takahiro Noguchi, Fnu Nishanth and Eric Severson
University of Minnesota, United States; University of Wisconsin-Madison, United States

2.9 Electric Drives for Transportation and Emerging Applications

Chair: Hassan Eldeeb

#338 | A Novel ZSC Suppression Strategy with Third-harmonic Back-EMF Estimation for OW-PMSM fed by Dual Inverter with a Common DC-bus [2.9 Posterboard 1]
Kibok Lee and Hyeonseong Kim
Korea University, Korea (South)

#1313 | Hybrid Modular Multilevel Converter with Reduced Energy Storage for Medium Voltage Variable Speed Drives [2.9 Posterboard 2]
Aditya Rao, Jian Liu, Jayesh Kumar Motwani, Rolando Burgos, Zhi Zhou and Dong Dong
Virginia Tech, United States; GE Power Conversion of GE Vernova, United States

#980 | Control of Modular Multilevel Converter using Full-bridge Submodules for Induction Machine Drives with Enhanced Speed Range Operation [2.9 Posterboard 3]
Nageswara Rao Karaka, Ibhan Chand Rath and Anshuman Shukla
Indian Institute of Technology, Bombay, India

#661 | Ripple-free Phase-pole Modulation of a Multiphase Induction Machine [2.9 Posterboard 4]
Omer Ikram ul Haq, Rahul Kanchan, Luca Peretti and Bosga Sjoerd
ABB Corporate Research, Sweden; KTH, Stockholm, Sweden

#1296 | An Improved Modulation Technique with Reduced Switching Frequency for Dual Three-Phase PMSM System [2.9 Posterboard 5]
Hu Wei, Huang Cong, Liu Kan and Chai Na
Hunan University, China

#483 | Enhanced Predictive Torque Control Strategy for Six-Phase Induction Machines A Comparative Study [2.9 Posterboard 6]
Osvaldo Gonzalez, Jesus Doval-Gandoy, Magno Ayala, Paola Maidana, Christian Medina, Jorge Rodas, Carlos Romero, Larizza Delorme and Raul Gregor
Laboratory of Power and Control Systems – FIUNA, Paraguay; Applied Power Electronics Technology (APET), Spain

#1712 | Efficient Predictive Control Strategy for EV Powertrains Based on Multiphase Motors Drives with Three-Level Inverters [2.9 Posterboard 7]
Joao Serra, Joao Dinis, Fernando Bento, Khaled Laadjal and Antonio J. Marques Cardoso
CISE, University of Beira Interior, Portugal, Portugal, Portugal

#1121 | Active Torque Control System For Electric Bikes Considering External Load Changes [2.9 Posterboard 8]
Ping-Jui Ho, Chen-Pei Yi, Yi-Jen Lin, Wei-Der Chung, Po-Huan Chou and Shih-Chin Yang
National Taiwan University, Taiwan; Industrial Technology Research Institute (ITRI), Taiwan

#333 | 2D Structure Pushing Nanocrystalline Common Mode Inductor First Resonant Frequency Above 10 MHz [2.9 Posterboard 9]
Rongrong Zhang, Hui Zhao, Chaoqiang Jiang, Shuo Wang, Teng Long, Kefu Liu and Jian Qiu
Fudan University, China; City University of Hong Kong, China; University of Florida, United States; University of Cambridge, United Kingdom

#1714 | Open-End Winding Synchronous Reluctance Motor Drive with a Floating Capacitor Bridge for High-Speed Applications [2.9 Posterboard 10]
Riccardo Testa, Antonio Femia, Luca Vancini, Gabriele Rizzoli, Michele Mengoni, Luca Zarri and Andrea Cavagnino
OCEM Power Electronics, Italy; University of Bologna, Italy; Politecnico di Torino, Italy

#455 | 13kW Motor Drive with Top-Side Cooled SiC MOSFETs for HVAC E-Compressor in EVs [2.9 Posterboard 11]
Zongzeng Hu, Yuequan Hu, Fulin Zhang, Bhaskar Pariti, Haiming Zhan and Joanne Wu
Wolfspeed, China; Wolfspeed, United States; Wolfspeed, Germany

#293 | A Research Overview on Household Refrigerator Hermetic Reciprocating Compressor Drives [2.9 Posterboard 12]
Andres Carvajal and Annette Muetze
TU Graz, Austria

#541 | Stacked Polyphase Bridges Converter having Common-Duty-Ratio Control with Gate Signal Delay [2.9 Posterboard 13]
Slavko Mocevic, Eddy Aeloiza and Cairoli Pietro
ABB, United States

#485 | Hardware Design of SiC-based 3 kV High-Power Four-Level Hybrid Clamped Converter [2.9 Posterboard 14]
Fu Xiaojie, Yan Sheng, Guo Yujia, Xiao Junwei, Yang Jie, Feng Hao, Ke Ziwei and Pan Jianyu
Chongqing University, China; Guangdong University of Technology, China

#614 | Increased Common-mode Current and Power Losses in Medium Voltage Machines enabled by 10 kV SiC MOSFETs [2.9 Posterboard 15]
Gao Liu, Zhixing Yan, Morten Rahr Nielsen, Shaokang Luan, Bjran Rannestad, Hongbo Zhao, Stig Munk-Nielsen and Michael Moller Bech
Aalborg University, Denmark; KK Wind Solutions, Denmark

#376 | Maximizing Linear Modulation Region of a Three-Phase Inverter for Single-Phase and Three-Phase Motor Drive [2.9 Posterboard 16]
Da-Hye Park and Wook-Jin Lee
Chungnam National University, Korea (South)

#1333 | Reducing Voltage Overshoot in SiC Drives with Asymmetrical PWM [2.9 Posterboard 17]
Yang Xu, Ji Wu, Nurani Chandrasekhar, Yongtian Liu, Kevin Lin and Nicholas Fava
Ford Motor Company, United States

#774 | A Generalized Multilevel Inverter & Slotless Permanent Magnet Motor-Drive Co-Design Framework [2.9 Posterboard 18]
Anubhav Bose, Arjit Bali, Andrew Stillwell and Kiruba Haran
University of Illinois Urbana-Champaign, United States

#405 | Characterization and Control of a Superconducting Homopolar Motor with Cryogenic GaN Inverter for Electric Aircrafts [2.9 Posterboard 19]
Felix Gliese, Matthew Pearce, Mohammad Siamaki, Grant Lumsden, Duleepa Thrimawithana, Rod Badcock, Joerg Roth-Stielow and Martin Neuburger
Esslingen University, Germany; University of Auckland, New Zealand; Victoria University of Wellington, New Zealand; University of Stuttgart, Germany

2.10 Devices and Gate Drivers

Chair: Christian Xiao

#180 | Surge Current Conduction Mechanisms of SiC MOFETs under Third-quadrant Operation [2.10 Posterboard 1]
Man Zhang, Helong Li, Zhiqing Yang, Zhao Shuang and Lijian Ding
Hefei University of Technology, China

#632 | Novel Cell-Level Insights into Third Quadrant Current Paths of Power SiC MOSFET [2.10 Posterboard 2]
Yuzhi Chen, Chi Li, Shusen Ni and Zedong Zheng
Tsinghua Univeristy, China

#962 | Impacts of Parasitic Power Loop Inductance on 10 kV SiC MOSFETs [2.10 Posterboard 3]
Gao Liu, Zhixing Yan, Morten Rahr Nielsen, Jannick Kjaer Jorgensen, Hongbo Zhao, Stig Munk-Nielsen and Michael Moller Bech
Aalborg University, Denmark

#724 | Analysis and Performance Trade-Offs of State-of-the-Art 4H-SiC Trench MOSFET Technology [2.10 Posterboard 4]
Kyrylo Melnyk, Peter Michael Gammon, Arne Benjamin Renz, Qinze Cao, Ajit Shah Vishal and Marina Antoniou
University of Warwick, United Kingdom

#1385 | Impact of External Gate Resistance on Dynamic ON-Resistance Behavior in GaN HEMTs Using Multiple Pulse Test [2.10 Posterboard 5]
Lee Gill, Luciano Andres Garcia Rodriguez, Mihai Negoita, Sandeepan DasGupta, Robert Kaplar and Alan Michaels
Sandia National Laboratories, United States; Virginia Tech, United States

#114 | 3D modelling and experimental results of Multi-Channel Monolithic-Cascode HEMT (MC2-HEMT) [2.10 Posterboard 6]
Quanbo He, Hengyu Wang, Vasantha Pathirana, Ming Xiao, Yuhao Zhang and Florin Udrea
University of Cambridge, United Kingdom; Zhejiang University, China; Virginia Tech, United States

#568 | Contactless Measurement-Based Modeling of a 4-MHz GaN Pulsed Power System While Considering Common Source Inductance [2.10 Posterboard 7]
Zhaoxia Yang, Mark Broman and Jianwu Zeng
Thin Film Technology Corporation, United States; Minnesota State University, Mankato, United States

#1297 | Short-Circuit protection for 650 V p-gate GaN HEMTs based on gate current sensing [2.10 Posterboard 8]
Simone Palazzo, Yoann Pascal, Thiago Pereira, Giovanni Busatto and Marco Liserre
University of Cassino and Southern Lazio, Italy; Fraunhofer Institute for Silicon Technology ISIT, Germany; Christian-Albrechts University of Kiel, Germany

#1417 | Damping Effect of Internal Gate Resistance for Cascode GaN HEMT [2.10 Posterboard 9]
Yin Fang, Carl Ho and Xuechao Liu
University of Manitoba, Canada; Power Integrations Inc., Canada

#966 | A Cryogenic Gallium Nitride Full Bridge for Use in a Thermally Insulating Dual Active Bridge [2.10 Posterboard 10]
Simon Robin Frank, Thomas Johannes Stroebele, Philipp Swoboda, Ruediger Schwendemann and Marc Hiller
Karlsruhe Institute of Technology (KIT), Germany

#1086 | Automated Static Characterization Platform for Multi-GaN Devices Across Cryogenic and High-Temperatures [2.10 Posterboard 11]
Purushottam Khadka, Cheng Wan, Zheyu Zhang, Qiu Tian and Ahmed Shahnewaz Siraj
Rensselaer Polytechnic Institute, United States; Clemson University, United States

#478 | Use of Current Mirror for Real-time Gate-Source Leakage Current Detection [2.10 Posterboard 12]
Ho-Tin Tang and Henry Shu-hung Chung
City University of Hong Kong, Hong Kong

#105 | Protection Scheme Analysis of LLC Series Connected Auxiliary Power Supply for HV SiC Grid-Connected Inverters [2.10 Posterboard 13]
Min Lin, Leon Tolbert and Brian Rowden
University of Tennessee, Knoxville, United States; Oak Ridge National Laboratory, United States

#1072 | A Centralized Short-circuit Protection Method Suitable for SiC MOSFETs Connected in Parallel [2.10 Posterboard 14]
Chengmin Li and Drazen Dujic
Eindhoven University of Technology, Netherlands; EPFL, Switzerland

#1154 | Single Gate-Drive GaN Power Electronics Building Block for Scalable and Fast-Switching High-Current Systems [2.10 Posterboard 15]
Dominik Koch, Mathias C.J. Weiser, Tobias Fink, Jeremy Nuzzo, Aline Reck, Manuel Ruess and Ingmar Kallfass
University of Stuttgart, Germany

#666 | Partial Discharge Improvements of Isolated Transformer in Medium-Voltage Gate-Driver Power Supply [2.10 Posterboard 16]
Yan Zhixing, Gao Yuan, Liu Gao, Luan Shaokang, Rahr Nielsen Morten, Rannestad Bjorn, Zhao Hongbo and Munk-Nielsen Stig
Aalborg University, Denmark; KK Wind Solution, Denmark

#383 | Active Gate Driver Combining Current Source and Active Gate Resistors to Reduce Turn-on Switching Loss and Surge Voltage [2.10 Posterboard 17]
Kiyotaka Ono, Sihoon Choi, Yu Yonezawa, Jun Imaoka and Masayoshi Yamamoto
Nagoya University, Japan

#1835 | Self-Reverse-Blocking Normally-On/Off-Dual-Gate Monolithic Bidirectional GaN Transistor [2.10 Posterboard 18]
Neha Nain, Patrick Ziegler, David Menzi, Kennith Kin Leong, Johann W. Kolar and Jonas Huber
ETH Zurich, Switzerland; Infineon Technologies, Austria

#1858 | TCAD-based Analysis of Dynamic Transients of 4H-SiC Vertical NPN BJT [2.10 Posterboard 19]
Mana Hosseinzadehlish, Saeed Jahdi, Xibo Yuan and Konstantinos Floros
University of Bristol, United Kingdom; Compound Semicondutors Applications Catapult, United Kingdom

#250 | Equivalent Capacitance of Nonlinear Capacitance in GaN-FET for Improving Accuracy in Suppressing Conditions o f Oscillatory False Triggering [2.10 Posterboard 20]
Yuki Fushino, Kazuhiro Umetani, Masataka Ishihara and Eiji Hiraki
Okayama University, Japan

2.11 Lighting Technologies

Chair: Ashish Kumar

#83 | Dimmable LED Assembly Driven by Passive LED Driver for Smart Lampposts [2.11 Posterboard 1]
Albert Ting Leung Lee, Wing Hang Chan and Ron Shu Yuen Hui
The University of Hong Kong, Hong Kong

#259 | A Synchronous Switching Method for a Variable Frequency ZVS Boost Converter [2.11 Posterboard 2]
Ben Stainthorpe, Mohamed Dahidah and Volker Pickert
Newcastle University, United Kingdom

#728 | Analysis of a dimmable Quasi-resonant LED Driver with Variable Inductor Magnetic Control [2.11 Posterboard 3]
Pablo Quintana-Barcia, Sarah Saeed, Javier Ribas, Jorge Garcia and Marina Perdigao
University of Oviedo, Spain; Polytechnic University of Coimbra, Portugal

#1391 | Analysis of the Impact of Transients from Dimmable LED Lighting on Residential Electronics [2.11 Posterboard 4]
Jeet Panchal, Lakshmi Ravi, Dong Dong and Rolando Burgos
Center for Power Electronics Systems, United States

2.12 Emerging Technologies

Chair: Ashish Kumar

#60 | Power Hardware-in-the-Loop Emulator for Rotor Inter-turn Faults of a Wound Rotor Induction Machine [2.12 Posterboard 1]
Koteswara Rao Alla and Pragasen Pillay
Concordia University, Canada

#85 | Design of a New Magnetic Coupling Structure for High-Speed Rotating Wireless Power Transmission System [2.12 Posterboard 2]
Mingzhen Wang, Longyuan Fan, Zicheng Liu, Dong Jiang and Ronghai Qu
Huazhong University of Science and Technology, China

#219 | Parasitic Capacitance Analysis of Integrated Transformers with Parallel Windings [2.12 Posterboard 3]
Tianlong Yuan, Feng Jin and Qiang Li
Virginia Tech, United States

#232 | Automatic HTRB Tester with A Novel Heating System for TO-247 Packaged 1700V Power Devices [2.12 Posterboard 4]
Junhong Tong, Qingxuan Ma and Alex Q. Huang
The University of Texas at Austin, United States

#303 | Characterization of Desaturation Based Fault Trip Unit for Ultra-Fast Fault Isolation [2.12 Posterboard 5]
Lakshmi Ravi, Chunmeng Xu, Gioele Gregis, Tiff Scott and Pietro Cairoli
ABB, Inc., United States; ABB, Inc., Italy

#335 | Boosting Wireless Power Transfer Efficiency in Capsule Endoscopy through Pulse Frequency Modulation [2.12 Posterboard 6]
Heng Zhang, Jiali Zhou and Chi-Kwan Lee
The University of Hong Kong, Hong Kong; University of Technology Sydney, Australia

#441 | Magnetic Voltage Isolator for the Feedback Loop of Power Converters for Space Applications [2.12 Posterboard 7]
Jose Antonio Fernandez Alvarez, Theyllor Hentschke de Oliveira, Abraham Lopez Antuna, Pablo Fernandez Miaja, Manuel Arias Perez de Azpeitia and Arturo Fernandez
Universidad de Oviedo, Spain; European Space Agency (ESA), Netherlands

#844 | Active Thermal Control for Power Semiconductors using Peltier-Devices [2.12 Posterboard 8]
Masamichi Yamaguchi, Hiroki Watanabe, Jun-ichi Itoh and Kyo-Beum Lee
Nagaoka University of Technology, Japan; Ajou University, Korea, Republic of

#1212 | Systematic Robust Controller Design for Induction Motor Drives Using the Coefficient Diagram Method [2.12 Posterboard 9]
Hanady A Krieshan and Ali M Bazzi
University of Connecticut, United States

#1252 | Towards Switching Cycle based Holistic Accurate Estimation and Simulation of Power Losses of Components in Power Electronics Converters [2.12 Posterboard 10]
Haisu Jiang, Xibo Yuan, Kefei Chen, Ruijie Zhu, Wenzhi Zhou, Quanrui Liu, Yonglei Zhang, Cheng Guo and Yi Li
China University of Mining and Technology, China; Coventry University, United Kingdom

#1381 | Modular Flat-Top High-Current Compensator for Flywheel Energy Storage System in Magnetic Confinement Fusion Applications [2.12 Posterboard 11]
Hyeongmeen Baik and Jinia Roy
University of Wisconsin-Madison, United States

#1468 | A Controller Hardware-in-the-loop Microgrid Testbed with Industrial BESS Switching Dynamics [2.12 Posterboard 12]
Harish Suryanarayana, Aniket Joshi and Jacob Miscio
ABB, United States

#1502 | Investigation of Coordination Limits between SiC-based and IGCT-based SSCBs [2.12 Posterboard 13]
Abhinav Patni, Govind Chavan, Chunmeng Xu, Zhou Dong and Pietro Cairoli
ABB, United States

#1870 | New Cryogenic T-Type Three-Switch Low-Voltage High-Current 4Q Power Supply for HTS Magnets [2.12 Posterboard 14]
Muecahid Akbas, Johann Walter Kolar and Jonas Huber
Power Electronic Systems Laboratory, ETH Zurich, Switzerland

#1613 | A Critical Exploration of Loss Optimization Techniques in Non-Inverting Buck-Boost Converters [2.12 Posterboard 15]
Nitish Jolly, Ayan Mallik, Connor Reece, Chris Darmody and Akin Akturk
Arizona State University, United States; CoolCAD Electronics, United States

#1699 | Design Optimization of High-Torque BLDC Motors with Various Slot/Pole Combinations for Robotic Applications [2.12 Posterboard 16]
Mohamed Farag, Landon Clark, Biyun Xie and JiangBiao He
University of Tennessee, United States; University of Kentucky, United States

#82 | A Comprehensive Study on An Enhanced Overmodulation Strategy for Motor Drives [2.12 Posterboard 17]
Zhe Zhang and Kevin Lee
Eaton, United States

Tuesday, October 22 2:30PM – 4:10PM

POSTER SESSION 3

Exhibit Hall

3.1 Energy Storage

Chair: Kaushik Basu

#1546 | Modeling and Control Analysis of Parallel Triple Active Bridge Converters Integrating PV and ESS for a DC Microgrid [3.1 Posterboard 1]
Osamah Aljumah, Shubham Dhiman, Vasishta Burugula, Shrivatsal Sharma and Subhashish Bhattacharya
North Carolina State University, United States

#704 | Control of Multiport Series Resonant Converters for Green Hydrogen Production Systems [3.1 Posterboard 2]
Lukas Antonio Budiwicaksana and Dong-Choon Lee
Yeungnam University, Korea (South)

#1623 | Real-time ZVS Range Improvement Control Scheme under Light Load for Single Stage Series-Resonant AC-DC Converter [3.1 Posterboard 3]
Huanghaohe Zou, Mafu Zhang, Saleh Farzamkia, Ruiyang Yu and Alex Q. Huang
The University of Texas at Austin, United States

#1464 | Electro-Thermal Co-Design for ANPC-DAB Converter with Triple-Phase-Shift Modulation Strategy [3.1 Posterboard 4]
Zhenqi Wang, Hui Cao and Yue Zhao
University of Arkansas, United States

#267 | Fast Charging of Liquid Metal Batteries [3.1 Posterboard 5]
Xianbo Zhou, Haomiao Li, Kangli Wang, Kai Jiang and Kai Jiang
Huazhong University of Science and Technology, China

#1677 | Multiple Indicators Fusion-based Health Prognostic for Battery Tray Using Long Short-term Memory Algorithm [3.1 Posterboard 6]
Taehyeon Gong, Jaehyeong Lee, Seunghyun Lee, Sungjun Lee, Yura Kim, Ganghyeon Kook, Woonki Na and Jonghoon Kim
Chungnam National University (CNU), Korea (South); California State University (CSU), United States

#281 | Converter-governor Cooperative Control Strategy of Full-power Variable Speed Pumped Storage Units for Frequency Response Characteristics Improvement [3.1 Posterboard 7]
Yihang Luan, Minxuan Peng, Kaihsun Chuang, Yuanzhi Zhang, Jianjun Sun and Xiaoming Zha
Wuhan University, China

#1068 | Optimizing Grid Regulation With Gravity Storage Systems: A Comparative Analysis With Different Motor Inertias [3.1 Posterboard 8]
Shubham Sundeep, Latha Sethuraman, Dayo Akindipe, Lee Jay Fingersh, Zach Wenrick and Aaron Munoz
National Renewable Energy Laboratory, Golden, CO, USA, United States; Renewell Energy, CA, USA, United States

#1679 | A Novel Y-Connection Single Stage Three Phase Active-Half-Bridge AC-DC Series-Resonant Converter [3.1 Posterboard 9]
Huanghaohe Zou, Mafu Zhang, Saleh Farzamkia and Alex Q. Huang
The University of Texas at Austin, United States

3.2 Grid Stability and Power Quality

Chair: Sanket Parashar

#1476 | Multi-Functional Intelligent MMC-Based HVDC Converter [3.2 Posterboard 1]
Jiaxiong Yu and Richard Zhang
Virginia Tech, United States

#1498 | New Passive Damped-LCL-Filter Based Three-Phase Four-Leg Shunt Active Power Filter [3.2 Posterboard 2]
Houqing Wang, Yue Zhao, Hui Cao, Darvish Peyman, Dongfang Han, Zhuxuan Ma, Jinlai Zhang and Zhenqi Wang
University of Arkansas, United States; Xinjiang University, China; Changsha University of Science and Technology, China

#29 | Low-Frequency Stability Analysis of Grid-tied Inverters under Multisampling Digital Control [3.2 Posterboard 3]
Tingkang Wang, Qianyi Huai, Wenxi Yao, Wuhua Li and Huan Yang
Zhejiang University, China

#292 | A Dual-PLL Structure Scheme For Stability Enhancement Under Weak Grid [3.2 Posterboard 4]
Jin Sicong, Zhang Xin and Wu Hao
Zhejiang University, China; Nanjing University of Aeronautics and Astronautics, China

#1499 | Numerical Methods Applied to Online Impedance Estimation in Grid-Tied PV Systems: A Performance Analysis [3.2 Posterboard 5]
Andreia Gomes, Jefferson Assis, Alfeu Filho, Fabiano Costa, Mauricio Correa and Darlan Fernandes
Federal University of Paraiba, Brazil; Federal University of Campina Grande, Brazil; Federal University of ABC, Brazil; Federal University of Bahia, Brazil

#1001 | On the Impact of High-Order Harmonic Generation in Electrical Distribution Systems [3.2 Posterboard 6]
Aaqib Peerzada, Bhaskar Mitra, Soumya Kundu and James Ogle
Pacific Northwest National Laboratory, United States

#1300 | A Passive Grid Impedance Estimation Method in Exploiting Variable Operating Conditions [3.2 Posterboard 7]
Giulia Di Nezio, Giovanni Marini, Salvatore D'Arco, Elisabetta Tedeschi and Alessandro Lidozzi
Roma Tre University, Italy; SINTEF Energy Research, Norway; Norwegian University of Science and Tecnology, Norway

#218 | An Analysis about Capital and Maintenance Costs Related to Electrical Flexibility [3.2 Posterboard 8]
Eduardo Perez Liberato, Matheus Bawden, Caio Mateus Cardozo Rego, Yan Tavares de Oliveira, Jose Oniram de Aquino Limaverde Filho, Thiago Felicio de Souza, Ronan Gustavo Carvalho Furtado and Eugenio Liborio Feitosa Fortaleza
University of Brasilia, Brazil; Eletrobras Furnas, Brazil

#7 | Delay Compensation Design and Wideband Oscillation of MMC-HVDC Cyber-physical Systems [3.2 Posterboard 9]
Jingming Cao, Chaoyu Dong, Yunfei Mu, Junnan Qin, Qian Xiao and Hongjie Jia
Tianjin University, China

#52 | Control Time Delay Compensation Method of Grid-Following Inverter by Complex Vector Theory [3.2 Posterboard 10]
Taisei Inoue, Minori Funakoshi, Toshiji Kato and Kaoru Inoue
Doshisha University, Japan

#1028 | A Current Source Hybrid Series Active Power Filter with Reduced Rated DC Source Current Rating [3.2 Posterboard 11]
Prashanth Atputhakumar, Carl Ho and Troy Eskilson
University of Manitoba, Canada

#1274 | Voltage Support Control Method Based on Grid Code under Unbalanced Voltage Conditions [3.2 Posterboard 12]
Jaehoon Choi and Yongsug Suh
Jeonbuk National University, Korea, Republic of

#630 | Three-Phase Circuit Analysis through Quaternions and Biquaternions [3.2 Posterboard 13]
Jingyang Fang
Shandong University, China

#1187 | Optimization-Based Model Reduction Scheme for Renewable Energy Power Plants Using Standardized Testing Scenarios [3.2 Posterboard 14]
Ram Shankar Yallamilli, Xiaonan Lu and Wei Du
Purdue University, United States; Pacific Northwest National Laboratory, United States

#166 | Preventing Reverse Power Flow to Utility Grid from Bidirectional Battery Charger for EVs With Power Quality Compensator Under Feed-in Tariff Program [3.2 Posterboard 15]
Reo Emoto, Shun Okamoto, Fuka Ikeda, Masayuki Okamoto, Hiroaki Yamada and Toshihiko Tanaka
Yamaguchi University, Japan; National Institute of Technology, Ube College, Japan

#990 | Solar PV and EV Controls for Reactive Power Support on Large Distribution Systems Modeled with Experimental and Synthetic Loads [3.2 Posterboard 16]
Rosemary Alden, Malcolm McCulloch and Dan Ionel
SPARK Lab, ECE Department, University of KY, United States; EPG, Engineering Science, University of Oxford, United Kingdom

#211 | Optimal Planning of Synchronous Condensers Considering the Impact of Inverter-Based Resources [3.2 Posterboard 17]
Ehsan Fouladi, Ali Mehrizi-Sani and Behrooz Bahrani
Virginia Tech, United States; Monash University, Australia

#1880 | Influence of Auto-Recloser Dead Time on Power Swings After Consecutive LVRT of GFOL PV [3.2 Posterboard 18]
Meenu Jayamohan, H R Sai Kiran Pandit and Sarasij Das
Indian Institute of Science, Bangalore, India

3.3 Data-driven and Machine Learning Methods

Chair: Zahra Saadatizadeh

#1678 | Performance Evaluation of Battery Abnormal Diagnostic Based on Autoencoder according to the Battery Management System Input Dataset [3.3 Posterboard 1]
Dongcheol Lee, Miyoung Lee, Youngmin Bae, Jongchan An, Garam Yang, Woonki Na and Jonghoon Kim
Chungnam National University (CNU), Korea (South); California State University, United States

#530 | Optimizing PV Array Performance: A2 LSTM for Anomaly Detection and Predictive Maintenance based on Machine Learning [3.3 Posterboard 2]
Ali Hamza, Zunaib Ali, Sandra Dudley-Mcevoy and Komal Saleem
London South Bank University, United Kingdom; Univeristy of East London, United Kingdom

#1601 | Real-Time Energy Price Forecasting using BiLSTM-Autoencoder Deep Learning Model [3.3 Posterboard 3]
Soumya Namani, Md Al Amin, Md Ochiuddin Miah, Abdullah Al Ahad Khan, Md Faisal Kabir and Md Habib Ullah
Penn State Harrisburg, United States; North Dakota State University, United States; United International University, Bangladesh

#274 | A Data-Driven Advisory Tool for Mixed-Generation Power Systems [3.3 Posterboard 4]
Otavio Bertozzi, Guang An Ooi, Mohd Asim Aftab, Murali S. Venkatraman, Grain P. Adam, Charalambos Konstantinou and Shehab Ahmed
KAUST University, Saudi Arabia; NEOM ENOWA, Saudi Arabia

#107 | Locality Preserving Projections Based Model Predictive Control for Three-phase Inverter [3.3 Posterboard 5]
Jianwu Zeng
Minnesota State University, Mankato, United States

#884 | Assessing Deep Learning Models in Predicting Heatsink Temperature: A Comparative Study on Extrapolation Capabilities [3.3 Posterboard 6]
Jiaze Kong, Xiaobing Shen and Wilmar Martinez
KU Leuven – EnergyVille, Belgium

#1768 | Physical Layout Design Automation for High-Power Density DC-DC Converter [3.3 Posterboard 7]
Zahra Saadatizadeh and Alan Mantooth
University of Arkansas, United States; University Of Arkansas, United States

#1504 | Digital Twin of Power Modules based on Physics Informed Machine Learning [3.3 Posterboard 8]
Borong Hu, Wei Mu, Hui Zhu, Ameer Janabi, Xufu Ren, Daohui Li, Jiayu Li, Yunlei Jiang and Teng Long
University of Cambridge, United Kingdom; NIO Inc, China

#1475 | Neural Network Trained Coldplate Models for Modular Converter Exploration [3.3 Posterboard 9]
Hamed Shabani, Robert M. Cuzner, Juan Ordonez and Cristofer Hood Marques
University of Wisconsin – Milwaukee, United States; Florida State University, United States; Federal University of Rio Grande, Brazil

#1125 | Automated Companion Tool for Synthesis of Model-Based Control Design for Power Converters [3.3 Posterboard 10]
Aidar Zhetessov and Giri Venkataramanan
University of Wisconsin-Madison, United States

#1707 | Reliability-Based Design Framework for Assesment of Digital Twin Models Applied to Vessel Controllers [3.3 Posterboard 11]
Hyungjun Jeon, Dong Trong Nguyen and Mehdi Zadeh
Norwegian University of Science and Technology, Norway

#165 | PE-GPT: A Physics-Informed Interactive Large Language Model for Power Converter Modulation Design [3.3 Posterboard 12]
Fanfan Lin, Junhua Liu, Xinze Li, Shuai Zhao, Bohui Zhao, Xinyuan Liao, Xin Zhang and Hao Ma
Zhejiang University, China; Forth AI, Singapore; Nanyang Technological University, Singapore; Aalborg University, Denmark; Northwestern Polytechnical University, China

#719 | Real-Time Anomaly Detection and Remedy Actions for Resilient Operation of DC-Coupled Fast EV Chargers [3.3 Posterboard 13]
Omar Abu-Rub, Ali Sharida, Maryam Saeedifard, Mohammad Shadmand and Sertac Bayhan
Georgia Institute of Technology, United States; Texas A&M University, United States; University of Illinois Chicago, United States; Hamad Bin Khalifa University, United States

#1608 | Field Demonstration of Blockchain-based Security for a Solar Farm [3.3 Posterboard 14]
BoHyun Ahn, Kalyan Nakka, Nathanial Handke, Trevor Reyna and Taesic Kim
Texas A&M University-Kingsville, United States; Texas A&M University, United States; University of Missouri-Columbia, United States

#1606 | Adversarial Machine Learning Attack on Machine Learning-based Controller for Solar Inverters [3.3 Posterboard 15]
Joaquin Massa, Kyoung-Tak Kim, Taesic Kim, BoHyun Ahn, Kumar Venayagamoorthy and Jianwu Zeng
Texas A&M University-Kingsville, United States; Soongsil University, Korea (South); University of Missouri-Columbia, United States; Clemson University, United States; Minnesota State University, Mankato, United States

#1245 | A Framework for Cyber-Secure Monitoring and Safe Operation of Solar PV Microgrids [3.3 Posterboard 16]
Jaewon Kim, Marija Ilic and Le Xie
Massachusetts Institute of Technology, United States; Texas A&M University, United States

#1295 | Design and Development of AC Impedance Measurement Test Circuit for Lithium-ion Cells [3.3 Posterboard 17]
Sarbani Mandal, Shaurya Pandey, Bikash Sah, Sai Krishna Mulpuri and Praveen Kumar
Indian Institute of Technology Guwahati, India; Fraunhofer Institute for Energy Economics and Energy System Technology IEE, Germany; Oak Ridge National Laboratory, United States

#1676 | Weighted Model-Based State-of-Charge Estimation Algorithm for Differential Terminal Voltage Application of LFP Battery [3.3 Posterboard 18]
Minhyeok Kim, Eunjin Kang, Seongkyu Lee, Minwoo Song, Bomyeong Ko, Jaea Lee, Woonki Na and Jonghoon Kim
Chungnam National University, Korea (South); California State University, United States

#638 | Induction Motor Fault Diagnosis Using Shifting Window Data Augmentation of Current Signals [3.3 Posterboard 19]
Robert Wright, Poria Fajri, Xingang Fu and Arash Asrari
University of Nevada Reno, United States; Purdue University Northwest, United States

3.4 Analytical and Control Tools

Chair: Yang Wu

#1660 | Proposal of Battery Back-up Unit (BBU) Configuration for Data Centers [3.4 Posterboard 1]
Mahmoud Gaafar, Samer Said, Mostafa Mosa, Mohamed Orabi and Tarek Sayed
Aswan University, Egypt

#277 | Investigation of the Heat Generation Of Liquid Metal Battery During Internal Short Circuit [3.4 Posterboard 2]
Yi Zhang, Min Zhou and Kai Jiang
Huazhong University of Science and Technology, China

#916 | Rolling Horizon-Based Building-to-Building Grid Energy Exchange Optimization: A Game Theory Method [3.4 Posterboard 3]
Mhret Berhe Gebremariam, Pablo Garcia, Angel Navarro Rodriguez, Oscar Pasarin and Cristian Blanco
University of Oviedo, Spain; Fundacion Universidad de Oviedo, Spain

#1173 | MATLAB GUI Based Simulation and Optimization Tool for Generic N-port MAB Converters [3.4 Posterboard 4]
Saikat Dey and Ayan Mallik
Arizona State University, United States

#1248 | Reinforcement Learning-based Development of Time-optimal Current Trajectories for Permanent Magnet Synchronous Motor Drives Under Voltage and Current Constraints [3.4 Posterboard 5]
Jeonghan Lee and Jae Suk Lee
Jeonbuk National University, Korea, Republic of

#1884 | From Black Box to Clarity: AI-Powered Smart Grid Optimization with Kolmogorov-Arnold Networks [3.4 Posterboard 6]
Xiaoting Wang, Yuzhuo Li, Yunwei Li and Gregory Kish
Department of Electrical and Computer Engineering, University of Alberta, Canada

3.5 Transportation Electrification III

Chair: Deepak Ronanki

#131 | Triple-Layer Coil Design for Cubic Wireless Charging Spaces: Enhancing Output Power and Power Flow Control [3.5 Posterboard 1]
Kaiyuan Wang, Rui Liang, Xiangrong Zhang, Yun Yang and Siew-Chong Tan
Nanyang Technological University, Singapore; The Hong Kong Polytechnic University, Hong Kong; The University of Hong Kong, Hong Kong

#146 | Unveiling the Essential Output Deviation Factors of Non-Ideal Inductive Power Transfer Systems with Self-Oscillating Control [3.5 Posterboard 2]
Zhen Sun, Kaiyuan Wang, Yao Wang, Yun Yang, Siew-Chong Tan and Shu Yuen Ron Hui
Nanyang Technological University, Singapore; The University of Hong Kong, Hong Kong

#221 | Cross-Coupling Compensation Using Gradient Ascent Method for Single-Transmitter Dual-Receiver Wireless Power Transfer [3.5 Posterboard 3]
Ryo Matsumoto, Toshiyuki Fujita and Hiroshi Fujimoto
The University of Tokyo, Japan

#1183 | A CLC-S Compensation for Output Power Fluctuation Mitigation of DWPT System [3.5 Posterboard 4]
Wang Wenbo, Deng Junjun, Li Lantian, Li Yuhong, Wang Renjie and Wang Zhenpo
School of Mechanical Engineering Beijing Institute of Technology, China

#1581 | Comparison of Resonant Inverter Topologies for Multi-MHz Wireless Power Transfer Systems [3.5 Posterboard 5]
Sounak Maji, Dheeraj Etta and Khurram Khan Afridi
Cornell University, United States

#268 | Battery Equalization Architecture Using Capacitively-Coupled ZETA-Derived Topology [3.5 Posterboard 6]
Zhengqi Wei, Henry Shu-hung Chung and Ruihong Zhang
City University of Hong Kong, Hong Kong; BYD Auto Industry Co., Ltd, China

#76 | Towards Practical Impedance-based Temperature Estimation of Li-ion Batteries: Impedance Measurements and Feature Extraction [3.5 Posterboard 7]
Jussi Sihvo and Daniel-Ioan Stroe
Aalborg University, Denmark

#261 | Identification of Lithium-ion Battery Degradation under Fast Charging Protocols [3.5 Posterboard 8]
Yaqi Li, Hongbo Zhao, Wendi Guo, Frede Blaabjerg and Daniel-Ioan Stroe
Aalborg University, Denmark

#1197 | Cold-Weather Profiling of Lithium-ion Cell Using Hybrid Pulse Power Characterization [3.5 Posterboard 9]
Majid Najafpour, Minh Tran, Mohammad Hassan Shojaeefard and Tomi Roinila
Iran University of Science and Technology, Iran; Tampere University, Finland

#1386 | Study of the Temperature and Aging Impact on an Enhanced Coulomb Counting Method for Estimating SOC of Lead-Acid Batteries [3.5 Posterboard 10]
Shokoufeh Valadkhani, Muhammad Abdelraziq, Zhansen Akhmetov, Samuel Klein and Zeljko Pantic
North Carolina State University, United States

#100 | Precise Remaining Useful Life Estimation of Lithium-ion Batteries via Pulse Test without Historical Data [3.5 Posterboard 11]
Maoshu Xu, Qionglin Shi, Junyi Xia, Kangli Wang, Kai Jiang, Lei Fan and Bo Li
Huazhong University of Science and Technology, China; Electric Power Science of Guizhou Power Grid, China

#312 | Hybrid Controller Automatic Fast Charging with Capacity Retention for Lithium-Ion Batteries [3.5 Posterboard 12]
Kyle Waterman and Raymond Sepe
Electro Standards Laboratories, United States

#1683 | Adaptive Stacking Ensemble Model with Genetic Algorithm-driven Hyperparameter Optimization for State of Health Prediction of Lithium-ion Batteries [3.5 Posterboard 13]
Mohamed J.M.A. Rasul, Faiz Majeed, Dania Batool, Femi Okemakinde, Abeeb A. Adejare, Na Woonki and Kim Jonghoon
Chunganm National University, Korea (South); Califonia State University, United States

#46 | Charging Strategies Influence on DC-DC Converter and Li-Ion Battery Performance [3.5 Posterboard 14]
Muhammad Usman Tahir, Sajib Chakraborty, Erdem Akboy, Ariya Sangwongwanich, Daniel Ioan Stroe, Omar Hegazy and Frede Blaabjerg
Department of Energy, Aalborg University, Denmark; ETEC Department, Vrije Universiteit Brussel, Belgium

#703 | Variable Frequency PWM Switching of Charge Equalization Circuits for Balancing Current Control in Adjacent Cell-to-Cell Architectures [3.5 Posterboard 15]
Jyotirmaya Sahoo, Ramesh Parnapalli, Amit Patra and Siddhartha Mukhopadhyay
Indian Institute of Technology Kharagpur, India

#1361 | Time-based Equalization Strategy of Parallel Charge Balancing Architecture for Lithium-ion Battery Application [3.5 Posterboard 16]
Jyotirmaya Sahoo, Ramesh Parnapalli, Amit Patra and Siddhartha Mukhopadhyay
Indian Institute of Technology Kharagpur, India

#1605 | An All-GaN 800V Three-Level PFC Converter [3.5 Posterboard 17]
Emad Nazerian, Mojtaba Heydari, Ruiyang Yu, Alex Q. Huang and Qingyun Huang
University of Texas at Austin, United States; Ideal Power Inc., United States; University of Missouri, United States

#1369 | A New Common-Mode Free 1-phase/3-phase Combo Non-isolated Battery Charger with a Wide Output Voltage Range [3.5 Posterboard 18]
Preetha Philip, Durga Prasad Pilli, Gyanendra Tiwari and Deepak Ronanki
Indian Institute of Technology Madras, India

#869 | Fractional Power based Multi-Utility Fast Charger with V2Aux and V2V Capability [3.5 Posterboard 19]
Warda Matin Khan, Rajeev Kumar Singh, Ranjit Mahanty and Vivek Nandan Lal
Indian Institute of Technology (BHU), Varanasi, India

#1419 | Experimental Validation of Rotor Position Synchronization Control in Central-Converter Multi-Motor Architectures for Aerospace Applications [3.5 Posterboard 20]
Claudio Lima, Christopher Lute and James Cale
Colorado State University, United States

3.6 Transportation Electrification IV

Chair: Marium Rasheed

#765 | Voltage-Level based SMPC with CMV Minimization for a Four-Level Inverter [3.6 Posterboard 1]
Apparao Dekka and Hoang Le
Lakehead University, Canada

#1846 | Temporal Sensitivity Analysis of Internal Temperature Informed Charging Algorithms and Rapid Thermal Management System for E-mobility [3.6 Posterboard 2]
Akash Samanta, Chandan Chetri, Dominic Karnehm, Antje Neve and Sheldon Williamson
Ontario Tech University, Canada; Bundeswehr University Munich, Germany

#1824 | A Normalized Coupler Model of Capacitive Power Transfer Systems under Positional Offset of Plates [3.6 Posterboard 3]
Yangbin Zeng, Chi K. Tse, Li Ding and Xiaolu Lucia Li
City University of Hong Kong, Hong Kong

#1663 | A Fast Computation Method to Calculate Performances of an Electric Propulsion System for Drive Cycles [3.6 Posterboard 4]
Md Sariful Islam, Ali Safayet and Mohammad Islam
HL Mechatronics, United States

#1851 | Mitigation of Soldering Joint Aging Failures in Power Converters with Immersion Cooling [3.6 Posterboard 5]
Reza Ilka, JiangBiao He, Roger England, George Zhang and Ning Ren
University of Kentucky, United States; Valvoline Global Operations, United States

#1881 | Advanced SSPC based on SiC-MOSFET for Aircraft Applications [3.6 Posterboard 6]
Fatma Khera, Jun Xie and Patrick Wheeler
University of Nottingham, United Kingdom

#535 | Virtual Admittance Based Switch Fault Detection for Hybrid UAVs [3.6 Posterboard 7]
Taehyung Kim and Sahithya Parvathareddy
University of Michigan – Dearborn, United States

#1828 | Electrolytic Capacitorless Wireless DC Motor Drive System with Delta-Sigma Modulation [3.6 Posterboard 8]
Xin Felix Chen, Chi K. Tse and Qianhong Chen
City University of Hong Kong, Hong Kong; Nanjing University of Aeronautics and Astronautics, China

3.7 Soft Switching in Power Converters

Chair: Caisheng Wang

#785 | Design Optimization and Planar Magnetics Integration of Three-Phase Interleaved LLC Resonant Converter [3.7 Posterboard 1]
Tong Li, Jin Wen, Jiajia Guan, Jiaxin Liu, Cai Chen and Yong Kang
Huazhong University of Science and Technology, China

#1024 | 18 kV Partial Discharge Free Medium Voltage Insulated Gate Driver Power Supply for SiC-Based Power Conversion System [3.7 Posterboard 2]
Abhinav Soni, Dong Dong, Troy Beechner, Zachary Smith and Rolando Burgos
Virginia Polytechnic Institute & State University, United States; RCT Systems, United States

#459 | Optimization of Transformer Design Parameters of a 20 kW SiC-Based Dual-Active Bridge Converter for Enhanced Efficiency [3.7 Posterboard 3]
Gayoung Park, Hwigon Kim and Shenghui Cui
Seoul National University, Korea, Republic of

#1437 | High-Performance Dual-Output Impedance Control Network-based Single-Stage AC-DC Converter [3.7 Posterboard 4]
Firehiwot Gurara, Dheeraj Etta and Khurram K. Afridi
Cornell University, United States

#925 | A Soft-Switched Bidirectional Single-phase Single-Stage AC-DC Isolated Converter with Active Power Factor Correction and Reduced Power Device Count [3.7 Posterboard 5]
Junwei Liu, Muhammad Talib Faiz, Chi Shing Wong, Ka Hong Loo and Chi Yung Chung
The Hong Kong Polytechnic University, Hong Kong

#248 | Single-Stage Isolated On-Board Charger with Reduced MOSFET Count by Sharing Switch Leg [3.7 Posterboard 6]
Dong-In Lee, Seong-Wook Jeong, Gyeong-Hyun Kwon and Han-Shin Youn
Incheon National University, Korea, Republic of

#380 | Novel Isolated Direct AC/DC Converter with Low Leakage-inductance Transformer and Hard-switching Technology Capable of Suppressing Surge Peak-voltage [3.7 Posterboard 7]
Shuji Katoh, Naoki Takagi, Keita Suzuki, Tetsuo Endoh, Yoshitaka Iwaji and Yoshikazu Takahashi
Tohoku University, Japan; Ibaraki University, Japan

#17 | Single-Phase Unidirectional Multilevel Rectifiers Based on Cascaded Cells [3.7 Posterboard 8]
Amanda Pereira Monteiro, Cursino Brandao Jacobina, Filipe Antonio da Costa Bahia, Reuben Palmer Rezende de Sousa, Jean Torelli Cardoso and Alan Robson Andrade Pinto
Federal University of Ceara, Brazil; Federal University of Campina Grande, Brazil; Federal University of Bahia, Brazil; Federal University of Pernambuco, Brazil

#1322 | A Rectifier with Inherent Unity Power Factor [3.7 Posterboard 9]
Sayed Reza Afzali Arani, Alireza Ramezan Ghanbari, Heinz Seyringer, Dietmar Klien, Lukas Saccavini and Norbert Linder
V-research, Austria; Tridonic, Austria

#1182 | Enhanced Efficiency for 11kW On-Board Charger with Variable Switching Frequency [3.7 Posterboard 10]
Seong-Yong Hong, Jae-Bum Lee, Seok-Min Hong, Chan-Bae Park and Hyung-Woo Lee
Korea National University of Transportation(KNUT), Korea (South)

#999 | Mathematical Analysis and Space Vector Modulation of the Three-phase Buck-Boost Rectifier with Reactive Power Capability [3.7 Posterboard 11]
Yan Figueiredo, Montie Vitorino and Jens Friebe
Federal University of Campina Grande, Brazil; University of Kassel, Germany

#70 | Single-Phase Single-Stage Isolated Buck-Boost Inverters [3.7 Posterboard 12]
Usman Ali Khan, Ashraf Ali Khan, Wonyong Jang, Hyeonwoo Jung and Jung-Wook Park
Yonsei university, Korea, Republic of; Memorial University of Newfoundland, Canada

#830 | Load-independent Class-E Inverter with ASK Modulation [3.7 Posterboard 13]
Wenqi Zhu, Ayano Komanaka, Yutaro Komiyama, Xiuqin Wei, Kien Nguyen and Hiroo Sekiya
Tokyo University of Science, Japan; Chiba University, Japan; Chiba Institute of Technology, Japan

3.8 Controller Design for Power Converters

Chair: Tianqi Hong

#901 | A THD Improving Method for a Single-phase Grid-tied Inverter with Boundary Conduction Mode Current Control [3.8 Posterboard 1]
Jiaxiong Xu, Mingzhi Gao, Jiawei Zhang and Miao Yu
Zhejiang University, China

#1599 | A Carrier-Based Discontinuous PWM Method to Suppress Leakage Current and Reduce Switching Loss for T-Type Three-Level Inverters [3.8 Posterboard 2]
Xin Zhang, Zeng Liu, Wenchen Wang and Jinjun Liu
Xi'an Jiaotong University, China

#1829 | Quantifiable Trade-off between Voltage Regulation and Active Power Sharing in Autonomous DC Microgrids: A Data-Driven Approach [3.8 Posterboard 3]
Zhong Liu and Xiaonan Lu
Purdue University, United States

#1818 | Gradient-Based Predictive Pulse Pattern Control for Medium-Voltage Drives with Very Fast Transients [3.8 Posterboard 4]
Ilari Hilden, Petros Karamanakos and Tobias Geyer
Tampere University, Finland; ABB Systems Drives, Switzerland

#655 | Adaptive Control for Suppressing Power Oscillations in Multi-VSG Systems [3.8 Posterboard 5]
Yian Guo, Julian Zhong Wei Chung, Haoxin Yang, Fei Deng and Yi Tang
School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore, Singapore

#1236 | Modular Soft-Switching EV Charger with Four-Leg PFC Stage and Transformerless On-Demand DC/DC Configuration [3.8 Posterboard 6]
Manfredi Gangi and Matthias Preindl
Columbia University, United States

#1566 | A Lifting Approach for Stability and Controller Design of Power Electronics with Constant Power Loads [3.8 Posterboard 7]
Luis Herrera and Richard Tarbell
University at Buffalo, United States

#1118 | A Frequency Response Based Methodology for the Design and Analysis of Active Power Filters Current Control [3.8 Posterboard 8]
Lidia Sanchez, David Reigosa, Javier Sola, Juan Luis Agorretea, Julian Balda and Fernando Briz
Universidad de Oviedo, Spain; Ingeteam R&D Europe, Spain

#1332 | A General Fully Distributed Control Scheme Considering Time Delay Compensation for Three-phase Grid-tied Power Inverter Systems [3.8 Posterboard 9]
Boya Wang and Matthias Preindl
Columbia University, United States

#989 | Unified Voltage and Torque Predictive Control for Induction Motor Drives Featuring Interleaved DC-DC Boost Converter [3.8 Posterboard 10]
Jacopo Riccio, Henry Mauricio Zapata Fonseca, Luca Tarisciotti, Alireza Davari, Michele Degano, Flores Bahamonde Freddy Arturo and Patrick Wheeler
University of Nottingham, United Kingdom; University Andres Bello, Chile; Shahid Rajaee Teacher Training University, Iran

#1254 | A Simplified Current Control for a SiC Reverse Voltage Blocking based Current Source Inverter for High-Speed Motor Drive Applications [3.8 Posterboard 11]
Sneha Narasimhan, Shubham Dhiman, Sathya Rupan Thirumoorthi, Partha Pratim Das and Subhashish Bhattacharya
North Carolina State University (NCSU), United States

#1169 | A Novel Controller Hardware-in-the-Loop (CHIL) Platform to Validate ITCC Protection Algorithm for Solid State Circuit Breaker (SSCB) [3.8 Posterboard 12]
Shervin Salehi Rad, Elias Nadi, Shuyan Zhao and Fei Lu
Drexel University, United States; Rowan University, United States; ABB, United States

#34 | Robust Control of Uncertain DC Microgrids Using SOS Programming [3.8 Posterboard 13]
Abhiram V. P. Premakumar, Ramtin Madani and Ali Davoudi
The University of Texas at Arlington, United States

#38 | Control Method Selection Strategy with Peak Current and Efficiency of CLLC Resonant Converter in Step-Down Operation [3.8 Posterboard 14]
Won-Yong Jang, Issac Kim, Hyeonwoo Jung and Jung-Wook Park
Yonsei Univ., Korea, Republic of, Korea (South)

#874 | Model Based Predictive Peak Current Control Scheme for LCLC Resonant Converter [3.8 Posterboard 15]
Nagesha Chitpadi and Lakshminarasamma N.
Indian Institute of Technology Madras,Chennai, India, India

#1810 | Fast Computation of Optimized Pulse Patterns for Multilevel Converters [3.8 Posterboard 16]
Isavella Koukoula, Petros Karamanakos and Tobias Geyer
Tampere University, Finland; ABB Systems Drives, Switzerland

#116 | Model Predictive Current Control of a 4-Level Negev Rectifier [3.8 Posterboard 17]
Francisco Juarez-Leon, Sreejith Chakkalakkal and Mehdi Narimani
McMaster University, Canada

#491 | A Direct Vector Control Strategy for Single-phase Differential Inverter [3.8 Posterboard 18]
Yanli Gao, Junhui Lin, Peng Liu, Yonggao Zhang, Shuang Xu and Liuchen Chang
East China Jiaotong University, China; North China University of Technology, China; University of New Brunswick Fredericton, Canada

#473 | A Simplified and Direct Carrier-Based PWM for Parallel Winding Current Source Inverter [3.8 Posterboard 19]
Yanchao Xiong, Dong Jiang, Yixuan Shuai and Zicheng Liu
Huazhong University of Science and Technology, China

#576 | Impact of the Distributed Current Controller on the Dynamic Performance of the Modular Multilevel Converter [3.8 Posterboard 20]
Max Dupont, Andrea Cervone and Drazen Dujic
Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland

3.9 Electric Machines 4

Chair: Silvio Vaschetto

#176 | Hybrid Structure Shield for Shaft Voltage Reduction and Fault Diagnosis [3.9 Posterboard 1]
Sung-Won Lee, Jun-Hyeok Heo, Jun-Kyu Kang and Jin Hur
Incheon National University, Korea, Republic of

#222 | Hybrid Shield Ring Structure for Shaft Voltage Reduction in IPMSM [3.9 Posterboard 2]
Dae-Hyeon Kim, Jun-Kyu Kang, Jun-Hyeok Heo and Jin Hur
Incheon National University, Korea, Republic of

#1734 | Induction Motor Fault Classification with Topological Data Analysis [3.9 Posterboard 3]
Bingnan Wang
Mitsubishi Electric Research Laboratories, United States

#639 | A Comparison of Induction Motor Fault Detection Using Single and Double-Channel Phase Currents [3.9 Posterboard 4]
Robert Wright, Poria Fajri, Xingang Fu and Arash Asrari
University of Nevada Reno, United States; Purdue University Northwest, United States

#487 | Modeling Equivalent Circuit of Shaft Voltage for EV Motor with Ceramic Bearings [3.9 Posterboard 5]
Jun-Hyuk Im, Yong-Ha Choo, Jun-Hyeok Heo, Sang-Hoon Lee and Jin Hur
Daegu Mechatronics & Materials Institute, Korea (South); Incheon National University, Korea (South)

#538 | High-Frequency Pulse Generator for Meduim Voltage Motor Insulation Testing [3.9 Posterboard 6]
Obinna Onodugo, Pascal Lingom, Emmanuel Agamloh, Annette von Jouanne and Alex Yokochi
Baylor University, United States

#808 | Demagnetization Fault Diagnosis of Vernier Permanent-Magnet Motor Based on Wavelet Packet Analysis and MSCNN [3.9 Posterboard 7]
Hao Wang, Xianglin Li, Xuejiang Tian, Chaolin Li, Wei Hua and Kai Wang
Qingdao University, China; JieYuan DianQi (Qingdao) Co., LTD, China; Southeast University, China; Nanjing University of Aeronautics and Astronautics, China

#1200 | Analysis of Zero-sequence Injection for Five-phase Induction Motor under Open-phase Fault [3.9 Posterboard 8]
Xiangwen Sun, Zicheng Liu, Guangyu Wang, Dong Jiang and Ronghai Qu
Huazhong University of Science and Technology, China

#220 | Novel High-Precision Adaptive Algorithm for Ball Bearing Fault Diagnosis Under Low Incremental Encoder Sampling Rate [3.9 Posterboard 9]
Juntao Wang and Pinjia Zhang
Tsinghua University, China

#885 | Test Results of Transient Temperature Distribution of High Slot Fill Motor Winding with Infrared Thermography [3.9 Posterboard 10]
Hiroya Sugimoto, Jun Ebinuma and Yuto Yamada
Tokyo Denki University, Japan

#1076 | Comparative Analysis of Electric Motor Cooling: Water Ethylene Glycol Housing Jacket vs Direct Stator Oil [3.9 Posterboard 11]
Arthur Zajac, Andrew Botham, Sun Lee, Jigar Mistry, Reza Nasirizarandi, Ofelia Jianu and Narayan C. Kar
Mechanical, Automotive and Materials Engineering – University of Windsor, Canada; Electrical and Computer Engineering – University of Windsor, Canada; Vitesco Technologies Canada, Inc., Canada

#715 | Comparison of Advanced Stator Cooling Techniques for High-Performance Electric Machines [3.9 Posterboard 12]
Gokhan Cakal, Thomas M. Jahns and Bulent Sarlioglu
University of Wisconsin-Madison, United States

#1868 | A Novel Radial-Flux IPM Eddy-Current Coupler for Wind Generator Applications [3.9 Posterboard 13]
Sajjad Mohammadi, Gholamreza Davarpanah and James L. Kirtley
MIT, United States; Amirkabir University of Technology, Iran

#1213 | Greybox Thermal Parameter Identification of Electric Machine Stators [3.9 Posterboard 14]
Nicholas Krause, Sossong Dominick and Ian P. Brown
Illinois Institute of Technology, United States

3.10 Electric Machines 5

Chair: Udochukwu B. Akuru

#1595 | Electromagnetic Performance Comparison of the Laminated- and Segmented-Rotor Double-Stator Wound-Field Flux Switching Machines [3.10 Posterboard 1]
Udochukwu Bola Akuru, Wasiq Ullah, Wasiullah Khan, Karen S. Garner, Lesedi Masisi and Faisal Khan
Tshwane University of Technology, South Africa; COMSATS University Islamabad, Pakistan; Stellenbosch University, South Africa; The University of the Witwatersrand, South Africa

#1004 | Optimal Design and Comparison of Synchronous Machines with Inner and Outer Reluctance Rotors and PM or DC Stator Combined Excitation [3.10 Posterboard 2]
Oluwaseun A. Badewa, Ali Mohammadi, Donovin D. Lewis and Dan M. Ionel
SPARK Lab, ECE Dept., University of Kentucky, United States; SPARK Lab, ECE Department, University of KY, United States

#1105 | Design, Analysis, and Implementation of Robust Two Degree of Freedom Current Regulator for Switched Reluctance Machines [3.10 Posterboard 3]
Nikunj Gupta, Siddharth Mehta, Prerit Pramod and Iqbal Husain
North Carolina State University, United States; Lightship Energy Inc, United States; MicroVision Inc, United States

#1674 | Double-Integral Ramp Tracking Current Regulator Architecture for Switched Reluctance Machines [3.10 Posterboard 4]
Nikunj Gupta, Siddharth Mehta, Prerit Pramod and Iqbal Husain
North Carolina State University, United States; Lightship Energy Inc, United States; MicroVision Inc, United States

#1120 | Boost Inverter for Switched Reluctance Motor Drive without Additional Inductor [3.10 Posterboard 5]
Satoshi Ohtaki, Hirotaka Kato, Hiroki Watanabe and Jun-ichi Itoh
Nagaoka University of Technology, Japan

#201 | Superconductor Joint Methods and AC Losses in Electric Machine Applications [3.10 Posterboard 6]
Nicholas Storti and Emmanuel Agamloh
Baylor University, United States

#276 | Wound-Rotor Asynchronous Machines for Use in Electrical Power Generation in Aviation [3.10 Posterboard 7]
Conner Ozatalar, Jeremiah Vannest, Julia Zhang, Shengyi Liu and Lijun Gao
Ohio State University, United States; Boeing, United States

#1686 | Design and Performance Characteristics of a Four-Module Fault-Tolerant Modular PM Machine [3.10 Posterboard 8]
Ken Chen, Xiaoyuan Zhang, Pengkun Tian, Thomas Jahns and Bulent Sarlioglu
University of Wisconsin-Madison, United States

#434 | Analysis of a Novel Phase-Unit Axial-Modular Permanent Magnet Machine With E-Core Stators for Electric Aircraft Propulsion System [3.10 Posterboard 9]
Yanlei Yu, Candra Adi Wiguna, Yu Zeng, Qingxiang Liu, Josep Pou, James Wang, Armen Baronian, Sun Huanqing and Christopher H. T. Lee
Nanyang Technological University, Singapore; EATON, Canada; Eaton, China

#1108 | Switch Open Fault Detection of Asymmetric 6-phase PMSM Based on Normalized Stationary Reference Frame dq-axis Currents [3.10 Posterboard 10]
Kim Myeongjae, Bae Yoengyu, Jun Soyoung, Seonhwan Hwang, Lee Kichang and Li Hui
Kyungnam University, Korea, Republic of; Korea Electrotechnology Research Institute, Korea, Republic of; Florida State University, United States

#748 | Effect of Integrated Stator Cooling Channels on the Electromagnetic-Thermal Performance of Traction Electric Motors [3.10 Posterboard 11]
Jigar Mistry and M. Hossain Mohammadi
Vitesco Technologies Canada, Inc., Canada

#1253 | Trade-offs and Performance Benefits of GaN Inverters in Low Inductance High-Speed PMSMs for Aerospace Applications [3.10 Posterboard 12]
Theophilus Narteh Wakemeh, Junyeong Jung and Iqbal Husain
North Carolina State University, United States

#1694 | Minimum Winding-loss Design of Cryogenically-cooled Hyper-conducting PM Motors [3.10 Posterboard 13]
Matteo Felice Iacchetti, Alexander Smith, Hongye Zhang, Paul Tuohy and Alexandru-Vlad Rusu
The university of manchester, politecnico di milano, United Kingdom; The university of manchester, United Kingdom

#997 | Sustainability-Centric Rare-Earth-Free Electric Machine Design for Traction Applications [3.10 Posterboard 14]
Mostafa Fereydoonian and Woongkul Lee
Purdue University, United States

3.11 Modeling and Reliability of Electric Drives

Chair: David Reigosa

#50 | A Low-cost and Highly Reliable Configuration for Multi-axis Electric Drive Systems [3.11 Posterboard 1]
David Blow and Baoyun Ge
University of Florida, United States; Georgia Institute of Technology, United States

#1242 | Position Sensing Fault Detection and Compensation of BLDC Motors Based on Fault Index Functions [3.11 Posterboard 2]
Taehyung Kim, Sahithya Parvathareddy and Anuj Shah
University of Michigan – Dearborn, United States

#941 | Novel PSO-based Speed-controlled IM Fed by PS and LS PWM 9L-MMC with Mitigative Study of CMV and Bearing Current [3.11 Posterboard 3]
Asad Hussain, Rohit Raj, Jyoti Ranjan Dash and Pramod Agarwal
Indian Institute of Technology, Roorkee, India

#1083 | High-bandwidth Dynamic Load Emulation of Mechanical Systems using Electric Drives [3.11 Posterboard 4]
Pranav Chandran and Brian Johnson
University of Texas at Austin, United States

#324 | Study of Current Third-order Harmonics Control to Reduce Iron Loss in Permanent Magnet Synchronous Motors [3.11 Posterboard 5]
Kaiki Akizuki, Toshiyuki Fujita, Hiroshi Fujimoto, Michihiro Nakagawa, Naoya Yamashita, Takayuki Miyajima, Yoshiki Yasuda and Akio Yamagiwa
The University of Tokyo, Japan; Daikin Industries, Ltd, Japan

#793 | Maximum-Emission Operating Setpoint for the Electromagnetic Compliance of a Variable-Frequency, Soft-Switching Converter [3.11 Posterboard 6]
Elliott Fix and Matthias Preindl
Columbia University, United States

#798 | Neural Network-based MTPA Control Considering Temperature Variation in IPMSMs [3.11 Posterboard 7]
Junhyeok Lee, Taegyeom Woo, Youngdoo Yoon and Dongsup Jin
Department of Automotive Engineering Automotive-Computer Convergence, Hanyang University, Korea, Republic of; Department of Automotive Engineering, Hanyang University, Korea, Republic of; Department of IT Convergence, Ulsan University, Korea, Republic of

#207 | Permutation Entropy applied to Fault Identification in Soft-started Induction Motors [3.11 Posterboard 8]
Vicente Biot-Monterde, Angela Navarro-Navarro, Jose Enrique Ruiz-Sarrio and Jose Alfonso Antonino-Daviu
Universitat Politecnica de Valencia – ITE, Spain

#1681 | Dual Phase-Shifts for Common-Mode Noise Mitigation of Dual-Winding Motor [3.11 Posterboard 9]
Xingchen Zhao, Boran Fan, Junming Liang, Dong Dong and Rolando Burgos
Virginia Tech, United States

#1291 | Advanced Pre-charge Circuit Protection for Variable Speed Drives [3.11 Posterboard 10]
JiJun Cao, Jiangang Hu, ChangQing Chen and JunSheng Mu
Rockwell Automation, China; Rockwell Automation, United States

#257 | MW-rated Induction Motor Control equipped with Fault-Ride-Through Capability for an Electric Propulsion Ship using Model Predictive Control [3.11 Posterboard 11]
Jongseok Kim, Seongil Kim, Duck-Su Lee, Heejin Ahn and Ki-Bum Park
Korea Advanced Institute of Science & Technology, Korea (South); HD Korea Shipbuilding & Offshore Engineering, Korea (South); HD Hyundai Electric, Korea (South)

#1636 | Super-Twisting Sliding Mode Control of DFIG in Wind Energy Conversion Systems for Improved Fault Ride-Through Capability [3.11 Posterboard 12]
Norah Alazemi and Hussain Hussain
Kuwait University, Kuwait

#1720 | Unbalanced Current Control in Electric Drives for Thermal Management of Inverter Power Devices [3.11 Posterboard 13]
Luigi Danilo Tornello, Tommaso Scimone, Giuseppe Scarcella, Giacomo Scelba, Salvatore Foti and Antonio Testa
University of Catania, Italy; University of Messina, Italy

#279 | Torque Pulsations in Variable-Flux Memory Motors [3.11 Posterboard 14]
Akrem Mohamed Aljehaimi and Pragasen Pillay
Concordia University, Canada

#617 | Advanced Control Platform for Integrated Modular Motor Drives Based on the Fast Serial Interface [3.11 Posterboard 15]
Armin Ebrahimian, Seyed Iman Hosseini Sabzevari and Nathan Weise
Marquette University, United States

#733 | Analysis of Time Optimal Control Strategies for Electrically Excited Synchronous Machines Using Dynamic Optimization [3.11 Posterboard 16]
Leonard Geier, Johannes Stoss, Andreas Liske and Marc Hiller
Karlsruhe Institute of Technology, Germany

3.12 Components and Converter-Level Packaging

Chair: Dakshina Murthy-Bellur

#1305 | SiC Switching Cell as ZVS Enabler for Si Phase Leg [3.12 Posterboard 1]
Xiaonan Dong, Chen Wang, Zhongjie Wang, Jian Zhou, Xiaoyong Ma, Yifeng Wang and Lingxiao Xue
Tianjin Uniersity, China; Tianjin Entar Energy Technology Co., Ltd, China

#358 | Analysis and Experimental Evaluation of Short-Circuit Energy Variation with Split Inductance [3.12 Posterboard 2]
Hongyi Gao, Dong Hai, Fujun Zheng, Bin Yu, Yuhang Yang, Yuanye Xia, Haoze Luo, Wuhua Li and Xiangning He
Zhejiang University, China; Hangzhou Silan Microelectronics Company Limited, China

#868 | Core Desaturation via Crisscross Switches for Maximal Magnetic Energy Harvesting [3.12 Posterboard 3]
Min Gao and Jinyeong Moon
Florida State University, United States

#1625 | Influence of Excitation Processes on Minor Loop Characteristics and Core Losses in Inductors [3.12 Posterboard 4]
Keiji Wada, Kosuke Oda and Koshi Takano
Tokyo Metropolitan University, Japan

#191 | Analysis and Comparison of Integrated Planar Transformers for CLLC Resonant Converters [3.12 Posterboard 5]
Tianlong Yuan, Feng Jin, Gibum Yu and Qiang Li
Virginia Tech, United States

#679 | Coil Optimization for Common-Mode Choke in Over-Molded GaN Power Modules [3.12 Posterboard 6]
Niu Jia, Han Cui and Leon Tolbert
University of Tennessee Knoxville, United States; Tianjin University, China

#67 | Addressing Partial Discharge in Winding Insulation and Preventing Surface Flashover in Power Electronic Substrates Utilizing Field Grading Materials [3.12 Posterboard 7]
Omar Faruqe, Pradip Chandra Saha, Asif Muhammad Juberi, Chanyeop Park and Woongje Sung
University of Wisconsin-Milwaukee, United States; University at Albany, United States

#567 | Automated Core Loss Tester Error Characterization for New Contributions to Large-Scale Datasets [3.12 Posterboard 8]
Emmanuel Havugimana and Mike Ranjram
Arizona State University, United States

#579 | Multi-objective Optimization of High-frequency Transformer for Dual-Active-Bridge Using Multilayer Perceptron-Genetic Algorithm [3.12 Posterboard 9]
Xiaobing Shen, Diego Bernal Cobaleda, Hans Wouters, Fanghao Tian, Hassan Pervaiz and Wilmar Martinez
KU Leuven – EnergyVille, Belgium

#1359 | A PCB Embedded Variable Inductor with Adjustable Air Gaps [3.12 Posterboard 10]
Yusheng Chen, Boyi Zhang, Peter Barbosa and Feng Jin
Delta Electronics (Americas) Ltd., United States

#1842 | Process Optimization of a Novel Soft Magnetic Composite Inductor Cores [3.12 Posterboard 11]
Cody Krawczyk, Lauren Walker, Jean Lee and Todd C. Monson
California Polytechnic State University, San Luis Obispo, United States; Sandia National Laboratories, United States

#256 | Basic Study on the Structural Design for Large-Capacity Litz Wires Using an Equivalent Circuit Model Considering the Path of All Strands [3.12 Posterboard 12]
Ryota Inoue, Ryuichi Takada, Hiroshi Ueda and SeokBeom Kim
Okayama University, Japan

#1389 | High-Frequency PCB Resonator Designs With Quality Factor Exceeding 1000 [3.12 Posterboard 13]
Jiayang Wu, Kerui Li, Siew-Chong Tan and Shu-Yuen Ron Hui
The University of Hong Kong, Hong Kong

#619 | Design and Performance Analysis of a Thermal Management System Based on Heat Pipe for GaN-Based Integrated Motor Drives [3.12 Posterboard 14]
Seyed Iman Hosseini Sabzevari, Salar Koushan, Armin Ebrahimian, Towhid Chowdhury, Nathan Weise and Ayman EL-Refaie
Marquette University, United States; Marquette Univeristy, United States

#1255 | High Power Density Submodule Development for a 20 kV T-Type Modular Dc Circuit Breaker with a 3.3 kV SiC Power Module [3.12 Posterboard 15]
Yizhou Cong, Yue Zhang, Xiao Li, Zhining Zhang, Pengyu Fu and Jin Wang
The Ohio State University, United States

#1589 | Design and Experimental Tests of Thermal Performances of a 10 kV SiC Power Module-Based Submodule of a Modular Multilevel Converter [3.12 Posterboard 16]
Qichen Yang, Sihun Song, Nash Bonaventura, Isabel Barnola, John Hauer, Zhehui Guo, Karl Schoder, Michael Steurer, Fang Peng and Hui Li
Florida State University, United States; Delta Electronics, United States

#121 | A Novel Method for Predicting the Lifetime of Film Capacitor Bank Considering Thermal Coupling and Variation in Ambient Temperature [3.12 Posterboard 17]
Kaining Kuang, Yuhao Lan and Zhengyan Zhou
The university of Sheffield, United Kingdom

#841 | A Dual-output Differential Tunnel Magnetoresistance Current Sensor for High-frequency Application [3.12 Posterboard 18]
Aozu Luan, Shuai Shao, Jiakun Du, Hui Chen, Chunyao Hou and Junming Zhang
Zhejiang University, China; Hangzhou City University, China

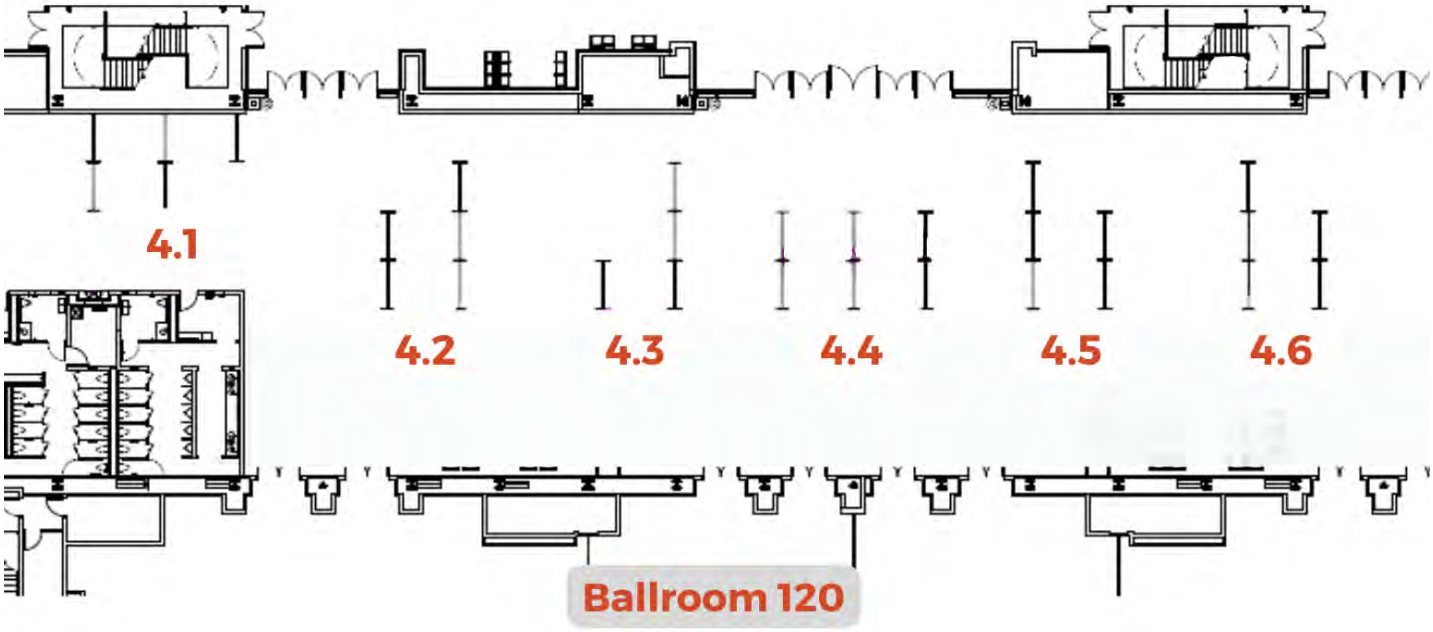
#1053 | Novel Low-Loss Filter for Overvoltage Mitigation in WBG-based Hard Switching Electric Drives with AC Cables [3.12 Posterboard 19]
Renato Amorim Torres, Suresh Gopalakrishnan, Chandra Namuduri and Yilun Luo
General Motors, United States

#1567 | Electrical and Thermal Evaluation of Ga2O3 Devices in MMC-HVDC Systems [3.12 Posterboard 20]
Arindam Sircar, Sudipto Saha, Uttam Singisetti and Xiu Yao
University at Buffalo, United States

Poster Session 4

Thursday, 2:00pm-3:40pm

Please see program for a detailed list of Poster Sub-sessions



Thursday, October 24 2:00PM – 3:10PM

POSTER SESSION 4

Ballroom 120 Pre-function

4.1 Sustainable Energy, Energy Storage, and Power-to-X Technologies

Chair: Luca Vancini

#392 | Model-Free Predictive Control of wave- hydrogen HESS [4.1 Posterboard 1]
Peiwen Tan, Huang Lei, Shixiang Wang, Zihao Mou, Baoyi Pan and Bingxin Xu
Southeast University, China

#1423 | A Networked Microgrid Framework and Testbed for Communication, Controls, and Optimization Testing [4.1 Posterboard 2]
Maximiliano Ferrari, John Smith, Ben Ollis, Aditya Sundararajan, Garcia Yuly and Michael Starke
Oak Ridge National Laboratory, United States; University of Puerto Rico Mayaguez, United States

#634 | Heat Distribution Control in a Three-Phase AC Input Induction Heating System with Three Work Coils Arranged in a Row [4.1 Posterboard 3]
Shunta Inami and Shohei Komeda
Tokyo University of Marine Science and Technology, Japan

#692 | Coordinated Active-Reactive Power Management of ReP2H Systems with Multiple Industrial Electrolyzers [4.1 Posterboard 4]
Yangjun Zeng, Yiwei Qiu, Jie Zhu, Shi Chen, Buxiang Zhou, Jiarong Li, Boshen Yang and Jin Lin
Sichuan University, China; Tsinghua University, China

#644 | Analysis of AC-DC Converters for Grid-tied High Temperature Steam Electrolysis Systems [4.1 Posterboard 5]
Temitayo Olowu, Amey Shigrekar, Micah Casteel, Ning Kang, Jeremy Hartvigsen and Tyler Westover
Idaho National Laboratory, United States

#1117 | New High Gain Boost Converter for Fuel Cell Electric Vehicle [4.1 Posterboard 6]
Vinod Kumar Yadav, Amarendra Edpuganti and Prabodh Bajpai
Indian Institute of Technology Kanpur, India

#851 | Impact of Hydrogen on the Dispatch Scheduling of a CAES-driven Energy Hub [4.1 Posterboard 7]
Nikhil Anand, Monika Sandelic, Tobias Lindstroem Jensen, Thomas Aalund Fredholm and Henrik Lykke Soerensen
Norlys Energy Trading A/S, Denmark; Eurowind Energy A/S, Denmark

#1615 | Energy Management of Hybrid Fuel Cell MCHP for Building Incorporating Hydrogen Storage Dynamics [4.1 Posterboard 8]
Taoufiq Kaoutari, Rafik El Khatib, Hasna Louahlia, Pierre Schatzel and Hamid Gualous
Caen university, France; Entec Smart Energy, France

#192 | Unlocking Capability for Green Hydrogen Production through Optimization of Hydropower Plant's Excess Power [4.1 Posterboard 9]
Pupung Adiwibowo and Hendy Eka Hardana
Hult International Business School, United States; School of Business and Management ITB, Indonesia

#264 | High-Pressure Solid Oxide Electrolysis Cell (SOEC) Dynamic Operation for Enhanced Power-to-X (P2X) Applications [4.1 Posterboard 10]
Yaqi Li, Xiaoti Cui, Soeren Hoejgaard Jensen and Frede Blaabjerg
Aalborg University, Denmark; DynElectro ApS, Denmark

#734 | Switching Sequence Investigation of the X-Type Five-Level Current Source Inverter for Reducing the Large DC Inductance [4.1 Posterboard 11]
Zijian Wang, Kaiwen Yang and Qiang Wei
Lakehead University, Canada

#1675 | Classification of Abnormal Battery Module Based on Electric Circuit Model Parameter from Discharging process for Re-use and Re-cycling System [4.1 Posterboard 12]
Han Dongho, Lee Sangryuk, Ko Eunjin, Ha Taebin, Sim Minju, Kim Taeyoon, Na Woonki and Kim Jonghoon
Chungnam National University, Korea (South); California State University, United States

#194 | Hydrogen Supply Infrastructure Planning Method Considering Indirect Network Effects [4.1 Posterboard 13]
Haoran Deng, Bo Yang, Dafeng Zhu, Gang Yao, Xinping Guan and Dipti Srinivasan
Shanghai Jiao Tong University, China; KTH Royal Institute of Technology, Sweden; National University of Singapore, Singapore

4.2 Grid Modernization and Transportation Electrification

Chair: Sneha Narasimhan

#826 | Utilizing HVDC links for Cross-Border Grids Interconnection: System Level Assessment [4.2 Posterboard 1]
Osama Saadeh, Baher Abu Sba, Bushra Alqbai and Zakariya Dalala
German Jordanian University, Jordan; University of Arkansas, United States; Abdullah Al Salem University, Kuwait

#1353 | A Generalized Configuring Architecture for Switching-Mode Multi-level Multi-line DC Power Flow Controllers: Topology, Operation and Control [4.2 Posterboard 2]
Honghyi Zhang, Miao Zhu, Pengfeng Lin, Lingyu Du, Zuo Chen and Linping Wu
Shanghai Jiao Tong University, China; Nari Group Corporation, China

#509 | Improved High-Frequency, Medium-Voltage Isolation Planar Transformers [4.2 Posterboard 3]
Htat Min and Mike Ranjram
Arizona State University, United States

#334 | Optimal Design of Electromagnetic Structure of High-frequency Transformer [4.2 Posterboard 4]
Yanjiao Jin, Binhao Chen, Guangyao Qiao, Yunfei Xu, Qiuyu Shi and Weiguo Li
State Grid Smart Grid Research Institute Co., LT, China

#517 | Power Loss Analysis and Optimal Design of High Efficiency MW-level Medium Frequency Transformer [4.2 Posterboard 5]
Jialiang Hu, Yiqing Ma, Bin Cui, Tang Xueteng, Yang Zhe and Biao Zhao
Tsinghua University, China

#931 | Scalable Modular Power Converter Design: A PoE-Based Approach for Enhanced Adaptability and Synchronization [4.2 Posterboard 6]
Nicholas Leak, Yuxuan Wu and Fang Luo
Stony Brook University, United States

#919 | A 1200V/425A SiC MOSFET Power Module with Integrated Balancing Circuit For Series-connection Applications [4.2 Posterboard 7]
Yumiao Yuan, Xingyu Pei, Weiqiang Zhou, An Lou, Haidong Yan, Junming Zhang and Shao Shao
College of Electrical Engineering Zhejiang University, China; DC Power Distribution and Consumption Technology Research Center,Zhuhai Power Supply Bureau of G, China; ZJU-Hangzhou Global Scientific and Technological Innovation Center, Zhejiang University College, China

#393 | Bidirectional Performance-considered 11 kW Integrated Wired/Wireless EV Charging System with Effective Operation Method [4.2 Posterboard 8]
Ju-A Lee, Dong Hyeon Sim, Hyeonu Jo, Chae-Lyn Kim, Dong-Wook Yoo and Byoung Kuk Lee
Sungkyunkwan University, Korea (South); Hanyang University, Korea (South)

#373 | Optimized Design Strategy of CLLC Converter Considering High Efficiency Operation in 22kW Bidirectional On-Board Charger [4.2 Posterboard 9]
Dong Hyeon Sim, Ju-A Lee, Hyeonu Jo, Chae-Lyn Kim, Dong-Wook Yoo and Byoung Kuk Lee
Sungkyunkwan University, Korea (South); Hanyang University, Korea (South)

#195 | A Single-Stage Adaptable Multimode On-Board Charger Facilitating G2V, V2G, and Traction Operations for EVs [4.2 Posterboard 10]
Priyatosh Jena, Virendra Prasad Maurya, Rajeev Kumar Singh and Vivek Nandan Lal
Indian Institute of Technology (BHU) Varanasi, India

#1637 | Optimized Model Predictive Control in Single-Phase Seven-Level Flying Capacitor Multilevel Converter for Bi-directional On-board Charger [4.2 Posterboard 11]
Parth Patel and Ambrish Chandra
Ecole de technologie superieure, Canada

#613 | Dynamic Modeling of Power Conversion Stages for an Exascale Supercomputer [4.2 Posterboard 12]
Rafal Wojda, Maiterth Matthias, Brewer Wes and Bouknight Sedrick
Oak Ridge National Laboratory, United States

4.3 Multi-Level Power Converters

Chair: Ruirui Chen

#537 | Comparison of Phase-Shifted and Phase-Disposition PWM Schemes in an Asymmetrical Cascaded HBridge Converter [4.3 Posterboard 1]
Pascal Lingom, Emmanuel Agamloh, Annette Von Juanne, Alex Yokochi, Joseph Song-Manguelle and Roland Unruh
Baylor University, United States; University of Quebec at Trois-Rivieres, Canada; Paderborn University, Germany

#184 | Harmonic Optimization in High Gain 13-L Switched-Capacitor Multilevel Inverter Using Hybrid Ant Colony Optimization [4.3 Posterboard 2]
Arya Singh, Vivek Nandan Lal and Ranjit Mahanty
IIT BHU Varanasi, India

#474 | Suppression of Overvoltage and Oscillation in Three-Level ANPC Converter Using Duty-Decreased PWM and Saturable Ferrite Cores [4.3 Posterboard 3]
Qianyi Huai, Chengxiang Zhu, Shan Li, Tingkang Wang, Wenxi Yao and Xiangning He
Zhejiang University, China

#384 | Resonant Flying Capacitor Multi-Level Converter with Rerouted Capacitor for High Power Density and Efficiency [4.3 Posterboard 4]
Dam Yun, Sunghyuk Choi and Jung-Ik Ha
Seoul National University, Korea, Republic of

#1129 | A Hybrid Si/SiC Cross-connected Submodule Based MMC for Enhanced Performance [4.3 Posterboard 5]
Rajat Shahane and Anshuman Shukla
IIT Bombay, India

#732 | A New Three-Level Split-Inductor T-Type Inverter [4.3 Posterboard 6]
Lucas Gomes, Montie Vitorino and Mauricio Correa
Federal University of Campina Grande, Brazil

#775 | A Heuristic Method to Minimize Switching Actions for Y-Matrix Modulated SC-MMC [4.3 Posterboard 7]
Ziyan Liao and Yunting Liu
Pennsylvania State University, United States

#1217 | Evaluation of grid-tied SiC-based Modular Multilevel Converter with Medium Frequency Operation [4.3 Posterboard 8]
Haodong Yang, Liyang Du and Alan Mantooth
University Of Arkansas, United States

#1479 | A Fully Distributed Modulation Scheme for Modular Multilevel Converters [4.3 Posterboard 9]
Minghui Lu, Marcelo Elizondo, Timothy Salsbury, Veronica Adetola and Kevin Schneider
Pacific Northwest National Laboratory, United States

#698 | Abnormal Voltage Compensation caused by Vertical Crossing in Phase-shifted PWM-based Cascaded H-bridge Inverters [4.3 Posterboard 10]
Jeong-Yul Bang, Dongho Choi, Hyeon-Woo Oh and June-Seok Lee
Dankook University, Korea (South)

#635 | Modular Multilevel Converters with Three-Active-Switch Symmetrical-Half-Bridge Submodules and Sensorless Voltage Balance [4.3 Posterboard 11]
Chenming Liu, Jiang Lai and Jingyang Fang
School of Control Science and Engineering, Shandong University, China

#562 | Enhanced Modular Multilevel Converter Based PV System for Injecting Balanced Grid Current Under Partial Shading Conditions [4.3 Posterboard 12]
Mustafa Fadel, Mohammed Elgendy, Mohamed Dahidah, Andrew Smith and Osama Abushafa
Newcastle University, United Kingdom

#320 | A Pulse Compensation Scheme for Maintaining Balanced Voltage of a Cascaded Multilevel Converter under Multiple Submodule Failures [4.3 Posterboard 13]
Aoki Yosuke and Miura Yushi
Nagaoka Univercity of Technology, Japan

#202 | An Innovative Multiport Soft Open Point with Ground Fault Suppression for Future Continuous Power Supply-Oriented Distribution Networks [4.3 Posterboard 14]
Bin-Long Zhang, Mohammadreza Lak, Mou-Fa Guo and Sahel Solemanifard
Yuan Ze University, Taiwan; Fuzhou University, China; National Sun Yat-Sen University, Taiwan

#1486 | Enhanced Reactive Power Transfer Capability and ZVS Range Analysis for a Single-Stage DAB based Electronic Transformer Using Bidirectional Switches [4.3 Posterboard 15]
Shubham Rawat, Ramandeep Narwal, Subhashish Bhattacharya, Jayant Baliga and Douglas Hopkins
NC State University, United States

#627 | A Three-Phase Reduced Stage AC-AC Converter with Galvanic Isolation and Isolated DC Ports [4.3 Posterboard 16]
Asad Hameed and Gerry Moschopoulos
The University of Western Ontario, Canada

#598 | Unaligned Boost Function and Buck Function for Parallel Capacitive-Link Universal Converter [4.3 Posterboard 17]
Junhao Luo, Khalegh Mozaffari, Brad Lehman and Mahshid Amirabadi
Northeastern University, United States; Enphase Energy Inc, United States

#471 | A High Performance Si/SiC Hybrid Switch-Based ANPC Converter With a Novel Configuration Optimization Algorithm [4.3 Posterboard 18]
Ping Liu, Mengmeng Jiao, Liu Long and Chunming Tu
Hunan University, China

4.4 High Density Power Converters

Chair: Issa Batarseh

#831 | A Soft-switching Single-phase half-bridge NPC inverter Based on a Magnetic Coupled Active Filter [4.4 Posterboard 1]
Qiyuan Hu, Shangzhi Pan, Ruixuan Wang, Zisen Lin, Jinwu Gong and Xiaoming Zha
Wuhan University, China

#569 | A Novel Current Sensor Based on Parasitic Inductance with Adaptive Compensation for Parasitic Resistance [4.4 Posterboard 2]
Xingchen Zhao, Tam Nguyen, Dong Dong and Rolando Burgos
Virginia Tech, United States

#571 | A SiC-Based 200degC 1200V Half-Bridge Phase-Leg Integrated with High-Density Power Supply and Novel Current Sensor based on Parasitic Inductance [4.4 Posterboard 3]
Xingchen Zhao, Bo Li, Zichen Zhang, Emmanuel Arriola, Guo-Quan Lu, Rolando Burgos, Khai Ngo, Dong Dong and Qingrui Yuchi
Virginia Tech, United States

#1877 | All-GaN MHz Hybrid-Switched-Capacitor Converter with Low Parasitic Inductance [4.4 Posterboard 4]
Tian Xia, Huaqiao Liu and Yenan Chen
Zhejiang University, China

4.5 Stability and Power Quality of Power Converters/Systems

Chair: Luca Tarisciotti

#435 | One-Cycle Control of Vienna Rectifiers under Variable Switching Frequency with Improved Waveform Quality [4.5 Posterboard 1]
He Zhou, Ding Hongfa, Zhang Ziqi, Chen Zibo, Liu Yingzhe and Zhang Dandi
Huazhong University of Science and Technology, China; University of Texas at Austin, United States

#1020 | Enhanced Ride-Through Capability for Single-Phase Series Active Power Filter Using an Auxiliary Leg [4.5 Posterboard 2]
Gilielson Paz, Cursino Jacobina, Isaac Freitas, Jean Cardoso and Victor Melo
Federal University of Campina Grande, Brazil; Federal University of Paraiba, Brazil

#1341 | Voltage and Current Feedforward Terms Impact in the Stability of Grid-Forming Inverter Systems [4.5 Posterboard 3]
Oriana Benfatto, Giulia Tresca, Andrea Formentini, Norma Anglani, Simone Cossu and Pericle Zanchetta
University of Pavia, Italy; University of Genova, Italy; University of Pavia, Italy

#971 | A Zero-Crossing Detection-Based Adaptive Stabilization Method for Cascaded DC Systems [4.5 Posterboard 4]
Bi'an Zhao, Youlin Fan, Tonglu Wang, Yufei Li, Yue Wang, Xinyang Su, Qifeng Wang and Jinli Hao
Xi'an Jiaotong University, China; The Hong Kong Polytechnic University, China; Huawei Technologies Co., Ltd., China; Xi'an Huawei Technologies Co., Ltd., China

#1316 | Power-Response Matrix-Based Modeling of Converter Systems for Small-Signal Analysis [4.5 Posterboard 5]
Anant Narula, Paul Imgart, Massimo Bongiorno, Paolo Mattavelli, Mebtu Beza and Jan R. Svensson
Chalmers University of Technology, Sweden; University of Padova, Italy; Hitachi Energy, Sweden

#1294 | Simplified Modeling Method for DC-side impedance of MMC Considering the impact of Wind Farms [4.5 Posterboard 6]
Peng Huang, Niancheng Zhou, Yongjie Luo, Xiuchao Duan and Qianggang Wang
Chongqing university, China

#169 | Qualitative Evaluation of Semi-Quantitative Design Guidelines Concerning Transient Stability [4.5 Posterboard 7]
Chao Charles Liu, Zhenxi Wu, Chi K. Tse, Hua Han and Jingxi Yang
City University of Hong Kong, Hong Kong; Central South University, China

#400 | Stability Analysis of DC-Coupled Converters with Impedance Spectroscopy [4.5 Posterboard 8]
Gernot Pammer, Oliver Koenig, Alois Hirsch, Daniel Leidorfer and Lucas Rotava
AVL List GmbH, Austria

#1158 | DVRs Analysis with Different Topologies and Control Methods [4.5 Posterboard 9]
Arthur Costa, Elias Neto, Gregory Almeida, Joao Martins and Darlan A. Fernandes
Federal Institute of Alagoas, Brazil; IRT Saint Exupery, France; Federal University of Alagoas, Brazil; Federal University of Paraiba, Brazil

#1152 | Robust Control Scheme Based on VPI Controller and PCC Voltage Feedforward for Grid-Following Inverters Under Weak Grid Conditions [4.5 Posterboard 10]
Xinghai Geng, Zeng Liu, Xincheng Dai, Xueling Yang and Jinjun Liu
Xi'an Jiaotong University, China

#481 | Stability Enhancement of DC Cascaded System Including CPLs by Using Nonlinear Inductor in Source-Interface DC-DC Converter [4.5 Posterboard 11]
Hongjian Lin, Shuhung Henry Chung and Ruihua Shen
City university of Hong Kong, China; BYD Company, China

#1719 | dq-Frame Input Impedance Characterization of a Five-Level Cascaded H-Bridge Robicon-Type Motor Drive [4.5 Posterboard 12]
Mohammad Nair Aalam, Qing Lin, Ashkan Barzkar and Rolando Burgos
CPES, Virginia Tech, United States

#973 | Impact of the Reactive Behavior of Grid-Connected Converters on Resonance Stability [4.5 Posterboard 13]
Amir Reza Zamani Babgohari, Mebtu Beza, Massimo Bongiorno, Anant Narula and Jan R. Svensson
Chalmers University of Technology, Sweden; Hitachi Energy, Sweden

#330 | Grid-forming Inverter Placement for Power Systems with High Inverter-based Resource Penetration Based on Participation Factors [4.5 Posterboard 14]
Tianwei Xia, Deepak Ramasubramanian, Wenzong Wang, Kai Sun and Kaiyang Huang
University of Tennessee, Knoxville, United States; Electric Power Research Institute, United States

#203 | Instability Intersection Frequency Auto-Detection for the Virtual Impedance-based Stabilization Method in Cascaded Systems [4.5 Posterboard 15]
Liu Xueqi and Zhang Xin
Zhejiang University, China

#1543 | Zero-Current-Injection Control for Reducing AC Current Distortion in Unfolding-Bridge-Based Single-Phase Grid-Tied Inverters [4.5 Posterboard 16]
Mojtaba Heydari, Emad Nazerian, Qingyun Huang and Alex Q. Huang
University of Texas at Austin, United States; University of Missouri, United States

#1058 | Predictive Current Control Strategy with Minimal Current Sensors for Shunt Active Power Filter using LCL Filter [4.5 Posterboard 17]
Thales Martins Bezerra, Nady Rocha, Alvaro De Medeiros Maciel and Gregory Arthur De Almeida Carlos
Universidade Federal da Paraiba, Brazil; Institut de Recheche Technologique Saint Exupery, France

4.6 Power Converter EMI

Chair: Mateja Novak

#179 | Evaluation and Design of Symmetrical Winding Configurations for Improved Common Mode Noise Reduction in Full Bridge Converters [4.6 Posterboard 1]
Philipp Marx, Marcel Probst, Joerg Haarer, Andre Haspel, Philipp Ziegler and Joerg Roth-Stielow
University of Stuttgart, Germany

#1102 | A Passive Self Damping Busbar to Reduce DC-link Ringing [4.6 Posterboard 2]
Luke Shillaber, Yunlei Jiang, Ameer Janabi, Wei Mu and Teng Long
University of Cambridge, United Kingdom; Space Exploration Technologies Corp., United States

#1078 | Advanced Frequency-Dependent Modeling Techniques for Bus Parasitics of WBGs-Enabled Circuits [4.6 Posterboard 3]
William Collings, Raghav Khanna, Alan Courtay and Andrew Lemmon
University of Toledo, United States; Synopsys, Inc., United States; University of Alabama, United States

#1127 | Dead-Time Compensation to Reduce the Common Mode Voltage in a Three-Phase Four-Leg Inverter [4.6 Posterboard 4]
Robert Tubbs, Alexander Julian and Giovanna Oriti
United States Marine Corps, United States; Independent Researcher and Consultant, United States; Naval Postgraduate School, United States

#1189 | Modeling and Analysis of The Balance Network for Common Mode EMI Noise Suppression [4.6 Posterboard 5]
Qiuzhe Yang, Shuo Wang and Qiang Li
Virginia Tech, United States; Apple Inc, United States

#412 | A Virtual Capacitor Based Transformerless Active Common-Mode EMI Filter [4.6 Posterboard 6]
Junzhao Zhang, Dong Jiang, Jianrui Liu and Yechi Zhang
Huazhong University of Science and Technology, China; Dalian Maritime University, China

#1777 | A multi-Variable dv/dt Filter Design Approach in SiC-Based Integrated Motor Drive [4.6 Posterboard 7]
Mohammad Arifur Rahman, Yilmaz Sozer, Alper Uzum and Syed Imam Hasan
Nexteer Automotive, United States; University of Akron, United States

#1641 | EMI Frequency Model of a Low Power SMPS in Discontinuous Conduction Mode [4.6 Posterboard 8]
Yandry Jacome, Ansley Jugoo, Mohamed Toure and Jean-Luc Schanen
Somfy, France; Univ Grenoble Alps – CNRS – Grenoble INP – G2ELab, France; Univ Grenoble Alps – CNRS – Grenoble INP – G2ELa, France

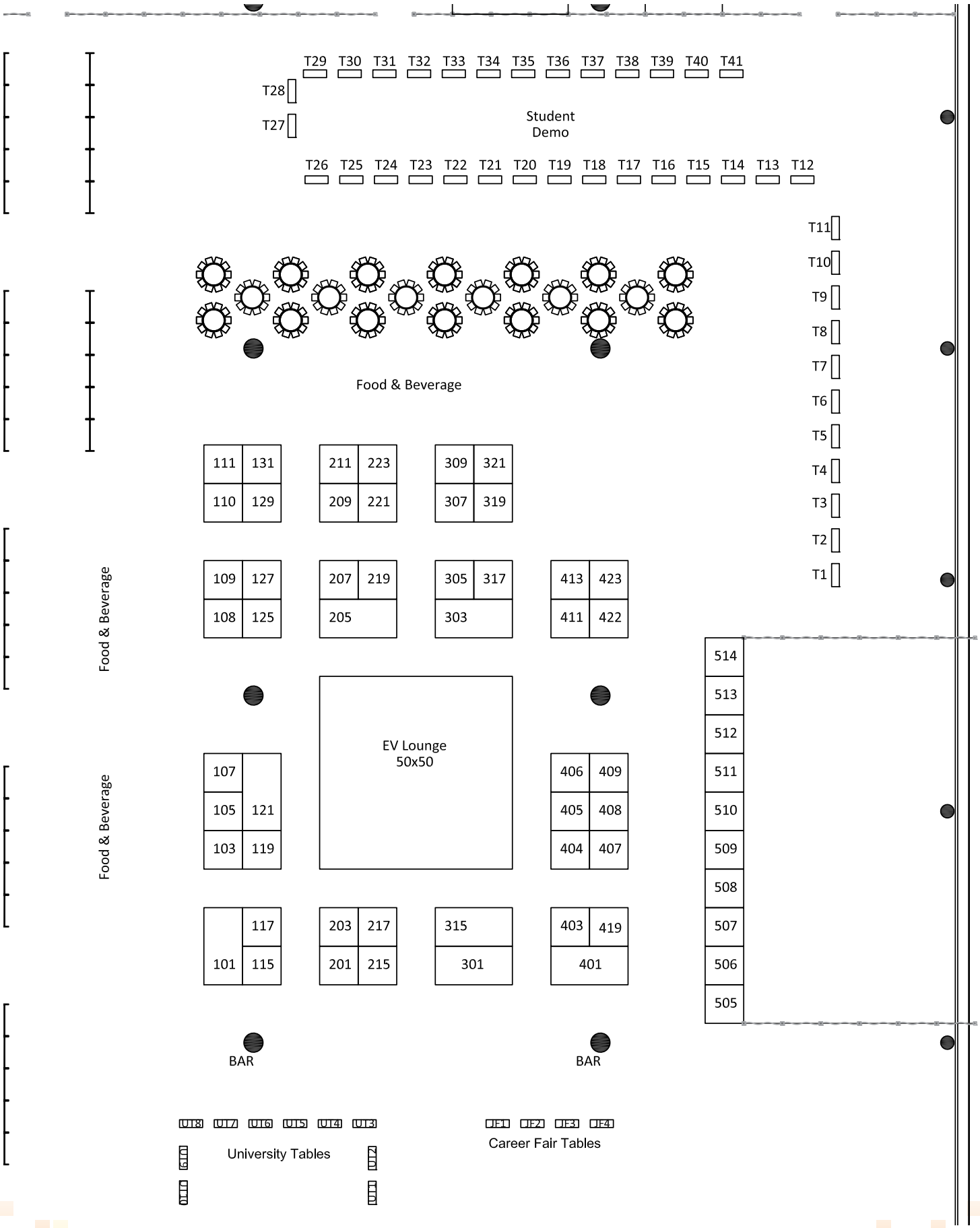
#1222 | An EMI/EMC Test Bed for EMI Susceptibility Evaluation and Weakness Detection [4.6 Posterboard 9]
Robb Raffaelli, Yuntao Xu, Di Zhang, Zachary Everhart and Michael Smith
Naval Post Graduate School, United States

#778 | Modeling, Analysis and Reduction of Radiated EMI Due to the Pulsating Voltage on PCB Ground Plane in a Non-Isolated Power Converter [4.6 Posterboard 10]
Yanwen Lai, Yirui Yang, Qinghui Huang, Shuo Wang and Zheng Luo
University of Florida, United States; Monolithic Power System, Inc, United States

#1036 | Open-Air Test Setup Characterization for Radiated Emissions of Motors Drives [4.6 Posterboard 11]
Roger Franchino and David Lechat
Schneider Electric, France

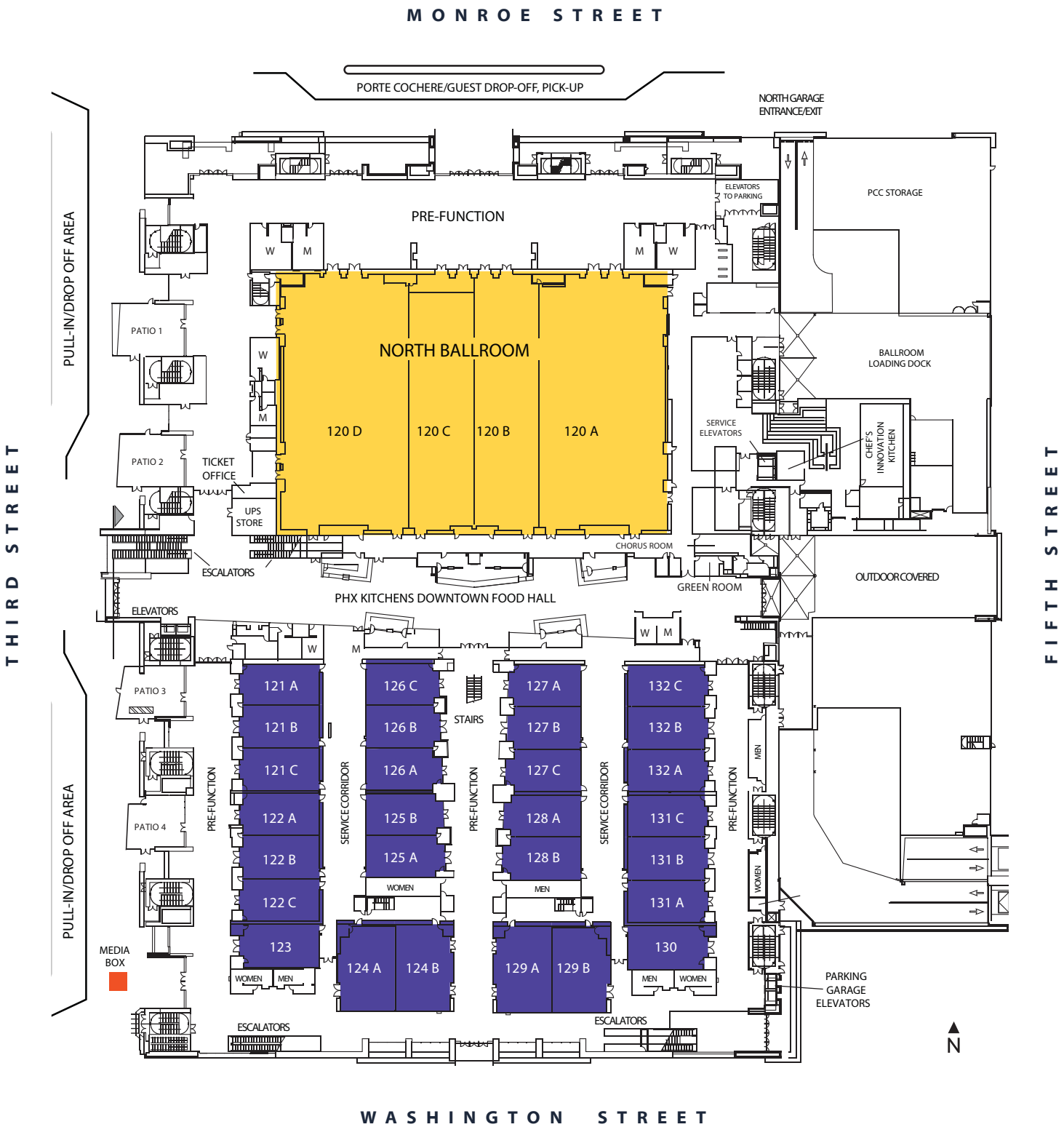
#1413 | Common-Mode EMI Noise Modeling and Cancellation with Impedance Balance Technique for Three-Phase Three-Level Back-to-Back Bridge Interconnection-Based Converter [4.6 Posterboard 12]
Tonglei Wang, Shin-Yu Chen, Ripunjoy Phukan, Rolando Burgos, Dong Dong, Gopal Mondal and Henrik Krupp
Center for Power Electronics Systems, United States; Siemens AG, Germany

EXHIBIT HALL FLOOR PLAN

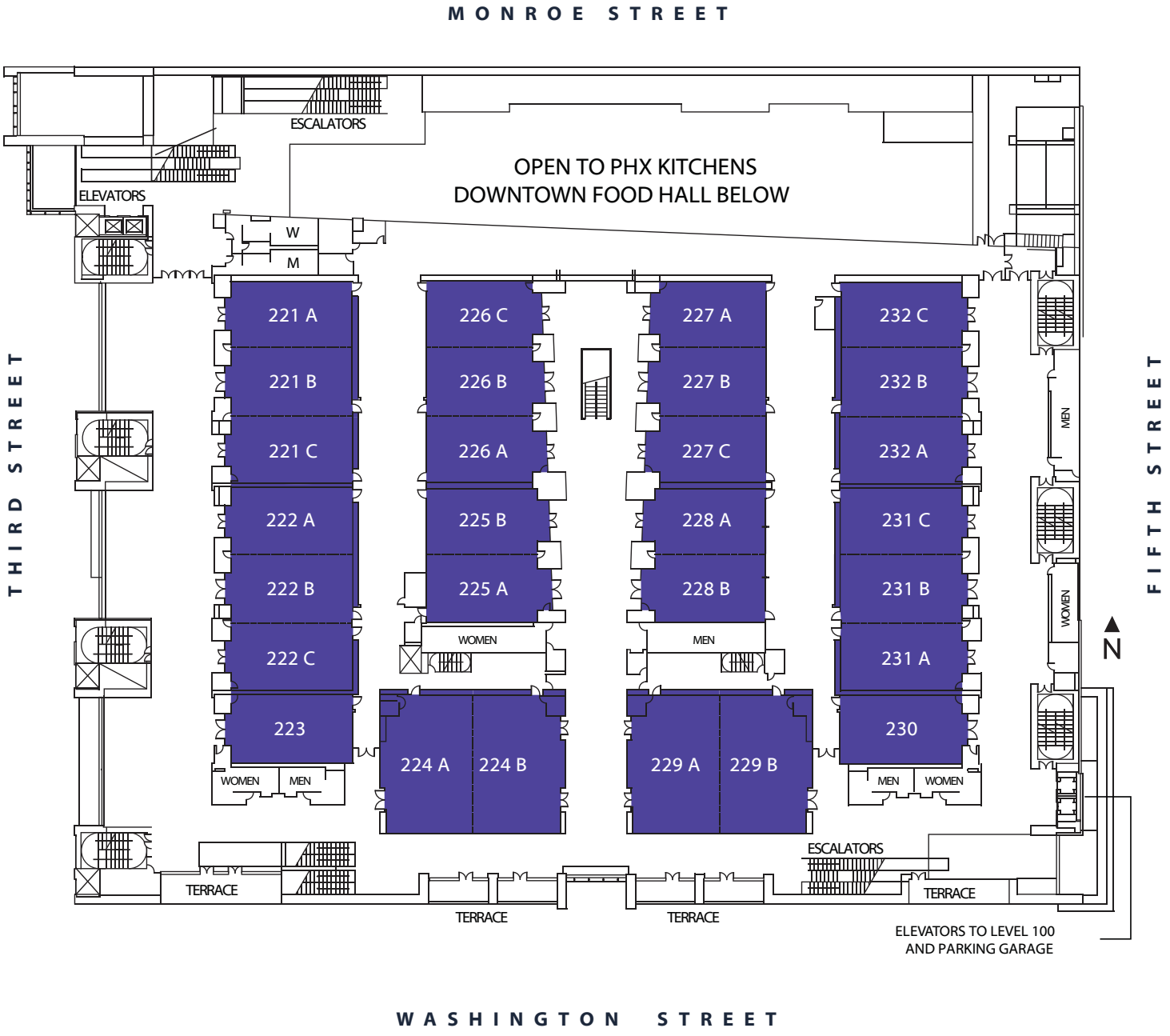


PHOENIX CONVENTION CENTER FLOOR PLANS

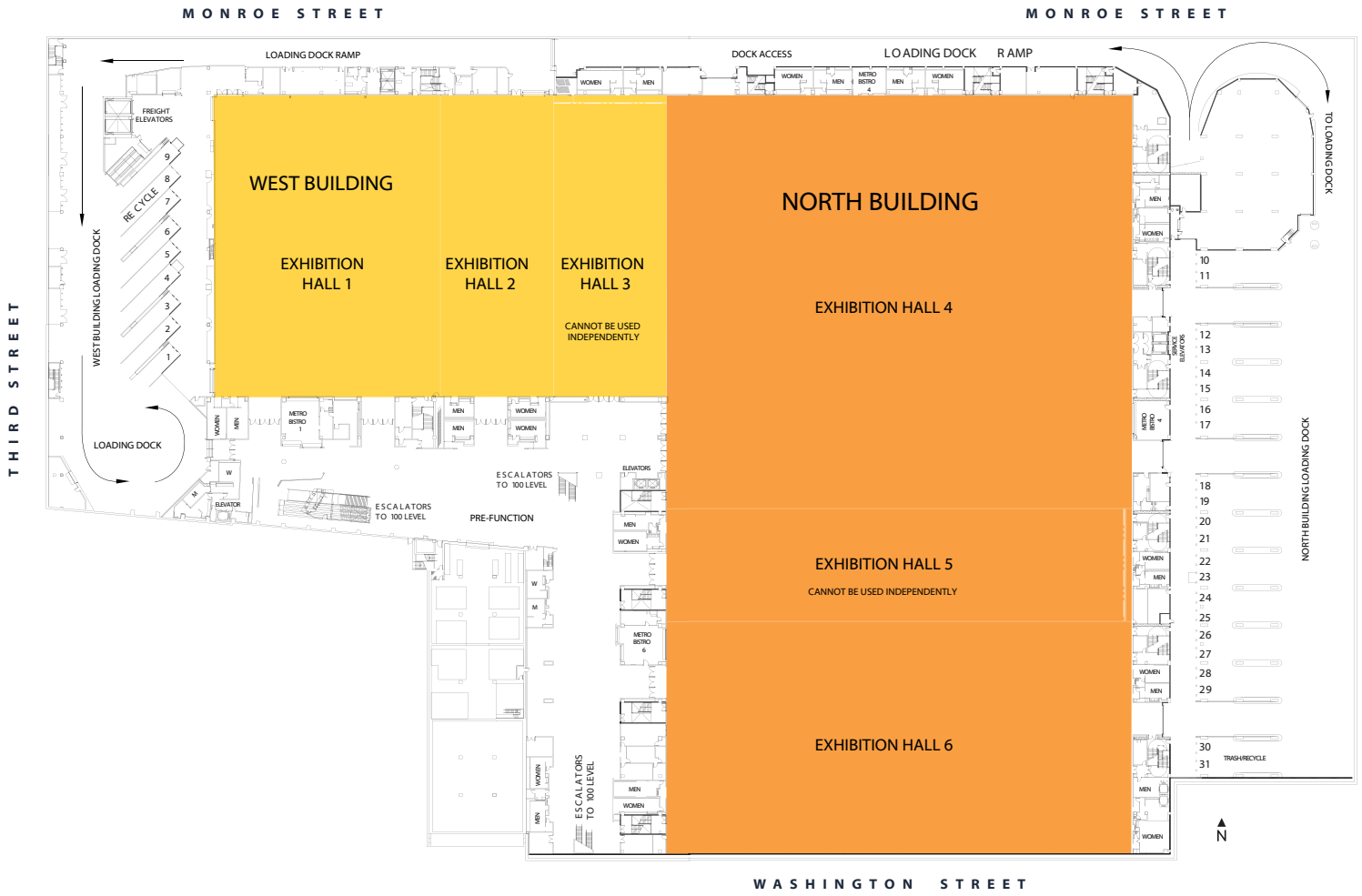
NORTH BUILDING | 100 LEVEL



NORTH BUILDING | 200 LEVEL



NORTH BUILDING | LOWER LEVEL



STUDENT DEMONSTRATIONS

Open – Monday, October 21 **5:00PM – 7:30PM**
Judging – Tuesday, October 22 **1:30PM – 5:00PM**

Exhibit Hall 5/6

Student Demonstrations provide an opportunity for students from various universities and countries to showcase their emerging technology research outcomes and interact with academia and industry.

Table 1 | Aggie Power Electronics AI-Powered Co-Pilot

Demonstrators: Vishwam Raval, Mohamed Zeid, Rolando Sandoval

Texas A&M University

Table 2 | Multi-Objective Design Automation and Optimization for Electric Propulsion Drive Systems

Demonstrator: Ben Luckett

University of Kentucky

Table 4 | A SiC Device-Based Reconfigurable Three Phase EV Charger with Fault-Tolerant Capability

Demonstrators: Uddhav Surve, Harish Karneddi, Gyanendra Tiwari

Indian Institute of Technology Madras

Table 5 | Optimized Design and PWM Control of 97% Efficient 9kW Modular TAB Converter for Space Applications Using Custom MAB Software

Demonstrators: Saikat Dey, Connor Reece

Arizona State University

Table 6 | Smart AI-driven Battery Management Systems and Advanced Charging Systems for E-mobility

Demonstrators: Latha Anekal, Ruvini De Seram, Jeonggi Son

Ontario Tech University

Table 7 | Integrated PCB Winding Transformers for High-Frequency DC-DC Converters

Demonstrator: Hans Wouters

KU Leuven

Table 8 | Battery Equalization Architecture Using Capacitively-Coupled ZETA-Derived Topology

Demonstrator: Zhengqi Wei

City University of Hong Kong

Table 9 | Ceramic-based Coils for Magnetic Components: Ideas and Challenges

Demonstrators: Shaokang Luan, Zhixing Yan

Aalborg University

Table 10 | Gallium Oxide Based Two-stage Half-Wave Voltage Multiplier

Demonstrator: Arindam Sircar

University at Buffalo

Table 11 | Characterization Automation for Gallium Nitride HEMTs from 50K to 400K for Space Power

Demonstrators: Tian Qiu, Purushottam Khadka

Rensselaer Polytechnic Institute

Table 12 | Novel In-Core Cooling of Yokeless and Segmented Armature (YASA) Axial Flux Machines

Demonstrator: Gokhan Cakal

UW Madison

Table 13 | Public Charging Infrustructure for Power Mobility Devices to Enhance Mobility and Inclusion of Device Users

Demonstrators: Shokoufeh Valadkhani, Muhammad Abdelraziq

North Carolina State University

Table 14 | Autonomous Wireless Charging System for VTOL and Hybrid UAVs/Drones

Demonstrator: Ujjwal Pratik

North Carolina State University

Table 15 | Magnetic and Insulation Techniques for Medium Voltage DC/DC Converters Using 10-kV SiC Devices

Demonstrator: Zihan Gao

University of Tennessee

Table 16 | An Update on 1.5-kV, 1.5-kW High Voltage Ratio GaN-based DC/DC Converter Design for the Moon

Demonstrator: Yuzhou Yao

The Ohio State University

Table 17 | Bidirectional GaN-based Semiconductor Galvanic Isolation (SGI) Converter for Energy Storage Application

Demonstrator: Zhining Zhang

The Ohio State University

Table 18 | SiC Power MOSFET Accelerated Lifetime Testing Platform

Demonstrator: Paul Bradford

Utah State University

Table 20 | A Cubic Wireless Charging Container System with Highly Uniform Magnetic Field Distribution

Demonstrators: Kaiyuan Wang, Yici Wang, Rui Liang

Nanyang Technological University

Table 21 | Demonstration of a Transistor Array Thermal Test Vehicle for Electronics Cooling Solutions

Demonstrators: Logan Horowitz, S. Tahmid Mahbub, Jiarui Zou

UC Berkeley

Table 22 | Matrix Autotransformer Switched Capacitor DC-DC Converter for Data Center Application

Demonstrators: Haoran Meng, Zhongshu Sun

University of Dayton

Table 23 | A Lightweight and High-Efficiency Wireless Power Transfer System for AUV

Demonstrators: Chen Chen, Sheng Ren

City University of Hong Kong

Table 24 | Low-profile Single-stage Voltage Regulator Module (VRM) for AI Computing

Demonstrators: Xufu Ren, Jinfeng Zhang, Zhenshuai Rong

University of Cambridge

Table 25 | Time-based Equalization Strategy of Parallel Charge Balancing Architecture for Lithium-ion Battery Pack

Demonstrator: Jyotirmaya Sahoo

Indian Institute of Technology Kharagpur

Table 26 | Fault-Tolerant Topologies with Halbach Array and PM-Free Multi-Stage Multi-Module Electric Machines for Electric Aircraft Propulsion

Demonstrators: Ali Mohammadi, Donovin Lewis, Matin Vatani

University of Kentucky

Table 27 | A High-Efficiency, High-Power-Density Bi-directional Three Phase PFC for EV Charger

Demonstrator: Emad Nazerian

The University of Texas at Austin

Table 28 | Advanced 1600W GaN PV Microinverter

Demonstrators: Mojtaba Heydari, Emad Nazerian

The University of Texas at Austin

Table 29 | High-performance SiC Power Module Based on 3D-repacking of Discrete SiC Devices

Demonstrators: Zibo Chen, Chen Chen, Huanghaohe Zou, Mafu Zhang

The University of Texas at Austin

Table 30 | Application of SiC MOSFETs in the Drive Systems of Ultra-Low Inductance, Highly Efficient PCB Stator Coreless AFPM Machines

Demonstrators: Yaser Chulaee, Ali Mohammadi, Matin Vatani

University of Kentucky

Table 31 | Wireless Power Transfer-Based Snubber for Suppressing Ringing of SiC MOSFET

Demonstrator: Bowang Zhang

The Hong Kong University of Science and Technology

Table 32 | Digital Multi Mode Control of Three Level Flying Capacitor Boost Converter for Fast Transient and Energy Efficiency

Demonstrator: Ruturaj Garnayak

Indian Institute of Technology Kharagpur

Table 33 | Superloop – An Efficient and Robust Dynamic Wireless Charging System for High-Speed Electric Vehicles

Demonstrators: Yuhan Zhang, Xuanting Shen

The University of Sydney

Table 34 | Use of Current Mirror for Real-time Gate-Source Leakage Current Detection

Demonstrator: Ho Tin Tang

City University of Hong Kong

Table 35 | 10 kV SiC-based Current Source Inverters for Motor Drive Applications

Demonstrator: Sneha Narasimhan

North Carolina State University

Table 36 | Hardware Implementation of Direct Effective Power Control (D-EPC) for Improving Output Voltage Stability of LLC Converters

Demonstrators: Takuto Hayashi, Yuki Hushino

Okayama University

Table 37 | Dual-PWM Controlled Boost Active Bridge for Bidirectional Inductive Power Transfer with Wide Impedance and Output Range

Demonstrators: Yihao Wu, Chenming Deng, Haoyu Wang

The University of Texas at Austin

Table 38 | Interior Permanent Motor with Enhanced Efficiency and Heat Dissipation for Electric Vehicles

Demonstrator: Hasnain Nisar

University of Connecticut

Table 39 | Real Time Position Sensor Fault Detection with Control Reconfiguration for PMSM Drive Systems

Demonstrators: Shaya Abou Jawdeh, Pengwei Li

University of Connecticut

Table 40 | A Single Phase 5-Level ANPC Converter with Fault Tolerance and Self-Healing Configurations

Demonstrators: Pengwei Li, Uiliam Kutrolli

University of Connecticut

Table 41 | A Three-port DCDC Converter Used in Renewable Energy Interfacing Microgrid

Demonstrators: Uiliam Kutrolli, Pengwei Li

University of Connecticut

EXHIBITOR LISTING

Exhibitor Listing Alphabetically

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CPES (Center for Power Electronics Systems, Virginia Tech)	107
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EXHIBITOR DIRECTORY

GOLD

ABB

United States
www.abb.com

ABB is a technology leader in electrification and automation, enabling a more sustainable and resource-efficient future. The company's solutions connect engineering know-how and software to optimize how things are manufactured, moved, powered and operated. Building on more than 140 years of excellence, ABB's 105,000 employees are committed to driving innovations that accelerate industrial transformation.

How2Power.com — BOOTH 221

United States
www.how2power.com

How2power.com is a free power electronics website for engineers. Great source of practical power design information. Read in-depth technical articles on power supply design, plus power component news and more in our e-newsletter, How2Power Today. Browse our special sections on Power Magnetics, SiC & GaN technology, EMI/EMC, Space Power and other topics. Find power electronics experts in the Consultants Corner directory. Browse or search our Industry Events calendar with over 400 events listed for 2024!

John Deere — BOOTH 301

United States
www.deere.com/en

For 185 years John Deere has led the way in developing innovative solutions to help our customers become more productive. We conduct business essential to life in ways that are more sustainable for all. We produce intelligent, connected machines and applications that are helping revolutionize the agriculture and construction industries –and enable life to leap forward.

SILVER

Comsol — BOOTH 105

United States
www.comsol.com

COMSOL is a global provider of simulation software for product design, engineering, and research in technical enterprises, labs, and universities. COMSOL Multiphysics® is an integrated environment for creating physics-based models and simulation applications. Simulation experts use COMSOL Server™ and COMSOL Compiler™ to deploy applications to design teams and customers worldwide.

Hioki USA Corp — BOOTH 103

United States
www.hioki.com

Hioki USA stands at the forefront of advanced measurement solutions, driving innovation and elevating product excellence across diverse sectors. Renowned for our precision-engineered electronic measuring instruments, we deliver an extensive portfolio meticulously designed for demanding industries, including automotive, renewable energy, and manufacturing. Hioki empowers engineers and technicians to achieve unparalleled project efficiency and safety by prioritizing reliability and accuracy. Visit BOOTH #103 to discover what Hioki can do for your business.

JMAG Div. / JSOL Corp. — BOOTH 203

Japan
www.jmag-international.com

JMAG is simulation software for electric device design and development. It accurately models the complex electromagnetic phenomena in a wide range of equipment. Since being released in 1983, JMAG has been used in industries and universities world-wide and has contributed to the development of thousands of products. Continuous communication with our users has made JMAG a world class analysis tool. It is our wish that JMAG continues to grow and develop with its users.

NoMIS Power

BOOTH 207

United States
nomispower.com

NoMIS Power was formed to bring the breakthrough advantages of Silicon Carbide (SiC) out of the laboratory and into the global power electronics industry. NoMIS Power develops SiC solutions for leading power electronics groups in applications ranging from electric vehicles to Solar PV and beyond. With our unparalleled experience in the SiC supply chain and a global network of partners, NoMIS Power is the trusted choice for groups seeking to evaluate SiC technology, accelerate market entry, and develop next-generation technology.

Opal RT Technologies

BOOTH 405

Canada
www.opal-rt.com

OPAL-RT is a world leader in real-time simulation and Hardware-in-the-Loop (HIL) testing equipment. Since 1997, OPAL-RT has empowered engineers and researchers with accessible, cutting-edge, and customized real-time simulation technology to accelerate the development of better products and more reliable energy transmission.

Plexim

BOOTH 119

United States
www.plexim.com

Plexim provides solutions for the design and test of power electronic systems and their associated controls. Our portfolio consists of the trusted simulation software PLECS, available as a Simulink blockset or standalone, the RT Box real-time simulator for controller hardware-in-the-loop testing and rapid control prototyping, and automatic embedded code generation capabilities for popular microcontrollers, including TI C2000 and STM32 MCUs.

RTDS Technologies Inc

BOOTH 403

United States
www.rtds.com

RTDS Technologies is the exclusive supplier of the RTDS® Simulator: the world standard for real-time digital power system simulation. Electric utilities, manufacturers, research institutes, universities, and consultants worldwide use the RTDS Simulator for hardware-in-the-loop testing, which allows them to de-risk and validate innovative power system equipment and projects.

STMicroelectronics

BOOTH 101

United States
www.st.com/content/ st_com/en.html

At ST, we are creators and makers of semiconductor technologies mastering the semiconductor supply chain with state-of-the-art manufacturing facilities. STMicroelectronics provides a wide range of imaging solutions and continues to enhance our customers products with different product categories. An integrated device manufacturer, we work with more than 200,000 customers and thousands of partners to design and build products, solutions, and ecosystems that address their challenges.

Wolfspeed

BOOTH 407

United States
www.wolfspeed.com

Wolfspeed (NYSE: WOLF) leads the market in the worldwide adoption of silicon carbide technologies that power the world's most disruptive innovations. As the pioneers of silicon carbide, and creators of the most advanced semiconductor technology on earth, we are committed to powering a better world for everyone. Through silicon carbide material, Power Modules, Discrete Power Devices and Power Die Products targeted for various applications, we will bring you The Power to Make It Real. Learn more at www.wolfspeed.com.

UNIVERSITY TABLETOPS

Berkeley Power and Energy Center UNIVERSITY TABLE 5

United States
www.bpec.berkeley.edu

The mission of the Berkeley Power and Energy Center is to further research and education in the power and energy area through engagement with industry. We seek to create an ecosystem where leading academic researchers and top industry partners can share and exchange ideas in pre-competitive research areas, advance the frontier of technology, and help educate the next generation of technology leaders.

Concordia University PEER Group UNIVERSITY TABLE 7

Canada
users.encs.concordia.ca/~peer

The Power Electronics and Energy Research (PEER) Group was established at Concordia University in 1986. Our research is supported by various grants from Federal and Provincial Agencies, as well as industry. The PEER Group offers programs in static power converters, electric machines, drives, and renewable energy that serve students at the university as well as engineers in the industry. The courses are offered on the Sir George Williams campus of Concordia University in downtown Montréal. Our research laboratory is located in the EV building at the corner of Guy and Sainte-Catherine streets.

FREEDM Systems Center at NC State UNIVERSITY TABLE 3

United States
www.www.freedm.ncsu.edu

The Future Renewable Electric Energy Delivery and Management (FREEDM) Systems Center at NC State University conducts research in Wide Bandgap Semiconductors, Power Systems, Electric Transportation, and Renewable Energy. Recent projects include a medium voltage solid state transformer, extreme high power DC fast chargers, and machine learning applications for grid stability. Learn more at freedm.ncsu.edu.

Kansas State University SPEC UNIVERSITY TABLE 4

United States
www.specsteam.com

Welcome to the Smart Power Electronics and Control Systems (SPECS) Research Group, an esteemed research team at Kansas State University in Manhattan, Kansas. Our ongoing research endeavors encompass multiport converters, high-frequency transients, smart coils, and the development and control of compact converters using SiC and GaN technologies. In addition, SPECS hosts the IEEE Industry Applications Society (IAS) Student Branch Chapter and organizes the annual IEEE Kansas Power and Energy Conference (KPEC), promoting collaboration and innovation within the power and energy sectors.

Texas A&M University UNIVERSITY TABLE 9

United States
www.tamu.edu/index.html

Advanced Electrical Machines and Power Electronics (EMPE) Lab – Texas A&M University

University of Wisconsin WEMPEC UNIVERSITY TABLE 6

United States
www.wempec.wisc.edu

Industry academia consortium developing cutting edge technology in the field of electric machines, control and power electronics.

SUNY University at Stony Brook UNIVERSITY TABLE 8

United States
www.suny.edu/campuses/stonybrook

Our lab is a leading center of excellence in advanced power and energy conversion, dedicated to advancing research and education while fostering innovation in power electronics technology. We provide state-of-the-art services that benefit both our local community and the nation. Our focus areas include power module packaging, high-performance converters, cryogenic motor drives, high-altitude partial discharge studies, EMI and reflected wave design, digital twin-based health management, microgrid PHIL platforms with hybrid energy storage, renewable energy integration, and intelligent control systems.

University of Tennessee-Knoxville UNIVERSITY TABLE 2

United States
curent.utk.edu

CURENT, Center for Ultra-Wide-Area Resilient Electric Energy Transmission Networks, is a graduated National Science Foundation (NSF) Engineering Research Center that was jointly supported by NSF and the Department of Energy (DoE) for a period of 10 years before becoming self-sustaining. A collaboration between academia, industry, and national laboratories, CURENT is led by the University of Tennessee, Knoxville. Partner institutions include Northeastern University, Rensselaer Polytechnic Institute and Tuskegee University.

EXHIBITORS

Advanced Power Conversion Solutions — BOOTH 509

United States
advanced-conversion.com

Advanced Conversion is taking the foundation of technology and industry-leading solutions to the next level by adding in-house design and manufacturing of high-performance bus bars. This allows the company to significantly decrease typical industry lead-times as well as better integrate the cap-bus design to its optimal manufactured level as a DC link solution. The result is a faster design, prototyping, and production solution to market for our customers in electric vehicles, aviation, alternative energy, and pulsed power.

APCS was acquired by Electro Technik Industries in March 2023.

Advanced Test Equipment Corp — BOOTH 404

United States
www.atecorp.com

Advanced Test Equipment Corp. (ATEC) is a leader in test equipment rentals, sales, and service. Since 1981, test engineers have relied on ATEC for its broad inventory, quick shipping, and customer care. ATEC carries EMC, Power Supplies & Loads, RF Safety, Electrical, NDT, Environmental, Communications, and General Purpose equipment. www.atecorp.com

Advent Diamond Inc. — BOOTH 505

United States
adventdiamond.com

Advent Diamond is developing semiconductor technology beyond today's limits. We are commercializing diamond semiconductor materials and components to support innovation in telecommunication, electrification and advanced sensing.

AmePower Contract- Manufacturing — BOOTH 315

United States
www.amepower.com

AmePower is a Contract Manufacturer able to support your Power Electronics Designs with Engineering, Manufacturing, Testing, Logistics, and Sales Technical Support. AmePower has a 44,000 sqft. State-of-the-art facility with in-house high-power testing capabilities. With a prime location in Miami, Florida, we help your product comply with Buy America requirements. AmePower holds multiple ISO Certifications (ISO0991:2015, ISO45001:2018, ISO14001:2015) and is certified Woman-Owned, Minority-Owned Small Business. Visit BOOTH #315 to learn more on how we can get your product ready in just weeks.

Cactus Materials Inc. — BOOTH 408

United States
www.cactusmaterials.com

Cactus Materials Inc., is one of only a small number of US Based, US Investor Owned, Integrated Designer & Manufacturers (IDM) of Advanced Compound Semiconductors. We offer a portfolio of products & technical capabilities that support the demanding performance requirements of today's aerospace & defense systems. From military data communications & optical sensing to power electronics needs in today's battlefield systems. Our high performance, reliable, & affordable Dual use products provide both standard & custom solutions for high performance & reliability demands. Optics & Power To Life!

Cambridge GaN Devices — BOOTH 319

United Kingdom
camgandevices.com

Cambridge GaN Devices, a spin-out from Cambridge University, is a fabless semiconductor company designing and developing energy-efficient GaN-based power devices for greener electronics. CGD aims to reduce high energy consumption and CO2 emissions through innovative, green power solutions. CGD has developed ICeGaN®, the industry-first eMode GaN transistor that can be driven like a Si MOSFET, eliminating the need for special gate drivers and complex drive circuits, while delivering outstanding efficiency, power density and system performance.

Comsol — BOOTH 105

United States
www.comsol.com

COMSOL is a global provider of simulation software for product design, engineering, and research in technical enterprises, labs, and universities. COMSOL Multiphysics® is an integrated environment for creating physics-based models and simulation applications. Simulation experts use COMSOL Server™ and COMSOL Compiler™ to deploy applications to design teams and customers worldwide.

Coiltech — BOOTH 111

Italy
https://www.coiltech.us

Coiltech is the international exhibition for the Coil Winding industry, bringing together companies across the supply chain for the design, production, and maintenance of electric motors, transformers, and generators. Known for efficiency and hosting the World Magnetic Conference, Coiltech is held in key industry hubs. Upcoming events: Coiltech North America (11-12 June 2025, Novi), Coiltech Deutschland (26-27 March 2025, Augsburg), and Coiltech Italia (17-18 September 2025, Pordenone).

CoolCAD Electronics — BOOTH 422

United States
coolcadelectronics.com

CoolCAD Electronics designs and fabricates wide bandgap silicon carbide (SiC) semiconductor transistors and integrated circuits (ICs) for applications in Power Electronics, Green Energy, High-Temperature Electronics and Deep Ultraviolet (UV) Optical Electronics.

CoolCAD SiC semiconductor devices operate at temperatures up to and beyond 400°C, that's significantly above the 200°C capabilities of ordinary silicon-based chips.

CPES (Center for Power Electronics Systems, Virginia Tech) — BOOTH 107

United States
cpes.vt.edu/about

The Center for Power Electronics Systems at Virginia Tech is among the largest and most renowned academic research centers in the world.

More than 100 researchers work in world-class facilities in Blacksburg and Arlington, VA to create advanced electric power processing systems of the highest value to society.

Specifically, CPES improves electrical energy processing and distribution that affects systems of all sizes—from battery-operated portable electronics to vehicles to regional, national, and electrical energy transmission systems.

DEWESoft LLC — BOOTH 209

United States
dewesoft.com

DEWESoft, offers a full suite of hardware for in-vehicle & lab applications. Scalable from 1-1000's of channels our instruments are small USB & EtherCat devices, stand-alone battery-powered systems, rack-mounted configurations, & ruggedized field-ready solutions. Powered by DEWESoft X software, we acquire & control many multi-domain test sets that include analog in/out, digital in/out, video, CAN, FlexRay, XCP, GPS, & more.

DEWETRON — BOOTH 413

United States
www.dewetron.com

DEWETRON is your reliable partner for data acquisition, offering high-quality, customizable systems. Our flexible chassis design allows you to build your ideal measuring system. Serving industries like energy, automotive, transportation, and aerospace, we provide precise measurement solutions. With over 30 years of experience and more than 25,000 systems in use globally, DEWETRON has earned the trust of the market. Choose your preferred measurement board, implement it into your system, and start measuring with confidence. Partner with DEWETRON for continuous support and innovation!

dSPACE Inc. — BOOTH 125

United States
www.dspace.com/en/inc/home.cfm

dSPACE is a leading provider of simulation and validation solutions worldwide for developing networked, autonomous, and electrically powered vehicles. Our portfolio ranges from end-to-end solutions for simulation and validation to engineering and consulting services as well as training and support.

EGSTON Power Electronics — BOOTH 131

Austria
www.egstonpower.com

Experience the future of power electronics with EGSTON Power Electronics, an Austrian pioneer in real-time emulation and test systems. Their advanced programmable amplifiers and Power Hardware-in-the-Loop (P-HIL) systems offer seamless operation in current, voltage, and mixed modes within a single unit, boasting a bandwidth of up to 15 kHz for precise performance. Scalable from 100 kVA to megawatt levels, these solutions excel in applications like grid and motor emulation, AC/DC source/sink, and RLC load emulation. Discover Austrian engineering at its finest.

Elantas PDG, Inc. — BOOTH 127

United States
www.elantas.com

ELANTAS is a leading global manufacturer of insulating and protecting materials for the electrical and electronics industry. Our innovations have provided quality solutions for over 100 years. Our portfolio includes wire enamels, insulation tapes, composites, impregnating and casting & potting materials for high- and low-voltage motors, generators and transformers, as well as conformal coatings, potting & encapsulation materials for protecting PCBs, modules or sensors. In addition, we offer a wide range of adhesives, as well as materials for thermal management and printed electronics.

Electronic Concepts Inc. — BOOTH 215

United States
www.ecicaps.com

Electronic Concepts, Inc. is the recognized leader in film capacitor design and manufacture. With our extensive experience in all aspects of film capacitors, we are always developing new products and innovations. Our vertical integration and innovative design capability offers the flexibility to meet your most demanding requirements and applications.

E4USA/XRP — BOOTH 511

United States
e4usa.org

e4usa seeks to demystify and democratize engineering through a series of high school and postsecondary courses that use authentic, design-based experiences that afford students the opportunity to earn college credit at participating colleges and universities. XRP partners with e4usa to offer affordable ways of integrating robotics and engineering design.

GaNPower International Inc. — BOOTH 510

Canada
iganpower.com

GaNPower International is developing Gallium Nitride (GaN) transistor switches ranging from 650V to 1200V, with current capabilities from 5A to 120A for power electronic applications. We believe that GaN power semiconductors have the potential to revolutionize the efficient use of electrical energy by designing high performance GaN power devices and related ICs in various packaging forms.

GMW Associates — BOOTH 307

United States
gmw.com

GMW solves customer problems with our expertise in magnetics, focusing on non-contact current sensors, transducers, and measurement instrumentation.

Danisense Type B/B+ Smart Residual Current Monitor: DC and AC residual current to 100kHz.

Danisense Current Transducers: ±2A to 11kA, dc accuracy 5ppm, ac (1kHz) accuracy 0.01% amplitude /0.05° phase, for power conversion efficiency measurements. GMW CPC and CPCO Clip-on/Clamp-on DC/AC Current Probes: ±250A to 16kA in harsh environments -40 to +100°C. PEM Rogowski Coil AC Current Probes: frequency response to >50MHz, ±30A to 1MA.

Hammond Power Solutions — BOOTH 217

United States
americas.hammondpowersolutions.com

HPS is the largest manufacturer of dry-type transformers in North America. We engineer and manufacture a wide range of standard and custom transformers that are exported globally in electrical equipment and systems.

HBK Engineering — BOOTH 507

United States
www.hbkengineering.com

Accelerate your product innovation with HBK solutions in virtual, physical and in-process testing. From the electrification of mobility to the advancement of smart manufacturing, we support you throughout the entire product life cycle, sharing your mission for a cleaner, healthier, and more productive world.

Higher Wire Inc — BOOTH 211

United States
www.higherwire.com

Higher Wire's mission is to maximize the useful life of energy systems. We create technologies that accelerate the transition to clean, reliable energy, including lithium-ion batteries from EV and material handlers that are renewed for use in stationary energy storage. We are also developing cutting-edge power conversion systems, such as an integrated three-port all-in-one solar + storage inverter using wide bandgap semiconductors.

Hioki USA Corp — BOOTH 103

United States
www.hioki.com

Hioki USA stands at the forefront of advanced measurement solutions, driving innovation and elevating product excellence across diverse sectors. Renowned for our precision-engineered electronic measuring instruments, we deliver an extensive portfolio meticulously designed for demanding industries, including automotive, renewable energy, and manufacturing. Hioki empowers engineers and technicians to achieve unparalleled project efficiency and safety by prioritizing reliability and accuracy. Visit BOOTH #103 to discover what Hioki can do for your business.

How2Power.com — BOOTH 221

United States
www.how2power.com

How2power.com is a free power electronics website for engineers. Great source of practical power design information. Read in-depth technical articles on power supply design, plus power component news and more in our e-newsletter, How2Power Today. Browse our special sections on Power Magnetics, SiC & GaN technology, EMI/EMC, Space Power and other topics. Find power electronics experts in the Consultants Corner directory. Browse or search our Industry Events calendar with over 400 events listed for 2024!

HVR Advanced Power Components Inc. — BOOTH 117

United States
www.hvrapc.com

HVR Provides cost-effective, engineered solutions for difficult, high-stress resistor applications. Our resistors excel in applications that require high voltage, high energy and low inductance.

The HVR family of resistor products spans a wide range, from the small axial lead type all the way to the multi-megajoule custom assemblies.

IEEE ECCE 2025 — BOOTH 506

United States
www.ieee-ecce.org/2024

IEEE Energy Conversion Congress & Expo (ECCE) will be held in Philadelphia, PA, October 19-23. More information will be sent to you in January 2025. Please contact info@ieee-ecce.org for more information.

IEEE IAS — BOOTH 303

United States
ias.ieee.org

IAS is a source of professional power to its 11,000+ worldwide members. Through a network of over 370 chapters globally, regional events and national and international conferences, the society keeps members abreast of current developments in the area of technology in electricity and electronics.

IEEE PELS — BOOTH 205

United States
www.ieee-pels.org

The Power Electronics Society (PELS) is one of the fastest-growing technical societies of the Institute of Electrical and Electronics Engineers (IEEE). For over 35 years, the Society has facilitated and guided the development and innovation in power electronics technology, which includes the application of circuit theory and design techniques, the development of analytical tools for efficient conversion, control, and condition of electric power, and the effective use of electronic components.

Imperix Ltd. — BOOTH 201

Switzerland
imperix.com

imperix develops high-end control equipment and prototyping hardware for power electronics, drives, smart grids, and related topics. Its products are designed to enable cutting-edge innovation in corporate and academic environments. They are especially valued for their ability to accelerate the implementation of laboratory-scale power converters and facilitate the derivation of high-quality experimental results.

Infineon Technologies — BOOTH 223

Canada
www.infineon.com

Infineon Technologies AG is a global semiconductor leader in power systems and IoT. Infineon drives decarbonization and digitalization with its products and solutions. With our power system solutions, we are a key enabler in the move to harness renewable energy resources and deliver energy-efficient solutions along the entire electrical energy chain. Together with our customers and partners, we make more out of less to actively shape a greener future.

IWATSU Test Instruments Europe GmbH BOOTH 305

Germany
www.iwatsu.com/tme

High power semiconductor curve tracers up to 5kV and 2kA, B-H analyzers for soft-magnetic material characterization, optical isolation systems for high voltage floating measurements, and a variety of probing solutions like AC/DC current probes, Rogowski coils and high voltage probes from IWATSU are designed for latest measurement challenges in power electronics applications. IWATSU ELECTRIC CO., LTD. was founded 1938 in Tokyo, Japan. IWATSU offers a broad portfolio of test & measurement equipment, and solutions for telecommunications and printing systems.

JMAG Div. / JSOL Corp. BOOTH 203

Japan
www.jmag-international.com

JMAG is simulation software for electric device design and development. It accurately models the complex electromagnetic phenomena in a wide range of equipment. Since being released in 1983, JMAG has been used in industries and universities world-wide and has contributed to the development of thousands of products. Continuous communication with our users has made JMAG a world class analysis tool. It is our wish that JMAG continues to grow and develop with its users.

John Deere BOOTH 301

United States
www.deere.com/en

For 185 years John Deere has led the way in developing innovative solutions to help our customers become more productive. We conduct business essential to life in ways that are more sustainable for all. We produce intelligent, connected machines and applications that are helping revolutionize the agriculture and construction industries –and enable life to leap forward.

MagneForce Software Systems, Inc. BOOTH 508

United States
www.magneforcess.com

MagneForce Software Systems produces software for design and simulation of rotating electric machinery. MagneForce products combine Finite Element techniques together with various time based circuit models to provide a total electric machine design environment. Unlike general purpose FE packages MagneForce simulators compute directly machine performance parameters such as voltages, currents, torque, power and efficiency. This is all done in an easy to learn and use Windows environment.

MathWorks BOOTH 129

United States
www.mathworks.com

The MATLAB and Simulink product families are fundamental applied math and computational tools adopted by more than 6,500 universities and colleges. MathWorks products help prepare students for careers in industry, where the tools are widely used for data analysis, mathematical modeling, and algorithm development in collaborative research and new product development.

Mitsubishi Electric US, Inc. BOOTH 115

United States
us.mitsubishielectric.com/en

Contributing to the realization of "Green Transformation" with innovative and ever-evolving semiconductors & devices. Mitsubishi Electric power modules are at the forefront of the latest energy innovations that seek to solve global environmental issues while creating a more affluent and comfortable society for all. Some of these innovations are photovoltaic (PV) and wind power generation from renewable energy sources, smart grids realizing efficient supply of power, hybrid/electric vehicles that take the next step in reducing carbon emissions and fuel consumption.

NoMIS Power BOOTH 207

United States
nomispower.com

NoMIS Power was formed to bring the breakthrough advantages of Silicon Carbide (SiC) out of the laboratory and into the global power electronics industry. NoMIS Power develops SiC solutions for leading power electronics groups in applications ranging from electric vehicles to Solar PV and beyond. With our unparalleled experience in the SiC supply chain and a global network of partners, NoMIS Power is the trusted choice for groups seeking to evaluate SiC technology, accelerate market entry, and develop next-generation technology.

NREL

BOOTH 401

United States
www.nrel.gov

At the National Renewable Energy Laboratory (NREL), we focus on creative answers to today's energy challenges.

NREL's advanced power electronics and electric machines research focuses on systems for electric vehicles (EVs) that control the flow of electricity between powertrain components.

Our scientists and engineers work closely with vehicle manufacturers, suppliers, universities, and other research organizations to develop technologies that overcome the most challenging technical barriers to EV commercialization. We provide the scientific building blocks needed to spur EV innovation.

Omicron Lab

BOOTH 514

United States
www.omicron-lab.com

OMICRON Lab is a division of OMICRON electronics GmbH specialized in providing Smart Measurement Solutions® to professionals such as scientists, engineers and teachers engaged in the field of electronics. It simplifies measurement tasks and provides its customers with more time to focus on their real business. OMICRON Lab was established in 2006 and is meanwhile serving customers in more than 60 countries. Offices in America, Europe, East Asia and an international network of distributors enable a fast and extraordinary customer support.

Opal RT Technologies

BOOTH 405

Canada
www.opal-rt.com

OPAL-RT is a world leader in real-time simulation and Hardware-in-the-Loop (HIL) testing equipment. Since 1997, OPAL-RT has empowered engineers and researchers with accessible, cutting-edge, and customized real-time simulation technology to accelerate the development of better products and more reliable energy transmission.

Pacific Power Source

BOOTH 409

United States
pacificpower.com

Founded in 1971, Pacific Power Source is an industry leading test equipment manufacturer and trusted partner. We provide best-in-class programmable AC & DC power sources and electronic loads with a focus on product innovation, intelligence, and ease of use. Test solutions include regenerative and programmable AC and DC power sources, electronic loads, regenerative grid simulators, and test automation software.

Payton America Inc

BOOTH 121

United States
www.paytongroup.com

Payton Planar Magnetics will custom design all your Planar magnetics from few watts to 300kWatts and up to 5MHz. All SMPS topologies. Designs in 24hours and custom samples in few weeks. Thermal, efficiency, mechanical and cost are always taking into consideration. Designs that work the 1st time.

PCIM Europe

BOOTH 512

Germany
pcim.mesago.com/nuernberg/en.html

Connecting industry and academia, the PCIM – Hub for Power Electronics is your inspiring gateway to excel in power electronics. Benefit from a holistic offering that links you with the knowledge and experts you need to drive power electronics forward – all year round. As part of the Hub, the PCIM Expo & Conference in Nuremberg, Germany, is the leading international event for Power Electronics, Intelligent Motion, Renewable Energy and Energy Management. It connects experts from industry and academia dedicated to driving forward products, research and development along the entire value chain.

Plexim

BOOTH 119

United States
www.plexim.com

Plexim provides solutions for the design and test of power electronic systems and their associated controls. Our portfolio consists of the trusted simulation software PLECS, available as a Simulink blockset or standalone, the RT Box real-time simulator for controller hardware-in-the-loop testing and rapid control prototyping, and automatic embedded code generation capabilities for popular microcontrollers, including TI C2000 and STM32 MCUs.

PMK- und Kommunikationstechnik GmbH

BOOTH 317

Germany
www.pmk.de/en/home

PMK Mess- & Kommunikationstechnik GmbH

PMK provides world-class probing solutions for the latest power electronics test and measurement challenges. Our probes use a universal BNC interface which makes them compatible with any oscilloscope. With over 30 years of experience, we offer a broad portfolio of best-in-class probing solutions. Our high-voltage >1.5GHz optically isolated probe series FireFly® with high CMRR, various current probing solutions, -55°C to +155°C operating temperature range probes, hands-free positioning systems, and much more, are helping our customers with the most challenging measurements.

PolyCharge America, Inc.

BOOTH 419

United States
www.polycharge.com

Breakthrough Capacitor Innovation NanoLam Powered™ capacitor products combine high intrinsic breakdown strength, high dielectric constant, and prismatic form factor to feature energy density and specific energy values that are often multiple times higher than competing capacitor technologies. NanoLam technology is an ideal platform for systems requiring a new level of performance.

Rohde & Schwarz

BOOTH 406

United States
www.rohde-schwarz.com

Test and measurement solutions from Rohde & Schwarz help customers such as component manufacturers, industrial electronics, research institutes, and universities reduce time to market while gaining reliable insights into their design and scientific work along the entire value chain.

RTDS Technologies Inc

BOOTH 403

United States
www.rtds.com

RTDS Technologies is the exclusive supplier of the RTDS® Simulator: the world standard for real-time digital power system simulation. Electric utilities, manufacturers, research institutes, universities, and consultants worldwide use the RTDS Simulator for hardware-in-the-loop testing, which allows them to de-risk and validate innovative power system equipment and projects.

Safran Group

BOOTH 513

United States
www.safran-group.com

Safran is an international high-technology group, operating in aviation, defense and space markets. Its core purpose is to contribute to a safer, more sustainable world, where air transport is more environmentally friendly, comfortable and accessible. Safran has a global presence, with 92,000 employees and sales of 23.2 billion euros in 2023, and holds leading positions in its core markets. Safran Electrical & Power is one of the world's leaders in aircraft electrical systems. The company is a key player in equipment electrification and in the electric and hybrid propulsion sector.

STMicroelectronics

BOOTH 101

United States
www.st.com/content/ st_com/en.html

At ST, we are creators and makers of semiconductor technologies mastering the semiconductor supply chain with state-of-the-art manufacturing facilities. STMicroelectronics provides a wide range of imaging solutions and continues to enhance our customers products with different product categories. An integrated device manufacturer, we work with more than 200,000 customers and thousands of partners to design and build products, solutions, and ecosystems that address their challenges.

Synopsys

BOOTH 309

United States
https://www.synopsys.com/

Three major technology trends—artificial intelligence, silicon proliferation, and software-defined systems—are shaping a new era of pervasive intelligence. For years, Synopsys has been a driving force of these trends, delivering the silicon to systems design solutions that have been essential to enabling them.

Teledyne LeCroy

BOOTH 219

United States
www.teledynelecroy.com

Teledyne LeCroy is a leading provider of oscilloscopes, probes, and software analysis solutions for power integrity, power electronics, power conversion, three-phase power and motor testing.

Tektronix

BOOTH 321

United States
www.tek.com/en

Tektronix designs and manufactures test and measurement solutions to break through the walls of complexity, and accelerate global innovation. Together we empower engineers to create and realize technological advances with ever greater ease, speed and accuracy. Tektronix solutions have supported many of humankind's greatest advances of the past 70 years. Health. Communication. Mobility. Space. With offices in 21 countries, we are committed to the scientists, engineers and technicians around the world who will define the future.

TSC Taiwan Semiconductor

BOOTH 411

United States
www.tsmc.com/english

Taiwan Semiconductor is a leading manufacturer of discrete semiconductor components, offering high quality and competitively priced Power Rectifiers, Zener's, TVS, MOSFETs, Analog Voltage Regulators, and Small Signal Diodes. TSC operates four wholly owned factories, including wafer fabrication and product assembly facilities. All TSC facilities are certified under TS16949 and ISO-9001 quality system certification, as well as ISO-14000 environmental certification. TSC supports major global customers in Power systems, Automotive, Lighting and other markets.

WAFIOS Machinery Corporation

BOOTH 110

United States
www.wafios.us/us/home

WAFIOS was established in 1893 and is today the world's largest supplier of precision machinery for wire, tube and formed parts. The North American headquarters is in Branford, CT and the Chicago-area Midwest Technical Center located in Mokena, Illinois provides additional resources as a service center for machine demos, trials, sample production for prototyping. The WAFIOS range of machine types include those for the production of hairpins, axial flux coils, busbars, spring coiling and forming, spring end-grinding, wire/tube bending and forming, wire straightening, cutting and end-working.

Wolfspeed

BOOTH 407

United States
www.wolfspeed.com

Wolfspeed (NYSE: WOLF) leads the market in the worldwide adoption of silicon carbide technologies that power the world's most disruptive innovations. As the pioneers of silicon carbide, and creators of the most advanced semiconductor technology on earth, we are committed to powering a better world for everyone. Through silicon carbide material, Power Modules, Discrete Power Devices and Power Die Products targeted for various applications, we will bring you The Power to Make It Real. Learn more at www.wolfspeed.com.

IEEE ENERGY CONVERSION CONGRESS & EXPO PHILADELPHIA, PA, USA OCT. 19-23

IMPORTANT DATES

March 2nd, 2025
Digest Submission

May 25th, 2025
Author Notification

July 20th, 2025
Final Paper with
IEEE Copyright Forms

CALL for PAPERS

The Seventeenth Annual IEEE Energy Conversion Congress and Exposition (ECCE 2025) will be held in Philadelphia, Pennsylvania, USA, from October 19 to October 23, 2025. ECCE is a pivotal international event on energy conversion. ECCE 2025 will feature both industry-driven and application-oriented technical sessions as well as an exposition. The conference will bring together practicing engineers, researchers and other professionals for interactive and multidisciplinary discussions on the latest advances in areas related to energy conversion.

Technical papers are solicited on any subject pertaining to the scope of the conference including, but not limited to, the following major topics:

Component, Converter and Subsystem Technologies

- Innovative magnetic materials, alternative conductor and winding insulation technologies
- Passive components and materials
- Power conversion topologies, modulation, and control
- Power electronic devices, gate drivers and integrated circuits
- Power electronic packaging integration
- Reliability, advanced fault protection systems, diagnostics, prognostics, and health management
- Rotating/linear electromagnetic devices
- Thermal management and advanced cooling technologies
- Electromagnetic interference and electromagnetic compatibility
- Advanced manufacturing
- Cyber-physical security (CPS) for power electronics systems
- Digital twins, cloud design and simulation techniques for energy conversion systems

Energy Conversion Systems and Applications

- Renewable and alternative energy power electronics systems
- Critical power and energy storage systems
- Energy efficiency for commercial, industrial and transportation applications
- Aerospace energy conversion systems
- Big data and artificial intelligence in energy conversion
- Electric vehicles (EV) and charging infrastructure
- Off-grid solutions for energy access
- Energy conversion for information technology and communication systems
- Grid-forming technologies
- Wireless power transfer
- High power/voltage conversion systems (HVDC, FACTS and multi-terminal DC systems)
- Industrial motor drives
- Medical, IoT and energy harvesting
- Microgrids, hybrid ac and dc grids, dc grids
- Power electronics for agriculture
- Sustainable recycling for power electronics, electric motors and energy storages

Digest Submission: Prospective authors are requested to submit a single column digest, according to the provided template, no longer than five (5) pages (including references) summarizing the proposed paper. The digest should include key equations, figures, tables, and references as appropriate, but no author names or affiliations. **Digests not conforming to these requirements will be rejected without review.** The digests must clearly state the objectives of the work, its significance in advancing the state of the art, and the methods and specific results in sufficient detail. All digests will go through a double-blind peer review process to ensure a confidential and fair review. The papers presented at the conference will be included in the IEEE Xplore Digital Library. Please refer to the conference website for detailed instructions regarding the digest submission and any future changes to the important dates.

www.ieee-ecce.org/2025

General Chair
Iqbal Husain
North Carolina State University, USA

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Michigan State University, USA

IEEE

IAS IEEE INDUSTRY APPLICATIONS SOCIETY Linking Research to Practice

pels IEEE POWER ELECTRONICS SOCIETY Powering a Sustainable Future

Contact email:
ecce2025tpc@gmail.com

IEEE ENERGY CONVERSION CONGRESS & EXPO PHILADELPHIA, PA, USA OCT. 19-23

IMPORTANT DATES

March 2, 2025
Tutorial proposal due

May 25, 2025
Notice of Acceptance

July 20, 2025
Final Tutorial Materials Due

CALL for TUTORIALS

ECCE is a pivotal international event on energy conversion. It brings together practicing engineers, researchers, and other professionals for interactive discussions on the latest advances in areas related to energy conversion.

The ECCE organizing committee invites proposals for tutorials to be presented at ECCE 2025. Each tutorial is three hours long, excluding break times. Each accepted tutorial will receive one conference registration together with an honorarium of $1,000. Please note that publication of a technical paper will still require a paid full registration.

All tutorial proposals should be submitted via the ECCE 2025 web portal under "Call for Tutorials." Please follow the Tutorial Proposal Form on the website as a submission template. The proposals will be reviewed by a panel of subject matter experts.

One or more of the following elements are strongly encouraged in the tutorial proposals:

a) Application-focused sessions on tools or methods for practicing engineers
b) ECCE 2025 topics relevant to the host city, e.g., smart mobility
c) Collaborative cross-disciplinary topics, industry-led or co-hosted lectures
d) Engaging topics and formats that effectively communicate with the audience and involve the attendees.

Tutorials considered less attractive to the audience include:

a) Lectures that are not balanced between theory and application
b) Tutorial topics or teams presented previously in immediate past ECCE
c) Tutorials that narrowly focus on the presenter's research that is already publicly available
d) Solicitation of a particular product or service.

Potential topic areas include but are not limited to:

Energy Conversion Systems and Applications

- Renewable energy, including under-represented ocean-wave, tidal, and geothermal
- Smart grids, microgrids, nanogrids
- Electrical energy storage, and battery charging technologies
- Energy conversion for information and communications technology
- Energy harvesting and conversion
- Smart, energy-efficient buildings
- Energy efficiency for advanced manufacturing
- Big data and machine learning in energy conversion
- Digital twins for energy conversion systems
- Resilience and cybersecurity in energy conversion systems
- Transportation electrification
- HVDC and HVDC grids
- Power electronics dominated low-inertia grids, especially grid-forming strategies and protection

Energy Conversion Technologies & Components

- Power electronic devices and conversion topologies
- Modeling and control of power converters
- Electric machines and drives
- Passive components, magnetics, and materials–particularly for high frequency
- Packaging, integration, and advanced manufacturing
- EMI and EMC
- Thermal management and advanced cooling technologies
- Wireless power transfer
- High-voltage power conversion, including insulation technologies
- Design automation and optimization
- Reliability, diagnostics, prognostics, and health management
- Fault-tolerant converters, drives and systems
- Protection and advanced gate drives for converters

Others

- Pedagogy for undergraduate learning and online education innovations
- Entrepreneurship, technology transfer, business management
- Development and use of standards for specific applications

www.ieee-ecce.org/2025

General Chair
Iqbal Husain
North Carolina State University, USA

General Co-Chair
Giovanna Oriti
Naval Postgraduate School, USA

Tutorial Chairs
M A Awal
EPC Power, NC, USA
m.awal@epcpower.com

Luca Zarri
University of Bologna, Italy
luca.zarri2@unibo.it

IMPORTANT DATES

March 2, 2025
Special Session Proposal Due

May 25, 2025
Notice of Acceptance

ECCE 2025
IEEE ENERGY CONVERSION CONGRESS & EXPO PHILADELPHIA, PA, USA OCT. 19-23

CALL for SPECIAL SESSIONS

The 17th Annual IEEE Energy Conversion Congress and Exposition (ECCE) will take place at the Philadelphia Convention Center in Pennsylvania, USA, from October 19th to 23rd, 2025. This year's Special Sessions will emphasize emerging technologies and industry-focused topics from non-academic perspectives, including contributions from manufacturers, government research laboratories, start-ups, and industry practitioners. To facilitate broader participation, authors of Special Sessions are not required to submit written papers or materials. Additionally, any materials presented will not be included in the official conference proceedings. Each session will be allocated one or two 100-minute slots, scheduled on the same or different days, subject to the overall conference program.

Different session formats are solicited:

- Formal presentations
- Informal talks with or without slides
- Full question and answer panel
- Panel debates
- Creative or hybrid presentation formats

One or more of the following elements are strongly encouraged in the special session proposals:

- Substantial industry or government engagement
- Industrial application oriented
- Regionally oriented topics
- Collaborative cross-disciplinary topics or teams
- Innovative, industry-engaging formats

Factors considered as less attractive to the audience are:

- Non-emerging topics
- Academic lectures
- Repetition of previous ECCE teams and topics
- Products-specific promotion

All special session proposals must be submitted through the web portal at www.ieee-ecce.org/2025/call-for-special-sessions. Submissions must follow posted guidelines and will be reviewed by a panel of subject matter experts.

Potential topic areas include but are not limited to:

Advanced Technologies in Defense and Aerospace
- Electric ship propulsion
- Radar and laser power systems
- Directed energy weapons
- Submarine integrated power system (SIP)
- Drone and UAV
- Maritime electric reliability, quality, and suppression

Transportation
- All-electric aircraft and E-VTOL
- Safety-centric design for autonomous technology
- Grid and wireless charging
- Battery management and protection

Automation, AI, and Robotics
- Advances in power electronics and drives for automation.
- Electronic and drive fault, safety, and quality inspection.
- Battery systems technology for robotics

Manufacturing Processes
- Electric furnace smelting
- Arc welding and electric discharge machining
- Hydrogen generation (electrolyzers, fuel cells)

Infrastructure
- Renewable energy integration
- Smart grids, microgrids, and nanogrids
- Energy conversion for information technology
- Cybersecurity in critical infrastructure

Component, Converter, and Subsystems
- Ultra wide-bandgap (U-WBG) semiconductor development
- Power semiconductor devices, magnetics, capacitances
- Electric machines and drives
- Packaging, integration, and advanced manufacturing

Design
- EMI and EMC
- High voltage power conversion, including insulation systems
- Reliability, diagnostics, prognostics, and health management
- Thermal management and advanced cooling technologies
- Design automation using machine learning

Others
- Standards development
- Education and career development
- Entrepreneurship, technology transfer, and business management
- Online education technology innovations

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ECCE 2025

IEEE ENERGY CONVERSION CONGRESS & EXPO PHILADELPHIA, PA, USA OCT. 19-23

SAVE THE DATE

October 19-23, 2025

Philadelphia
PENNSYLVANIA **USA**

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IMPORTANT DATES

June 15th, 2025
Online Form Submission

July 6th, 2025
Author Notification

IEEE ENERGY CONVERSION CONGRESS & EXPO 2025 PHILADELPHIA, PA, USA OCT. 19-23

CALL for POST-JOURNAL PRESENTATIONS

The Seventeenth Annual IEEE Energy Conversion Congress and Exposition (ECCE 2025) will be held in Philadelphia, Pennsylvania, USA, from October 19 to October 23, 2025.

Post-Journal presentations, ***on any subject pertaining to the scope of ECCE 2025,*** are solicited from authors of 2024/2025 articles in the reference journals for the IEEE IAS and IEEE PELS, including:

- >> IEEE Transactions on Industry Applications
- >> IEEE Transactions on Power Electronics
- >> IEEE Journal of Emerging and Selected Topics in Power Electronics
- >> IEEE Open Journal of Industry Applications
- >> IEEE Open Journal of Power Electronics
- >> IEEE Transactions on Transportation Electrification

Authors of published journal articles will have an opportunity to present their work live to the ECCE audience. The journal authors will advocate their published ideas and draw attention to the participating journals.

This is **"presentation only"** as the ***published*** journal article will not be included in the published conference proceedings. The technical program committee reserves the right to select a limited number of submitted Post-Journal presentations based on factors such as journal eligibility, suitability to the conference and session topics, technical merits, among others.

Registration Requirement

Full registration for ECCE 2025 is required for post-journal presenter(s).

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