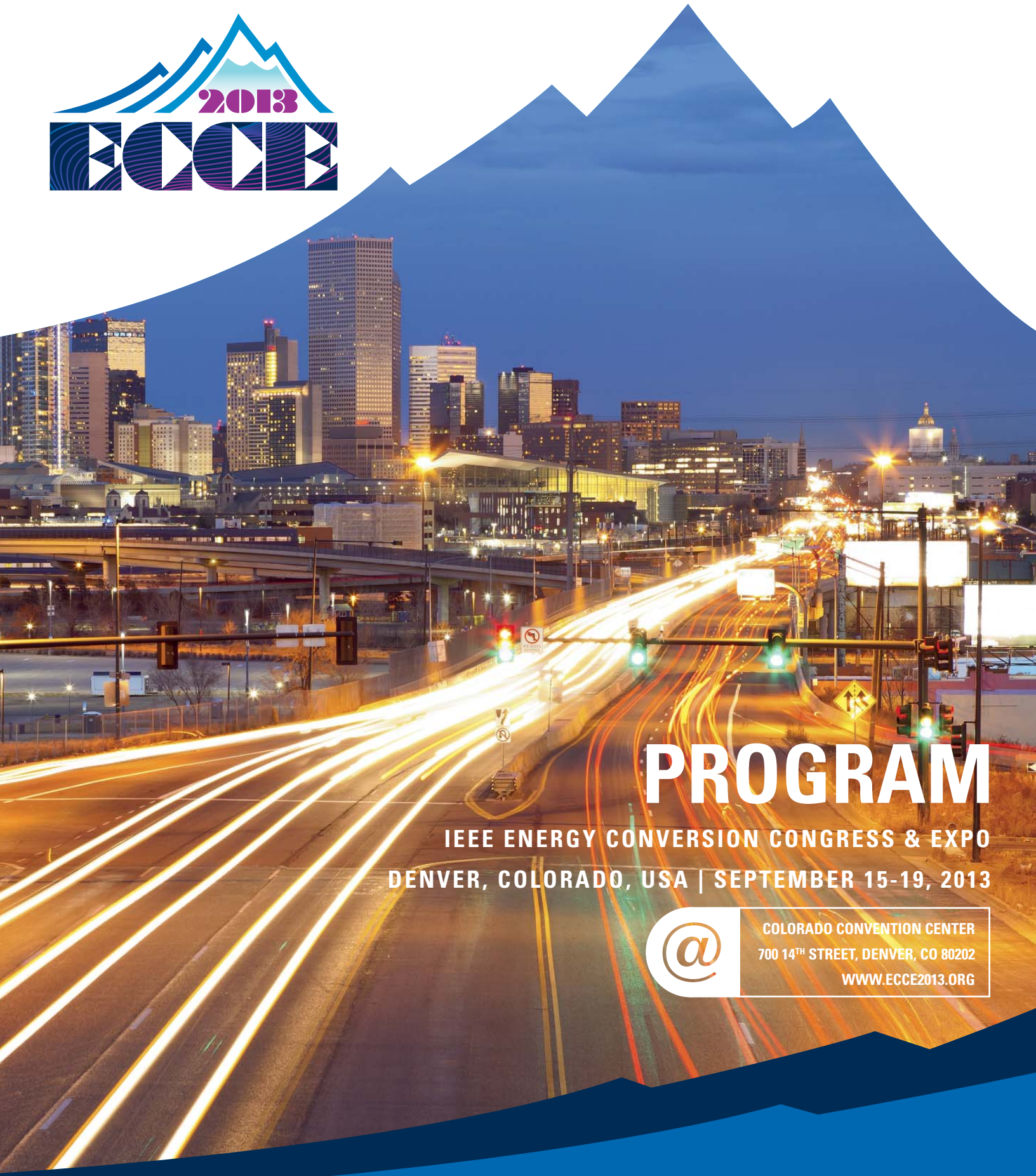

PROGRAM

IEEE ENERGY CONVERSION CONGRESS & EXPO

DENVER, COLORADO, USA | SEPTEMBER 15-19, 2013

@ COLORADO CONVENTION CENTER
700 14TH STREET, DENVER, CO 80202
WWW.ECCE2013.ORG

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IEEE Advancing Technology for Humanity

Dear friends and colleagues,

Welcome to Colorful Denver, Colorado and the Fifth Annual IEEE Energy Conversion Congress and Exhibition (ECCE 2013). The spectacular backdrop of the majestic Rockies combining with the pioneering ethic of the Colorado Front Range gives ECCE 2013 an unmatched energy and excitement, as the combination of the Wild West mindset mixing with the innovative spirit of the energy conversion community serves to uniquely define the ethos of this edition of the ECCE conference, an ethos that is exemplified by the number of renewable industry players that are located in this area, such entities as NREL, Molycorp, Vestas, SMA America, Unique Mobility, Xcel Energy, REpower USA, RES-Americas, Boulder Wind Power, Siemens Energy, Clipper Wind Power, One Globe Renewables, Sky Fuel, to name a few.

In addition, we are fortunate in hosting an auspicious landmark celebration: the 25th anniversary of the founding of the **Power Electronics Society**, one of the co-sponsor societies of the ECCE. Please keep an eye out for the special celebration of this event.

ECCE is also very happy to welcome SMMA — The Motor & Motion Association as an **Association Partner**. SMMA is the manufacturing trade association for the electric motor and motion control industries, consisting of more than 120 member companies include manufacturers, suppliers, users, consultants and universities. Many of you will recognize the SMMA from their outstanding work in their Motor and Motion College, the Permanent Magnet Division, and the Electric Motor Education and Research Foundation (EMERF). We believe that ECCE and SMMA can do great things together and we are extremely excited about the beginning of our partnership.

This year's conference serves to present energy conversion solutions to the community, these solutions come in the form of twelve practical and ambitious tutorials, distributed evenly amongst all the technical tracks covered by ECCE; it comes in the form of four stellar keynote speakers, each bring forth their fecund imagination and wide ranging perspectives; it comes in the form of a lively and exciting exhibition program, including the popular Industrial Seminars, student project presentations focused on the area of Emerging Technologies, a Student-Industry dinner to facilitate the passing on of knowledge and passion to the future engineers, and interspersed throughout the technical program: Special Topics sessions as well as Vendor and Products sessions to serve the immediate needs of the practicing engineer with the state of the art solutions; it comes in the form of an invigorated and energetic new format to a great traditional session: the Town Hall Meeting, replacing the Rap Session; and finally, it comes in the form of the expanded technical program, reflecting the talents and genius of our technical community: the oral and poster sessions.

As always, the technical sessions coalesce around two major thematic areas: those topics that are focused on broad Energy Conversion System solutions and those topics that are more specifically focused on the Components and Subsystems solutions. There are smart grids, appliances, and buildings sessions alongside power semiconductor devices sessions, renewable energy systems sessions alongside electric machine sessions, transportation application sessions alongside electric motor drive sessions, telecommunication system sessions alongside power converter sessions, energy harvesting sessions alongside component and sub-component packing sessions. Suffice it to say that the conference hall will be abuzz with the sounds of debates, discussions, and discourses.

We have taken advantage of the opportunity that our geographical location has provided and have planned two exciting tours that are unique to this area. One is to the world renowned National Renewable Energy Laboratory's (NREL) National Wind Technology Center while the second planned tour is to SMA America PV Inverter manufacturing facility. Both tours should be outstanding.

As you can see, the ECCE 2013 Dream Team is proud of this program and we hope that it meets your expectations and serves your needs.

My deepest gratitude to the ECCE 2013 organizing committee, the vice chairs and topic chairs of the technical programs committee and the members of the exhibits committee for the hard work and long hours that they have put in voluntarily. Thanks are also due to the officers of the two sponsoring societies, PELS and IAS, for their steadfast support of the conference. A very enthusiastic thank you to the Courtesy Associates team who has supported ECCE since its inception, their assistance has been invaluable.

Finally, I would like to express our gratitude to our sponsors: GE Global Research, Nexteer Automotive, OPAL-RT, Allegro MicroSystems, LLC, Ingersoll Rand, Powerex Inc., and our many other partners and exhibitors. Our mission would be impossible without your continued support.

Peter Wung
2013 General Chair

VISIT DENVER
The Convention & Visitors Bureau

Dear ECCE Energy Conversion Congress Attendees:

On behalf of VISIT DENVER and our more than 1,200 business members, I'd like to welcome you to the Mile High City! You couldn't have picked a more exciting time to visit. Denver is booming with new museums, restaurants, brewpubs and attractions. Walk along our mile-long 16th Street Mall, which is lined with 42 outdoor cafes. The electric buses on the Mall are free – hop on and hop off, they make everything easy to reach.

From the Denver Art Museum (designed by renowned architect Daniel Libeskind) to our new History Colorado Center, you'll find Denver is filled with attractions to explore. We have the nation's second largest performing arts center and six sports stadiums, for a record seven professional sports teams. Our B-cycle bike sharing program has more than 800 bikes available at 83 stations across the city, part of an 850-mile network of off-street bike trails.

And of course, we have outstanding shopping and dining opportunities, exciting nightlife and live music – and we brew more beer than any other city in America! After the meeting, the beauty, splendor and adventure of the Colorado Rocky Mountains are only minutes away. We hope you have a safe and productive stay in our city, and come back soon!

Richard W. Scharf
President & CEO

P.S. You can find everything you need to know about Denver at www.visitdenver.com.

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An Invitation to Celebrate PELS 25th Anniversary

Come to the ECCE Banquet at 7:00 p.m. on Wednesday night for a very special commemorative event!

Evening MC
Pete Wung — *General Chair*

Special Event MC
Prasad Enjeti — *25th Anniversary Chair*
Phil Krein — *25th Anniversary Co-Chair*

Featured Special Guests
Don Tan — *President*
John Kassakian — *First President*
Trey Burns — *Council President*
Tom Wilson, Sr. — *Past President*

25th Anniversary Committee Members
Don Tan, Prasad Enjeti, Phil Krein, Katherine Kim, Uday Deshpande, Alireza Khaligh, and Donna Florek

pels

Celebrating 25 Years 1988 - 2013
IEEE POWER ELECTRONICS SOCIETY

IEEE

Celebrating a quarter century of success! Toast to an even brighter quarter century!

Sunday, September 15

7:00 am – 7:00 pm	Registration	*Lobby A*

Tutorials Group 1 • 8:00 am – 12:00 pm

103/105	104/106	108	107/109	110/112	111/113
T1-1: Stability of Power Conversion Systems	T1-2: Advanced Power Semiconductors: Art of Control, From Theory to Practice	T1-3: Model Predictive Control of Industrial Drives	T1-4: Testing and Diagnostics of Induction Machines in an Industrial Environment	T1-5: Switched Reluctance Machines: Design and Control	T1-6: Dynamic Modeling of Renewable Energy Generator and Power Plant

12:00 pm – 1:00 pm	Lunch on Own	

Tutorials Group 2 • 1:00 pm – 5:00 pm

103/105	104/106	108	107/109	110/112	111/113
T2-1: Matrix Converters: Implementation and Industrial Applications	T2-2: Characteristics and Application of IGBT Power Modules	T2-3: Power Electronics Solutions for Electric and Plug-in Hybrid Electric Vehicle Battery Charging and Energy Management	T2-4: The Role of Thermal Simulation in Electric Machine Optimization	T2-5: Permanent Magnet Fundamentals	T2-6: Photovoltaic Panels: Technology, Modeling and Characterisation

4:00 pm – 5:00 pm	Newcomers Session	*210/212*
5:00 pm – 7:00 pm	Opening Reception	*Mile High Prefunction*

Monday, September 16

7:00 am – 7:00 pm	Registration	*Lobby A*
8:00 am – 10:00 am	Plenary Session	*Mile High Ballroom*
10:00 am – 10:20 am	AM Break	*Lobby A*

Oral Sessions • 10:20 am – 12:00 pm

102	104/106	107/109	108	110/112	111/113	201	203	205	207	210/212
S1: Marine and Aerospace Systems	S2: Renewable Energy Storage	S3: Operation and Control of DC-grids	S4: Modulation of Multilevel Converters	S5: Converter Modeling and Control I	S6: DC-DC Isolated I	SS1: Products and Service Session I	S7: Drive Control Topics in Transportation Applications	S8: Grid Integration of Wind Energy	S9: Induction Machines	S10: Power Electronic Modules I

12:00 pm – 1:30 pm	Lunch on Own	

Oral Sessions • 1:30 pm – 3:35 pm

102	104/106	107/109	108	110/112	111/113	201	203	205	207	210/212
S11: Battery and Battery Management	S12: Wave Energy Technology	S13: Modular Topologies for Solid-state Transformers	S14: Control of Multilevel Converters I	S15: Stability and Power Quality	S16: DC-DC Non-isolated I	SS2: Products and Service Session II	S17: High Frequency Injection Sensorless Control	S18: Grid Integration of Solar PV	S19: IPM Machines for Electric Vehicles	S20: Magnetic Materials and Design

4:00 pm – 6:30 pm	Exhibit Hall Open	*Exhibit Hall A*
4:00 pm – 6:30 pm	Expo Reception *Supported by OPAL RT*	*Exhibit Hall A*
4:00 pm – 6:30 pm	Student Demonstrations	*Exhibit Hall A*
5:00 pm – 6:30 pm	Poster Session I	*Exhibit Hall A*
7:00 pm – 9:30 pm	Industry Student Dinner *Supported by GE Global Research and Nexteer Automotive*	*Mile High Prefunction*

Tuesday, September 17

7:00 am – 6:00 pm	Registration	*Lobby A*

Oral Sessions • 8:00 am – 9:40 am

102	104/106	107/109	108	110/112	111/113	201	203	205	207	210/212
S21: Electric Drivetrain	S22: Energy Storage and PF Control	S23: Design and Active Damping of Filters for Grid Converters	S24: Converter Modeling and Control II	S25: 3-phase Inverters	S26: DC-DC Non-isolated II	S27: High Power Drives	S28: Control Issues in Permanent Magnet Motor Drives	S29: Wind Energy Systems	S30: SR Machines	S31: Wide Bandgap Semi-conductors I

9:00 am – 6:00 pm	Exhibit Hall Open	*Exhibit Hall A*
9:40 am – 10:00 am	AM Break	*Exhibit Hall A*
10:00 am – 11:30 am	Poster Session II	*Exhibit Hall A*
11:30 am – 12:00 pm	Ford Motor Company Industrial Seminar	*Exhibit Hall Stage*
12:00 pm – 2:00 pm	Lunch	*Exhibit Hall A*
2:00 pm – 2:30 pm	OPAL RT Industrial Seminar	*Exhibit Hall Stage*
2:30 pm – 3:00 pm	Powerex, Inc. Industrial Seminar	*Exhibit Hall Stage*
3:00 pm – 3:30 pm	Allegro MicroSystems, LLC Industrial Seminar	*Exhibit Hall Stage*
3:30 pm – 5:00 pm	Poster Session III	*Exhibit Hall A*
4:15 pm – 4:30 pm	PM Break	*Exhibit Hall A*
5:00 pm – 5:30 pm	Ingersoll Rand Industrial Seminar	*Exhibit Hall Stage*
5:30 pm – 6:00 pm	Littelfuse Industrial Seminar	*Exhibit Hall Stage*

Tuesday, September 17 *(Continued)*

Townhall Meetings • 7:30 pm – 9:00 pm

110/112	107/109
Renewable Energy Technologies	Emerging Converter Design Technologies

Wednesday, September 18

7:00 am – 7:00 pm Registration ..... *Lobby A*

Oral Sessions • 8:00 am – 9:40 am

102	103/105	104/106	107/109	108	110/112	111/113	201	203	205	207	210/212
SS3: Advances in Wireless Power for Electric Vehicles I	S32: Control of Multilevel Converters II	S33: PV Generation I	S34: Microgrids	S35: Converter Modeling and Control III	S36: Power Converters for Transportation Applications I	S37: Power Converters for Utility Applications I	S38: Fault Detection and Fault Tolerant Drives	S39: Predictive Control of Drives	S40: Non-conventional Electric Machines	S41: IPM Machines I	S42: Power Electronic Modules II

9:40 am – 10:00 am AM Break ..... *Lobby A*

Oral Sessions • 10:00 am – 11:40 am

102	103/105	104/106	107/109	108	110/112	111/113	201	203	205	207	210/212
SS4: Advances in Wireless Power for Electric Vehicles II	S43: Multilevel Converter Topologies	S44: PV Generation II	S45: Microgrids Systems	S46: Converter Modeling and Control IV	S47: Power Converters for Transportation Applications II	S48: Power Converters for Utility Applications II	S49: Current Regulation in Drives	S50: High Power Drives and Multilevel Power Converters	S51: Thermal Analysis of Electric Machines	S52: PM Machines	S53: Wide Bandgap Semi-conductors II

11:40 am – 1:30 pm Lunch on Own

Oral Sessions • 1:30 pm – 3:10 pm

102	103/105	104/106	107/109	108	110/112	111/113	201	203	205	207	210/212
S54: Charging Systems	SS5: Recent Advances in Switched Capacitor Circuits I	S55: PV Generation III	S56: Microgrid Control	S57: Converters EMI	S58: Power Converters for Renewable Energy Applications I	S59: Multilevel Converters I	S60: Hardware-in-the-loop, Simulation, and Hardware Issues	S61: Direct Torque Control	S62: DC-DC Non-isolated III	S63: Synchronous Reluctance Machines	S64: Passive Components

3:10 pm – 3:30 pm PM Break ..... *Lobby A*

Oral Sessions • 3:30 pm – 5:10 pm

102	103/105	104/106	107/109	108	110/112	111/113	201	203	205	207	210/212
S65: Special Power Converters in Transportation	SS6: Recent Advances in Switched Capacitor Circuits II	S66: PV Converters	S67: Control Under Unbalanced Grid Conditions	S68: AC-DC Multi-phase I	S69: Power Converters for Renewable Energy Applications II	S70: Resonant DC-DC	S71: Control Issues in Electric Drives	S72: Assorted Issues in Electric Drives	S73: Modeling and Control V	S74: Magnetic Gears	S75: Thermal Management

7:00 pm – 9:00 pm ECCE Banquet ..... *Mile High Ballroom*

Thursday, September 19

7:00 am – 3:00 pm Registration ..... *Lobby A*

Oral Sessions • 8:00 am – 9:40 am

102	103/105	104/106	107/109	108	110/112	111/113	201	203	205	207	210/212
S76: Wireless Power Transfer I	S77: Power Quality	S78: Wind Energy: DFIG Control and Operation	S79: Distributed Generation I	S80: DC-DC Isolated II	S81: AC-AC Converters	S82: Power Converters for Photovoltaics	S83: Maximum Power Point Tracking I	S84: Power Converters for Electric Drives	S85: Magnetic Bearings and Bearlingless Machines	S86: Diagnostics and Fault Analysis of Electric Machines I	S87: Converter-level Power Electronic Device Integration

9:40 am – 10:00 am AM Break ..... *Lobby A*

Oral Sessions • 10:00 am – 11:40 am

102	103/105	104/106	107/109	108	110/112	111/113	201	203	205	207	210/212
S88: Wireless Power Transfer II	S89: HVDC and FACTS	S90: Wind Farm Connection	S91: Distributed Generation II	S92: Converter Applications	S93: Matrix Converters	S94: Single Phase DC to AC Inverters I	S95: Maximum Power Point Tracking II	S96: Drive Topologies and Packaging for HEVs	S97: Noise and Vibration in Electric Machines	S98: IPM Machines II	S99: Power Electronic Modules III

12:00 pm – 1:30 pm Awards Lunch ..... *Mile High Ballroom*

Oral Sessions • 1:30 pm – 3:10 pm

102	103/105	104/106	107/109	108	110/112	111/113	201	203	205	207	210/212
S100: Wireless Power Transfer III	S101: Grid Connected Converters I	S102: Wind Energy Converters	S103: Distributed Generation III	S104: AC-DC Multi-phase II	S105: Multilevel Converters II	S106: Single Phase DC to AC Inverters II	S107: Lighting Technologies I	S108: Energy Efficient Motor Drives	S109: Losses in Electrical Machines	S110: Axial Flux Machines	S111: Wide Bandgap Semi-conductors III

3:20 pm – 3:40 pm PM Break ..... *Lobby A*

Oral Sessions • 3:30 pm – 5:10 pm

102	103/105	104/106	107/109	108	110/112	111/113	201	203	205	207	210/212
S112: Wireless Power Transfer IV	S113: Grid Connected Converters II	S114: Wind Energy Technologies	S115: AC-DC Multi-phase III	S116: Modular Multilevel Converters	S117: Single Phase AC-DC	S118: Single Phase DC to AC Inverters III	S119: Lighting Technologies II	S120: Model-based Sensorless Control	S121: High Frequency Effects in Electric Machines	S122: Diagnostics and Fault Analysis of Electric Machines II	S123: Gallium Nitride Devices

Sunday, September 15

7:00 am – 7:00 pm	Registration ..... *Lobby A*

Tutorials Group 1 • 8:00 am – 12:00 pm

Room: 103/105	Room: 104/106	Room: 108	Room: 107/109	Room: 110/112	Room: 111/113
T1-1: Stability of Power Conversion Systems	T1-2: Advanced Power Semiconductors: Art of Control, From Theory to Practice	T1-3: Model Predictive Control of Industrial Drives	T1-4: Testing and Diagnostics of Induction Machines in an Industrial Environment	T1-5: Switched Reluctance Machines: Design and Control	T1-6: Dynamic Modeling of Renewable Energy Generator and Power Plant

12:00 pm – 1:00 pm	Lunch on Own

Tutorials Group 2 • 1:00 pm – 5:00 pm

Room: 103/105	Room: 104/106	Room: 108	Room: 107/109	Room: 110/112	Room: 111/113
T2-1: Matrix Converters: Implementation and Industrial Applications	T2-2: Characteristics and Application of IGBT Power Modules	T2-3: Power Electronics Solutions for Electric and Plug-in Hybrid Electric Vehicle Battery Charging and Energy Management	T2-4: The Role of Thermal Simulation in Electric Machine Optimization	T2-5: Permanent Magnet Fundamentals	T2-6: Photovoltaic Panels: Technology, Modeling and Characterisation

4:00 pm – 5:00 pm	Newcomers Session ..... *Room: 210/212*
5:00 pm – 7:00 pm	Opening Reception ..... *Mile High Prefunction*

Monday, September 16

7:00 am – 7:00 pm	Registration ..... *Lobby A*
8:00 am – 10:00 am	Plenary Session ..... *Mile High Ballroom*
10:00 am – 10:20 am	AM Break ..... *Lobby A*

Oral Sessions • 10:20 am – 12:00 pm

	Room: 102	Room: 104/106	Room: 107/109	Room: 108	Room: 110/112	Room: 111/113	Room: 201	Room: 203	Room: 205	Room: 207	Room: 210/212
	S1: Marine and Aerospace systems	S2: Renewable Energy Storage	S3: Operation and Control of DC-grids	S4: Modulation of Multilevel Converters	S5: Converter Modeling and Control I	S6: DC-DC Isolated I	SS1: Products and Service Session I	S7: Drive Control Topics in Transportation Applications	S8: Grid Integration of Wind Energy	S9: *Jimmie J. Cathey Memorial Session:* Induction machines	S10: Power Electronic Modules I
10:20 am – 10:45 am	Performance Evaluation on 3-phase Buck-type PWM Rectifiers with Integrated and Symmetrical Boost Converter Using SIC Mosfetsfor Aircraft Applications	New Control Strategy for Bidirectional LLC Resonant Converter in Energy Storage Systems	A Generalized Voltage Droop Strategy for Control of Multi-terminal DC grids	Space Vector Modulation for Cascaded Asymmetrical Multilevel Converters Under Fault Conditions	V2 Control with Capacitor Current Ramp Compensation using Lossless Capacitor Current Sensing	Piezoelectric Transformer-based DC-DC Converter with improved Burst-mode Control	Dy-free Rare Earth Magnets	An Accurate Torque Control of Permanent Magnet Brushless Motor using Low-resolution Hall-effect Sensors for Light Electric Vehicle Applications	Medium Voltage Inverter to Establish Grid Interface and Provide Ancillary Support for DC Distributed Wind Farms	Efficiency Determination of Converter-fed Induction Motors: Waiting for the IEC 60034-2-3 Standard	Characterization of 4.5 kV/2.4 kA Press Pack IGBT Including Comparison with IGCT
10:45 am – 11:10 am	Medium Voltage Current Source Converter Drives for Marine Propulsion System using a Dual-winding Synchronous Machine	Experimental Verification of Flywheel Power Leveling System Oriented to Low Cost and General Purpose Use	Optimization with System Damping Restoration for Droop Controlled DC-DC Converters	Phase-shifted Pulse-width-amplitude Modulation for Quasi-Z-source Cascade Multilevel Inverter Applied to PV Power Systems	State-Machine Realization of Second-order Sliding-mode Control for Synchronous Buck DC-DC Converters	Cycle-by-cycle Average Input Current Sensing Method for LLC Resonant Topologies	ASIC Based Current Transducers	Dynamic DC-link Voltage Adaptation for Thermal Management of Traction Drives	Resonance Issues and Active Damping in HVAC Grid-connected Offshore Wind Farm	A Grid-connected Induction Machine Capable of Operation at Unity and Leading Power Factor	A Novel IGBT package to reduce current imbalance with pinfin baseplate

Monday, September 16 *(Continued)*

	Oral Sessions • 10:20 am – 12:00 pm *(Continued)*										
	Room: 102	**Room: 104/106**	**Room: 107/109**	**Room: 108**	**Room: 110/112**	**Room: 111/113**	**Room: 201**	**Room: 203**	**Room: 205**	**Room: 207**	**Room: 210/212**
	S1: Marine and Aerospace systems	**S2: Renewable Energy Storage**	**S3: Operation and Control of DC-grids**	**S4: Modulation of Multilevel Converters**	**S5: Converter Modeling and Control I**	**S6: DC-DC Isolated I**	**SS1: Products and Service Session I**	**S7: Drive Control Topics in Transportation Applications**	**S8: Grid Integration of Wind Energy**	**S9:** *Jimmie J. Cathey Memorial Session:* **Induction machines**	**S10: Power Electronic Modules I**
11:10 am – 11:35 am	Consideration of Active-front-end Rectifier for Electric Propulsion Navy Ship	Quantitative and Qualitative Evaluation of Flexible Distribution of Energy and Storage Resources	Design and Verification of Smart and Scalable DC Microgrids for Emerging Regions	Optimization of the Pulse-width-modulation Strategy for Redundant and Non-redundant Multi-level Cascaded-cell Converters	Ripple Minimization in Asymmetric Multiphase Interleaved DC-DC Switching Converters	Design of an Interleaved Isolated Boost Converter with Coupled Inductors for High Step-up Applications	450MVA GCT-STATCOM for Stability Improvement and Over-voltage Suppression	Suppression Method of Rising DC Voltage for the halt sequence of an inverter in the motor regeneration	Hybrid Control Strategy for a Doubly Fed Induction Generator in Medium Voltage Wind Power System under Unbalanced Grid Conditions	Analysis of Pulsating Torque in Squirrel Cage Induction Machines by Investigating Stator Slot and Rotor Bar Dimensions for Traction Applications	Device Characterization and Performance of 1200V/45A SiC JFET
11:35 am – 12:00 pm	Time-Delay Effects in a HIL Aircraft Power System Emulator	Determination of the Optimal Capacity Based on a Life Time Cost Function in Wind Farm	Using Apparent Resistance for Fault Discrimination in Multi-terminal DC Systems	Modeling and Voltage Balancing Method for Modular Multilevel Converter	Bang-Bang Charge Control for LLC Resonant Converters	A Series-input Forward Converter with Shared RCD Cell for High-reliability and Wide Input Voltage Range Applications	Overview of a Family Power Stack Development Process	Impact of Position Sensor Accuracy on the Performance of IPM Drives	Analysis, Design, and Implementation of Multi-function Interfaced Inverters for Distributed Generation	Finite Element Analysis of End Ring Impedance in Squirrel Cage Induction Machines	Simple Spice Based Modeling Platform for 4.5 kV Power IGBT Modules
12:00 pm – 1:30 pm	**Lunch on Own**										
	Oral Sessions • 1:30 pm – 3:35 pm										
	Room: 102	**Room: 104/106**	**Room: 107/109**	**Room: 108**	**Room: 110/112**	**Room: 111/113**	**Room: 201**	**Room: 203**	**Room: 205**	**Room: 207**	**Room: 210/212**
	S11: Battery and Battery Management	**S12: Wave Energy Technology**	**S13: Modular Topologies for Solid-state Transformers**	**S14: Control of Multilevel Converters I**	**S15: Stability and Power Quality**	**S16: DC-DC Non-isolated I**	**SS2: Products and Service Session II**	**S17:** *Alfio Consoli Memorial Session:* **High Frequency Injection Sensorless Control**	**S18: Grid Integration of Solar PV**	**S19: IPM Machines for Electric Vehicles**	**S20: Magnetic Materials and design**
1:30 pm – 1:55 pm	Cell Balancing Control Using Adjusted Filters in Flyback Converter with Single Switch	Adaptive Damping Power Take-off Control for a Three-body Wave Energy Converter	Optimum Number of Cascaded Cells for High-power Medium-voltage Multilevel Converters	Analysis and Operation of Modular Multilevel Converters with Phase-shifted Carrier PWM	Optimization of LCL Filter based on THD Estimation Model	Buck derived converters based on gallium nitride devices for Envelope Tracking applications	Transfer Molded IGBT for Hybrid Vehicle with Improved Cycling Durability	Sensorless Control of Doubly-fed Induction Generators Based on Stator High Frequency Signal Injection	Model Predictive Control of Grid-connected Inverters for PV Systems with Flexible Power Regulation and Switching Frequency Reduction	A Comparison of IPM Traction Machines with Different PM Materials	Measured Performance and Micro-fabrication of Racetrack Power Inductors
1:55 pm – 2:20 pm	Online SOC and SOH Estimation for Multicell Lithium-ion Batteries Based on an Adaptive Hybrid Battery Model and Sliding-mode Observer	Modeling of a Two-body Wave Energy Converter Driven by Spectral JONSWAP Waves	A Modular Multilevel Converter-based Power Electronic Transformer	Decoupled Control of an 3-phase to 3-phase Modular Multilevel Converter	Stability Issues of Z+Z or Y+Y Type Cascade System	Switching Performance Comparison of the SiC JFET and the SiC JFET/ Si MOSFET Cascode Configuration	Standard Packages and Features for DIP-IPMs in Small Motor Drive Applications	Arbitrary Injection for Permanent Magnet Synchronous Machines with Multiple Saliencies	A Single-stage Buck-Boost Three-level Neutral-point-clamped Inverter for the Grid-tied Photovoltaic Power Generation	Advanced High Power-Density Interior Permanent Magnet Motor for Traction Applications	Laminated Low Temperature Co-fired Ceramic Ferrite Materials and the Applications for High Current POL Converters

Monday, September 16 *(Continued)*

Oral Sessions • 1:30 pm – 3:35 pm *(Continued)*

	Room: 102	Room: 104/106	Room: 107/109	Room: 108	Room: 110/112	Room: 111/113	Room: 201	Room: 203	Room: 205	Room: 207	Room: 210/212
	S11: Battery and Battery Management	**S12: Wave Energy Technology**	**S13: Modular Topologies for Solid-state Transformers**	**S14: Control of Multilevel Converters I**	**S15: Stability and Power Quality**	**S16: DC-DC Non-isolated I**	**SS2: Products and Service Session II**	**S17:** *Alfio Consoli Memorial Session:* **High Frequency Injection Sensorless Control**	**S18: Grid Integration of Solar PV**	**S19: IPM Machines for Electric Vehicles**	**S20: Magnetic Materials and design**
2:20 pm – 2:45 pm	Design Considerations for Hybrid Battery/ Supercapactior Systems for Pulsed Power	Experimental Testing and Model Validation for Ocean Wave Energy Harvesting Buoys	A Cost Effective Power Sharing Strategy for a Cascaded Multilevel Converter Based Solid State Transformer	Experimental Verification of Direct Dead-time Control and DC-link Neutral-point Balancing of a Three Level Neutral-point-clamped (3L-NPC) VSC	Modified Norm Type Stability Criterion for Cascade AC System	Impact of Parasitic Elements on the Spurious Triggering Pulse in Synchronous Buck Converter	Cree All-SiC Power Modules Enables Higher Performance Power Conversion Solutions at a Lower System Cost than State-of-the-art Si IGBT Modules	A Pulse Injection Based Sensorless Position Estimation Method for a Switched Reluctance Machine over a Wide Speed Range	Mitigating Variability of High Penetration Photovoltaic Systems in a Community Smart Microgrid using Non-flat Photovoltaic Modules	Efficiency Contours and Loss Minimization over a Driving Cycle of a Variable-flux Flux-intensifying Interior Permanent Magnet Machine	Complex Permeability Measurements of Radial-anisotropy Thin-film Magnetic Toroidal Cores
2:45 pm – 3:10 pm	On-line Adaptive Tuning of a Lithium-ion Battery Cell State of Charge Observer	Power Converter and Control System Developed in the Ocean Sentinel Instrumentation Buoy for Testing Wave Energy Converters	Review of Modular Power Converters Solutions for Smart Transformer in Distribution System	Capacitor Balance in a Five-level Based Half-bridge Converter by Use of a Mixed Active-cell	Stability Analysis of Damping Control to Suppress Filter Resonance in Multi-modular Matrix Converter	High Frequency Synchronous Buck Converter using GaN-on-SiC HEMTs	All SiC Power Module with Advanced Structure and its Solar Inverter Application	Initial Rotor Position Detection for Delta-connected Synchronous Reluctance Motor	Grid Impacts and Mitigation Measures for Increased PV Penetration Levels using Advanced PV Inverter Regulation	Design and Analysis of IPM Machine with Bar Wound Fractional Slot Distributed Winding for Automotive Traction Application	CCTT-core Split-winding Integrated Magnetic Interleaved Boost Converter for Renewable Energy Applications
3:10 pm – 3:35 pm	Effects of Pulse and DC Charging on Lithium Iron Phosphate ($LiFePO_4$) Batteries	Medium-voltage Power Converter Interface for Wave Dragon Wave Energy Conversion System	Power Flow Analysis for 3-port 3-phase Dual Active Bridge DC-DC Converter and Design Validation Using High Frequency Planar Transformer	Current Control of a Phase-Shifted-PWM STATCOM Using the Modular Multilevel Cascade Converter Based on Single-star Bridge-cells (MMCC-SSBC)	A Hybrid Damping Method for LLCL-filter Based Grid-tied Inverter with a Digital Filter and an RC Parallel Passive Damper	Evaluation of the Lagrangian Method for Deriving Equivalent Circuits of Integrated Magnetic Components: A Case Study Using the Integrated Winding Coupled Inductor	Boost Inductors, Design for Cost and Loss Minimization	Low-speed Position Sensorless Drive for Highly Efficient Permanent Magnet Synchronous Motor without Rare-earth Metals	Controlling of Medium Voltage Power-factor of Photovoltaic Power Plants from the Low Voltage Side	Rotor Structure in 50 kW Spoke-type Interior Permanent Magnet Synchronous Motor with Ferrite Permanent Magnets for Automotive Applications	Leakage Inductance Calculation for Planar Transformers with a Magnetic Shunt

4:00 pm – 6:30 pm	**Exhibit Hall Open**	*Exhibit Hall A*
4:00 pm – 6:30 pm	**Expo Reception** *Supported by OPAL RT*	*Exhibit Hall A*
4:00 pm – 6:30 pm	**Student Demonstrations**	*Exhibit Hall A*
5:00 pm – 6:30 pm	**Poster Session I**	*Exhibit Hall A*
7:00 pm – 9:30 pm	**Industry Student Dinner** *Supported by GE Global Research and Nexteer Automotive*	*Mile High Prefunction*

Tuesday, September 17

7:00 am – 6:00 pm	**Registration** ..... *Lobby A*										
	Oral Sessions • 8:00 am – 9:40 am										
	Room: 102	**Room: 104/106**	**Room: 107/109**	**Room: 108**	**Room: 110/112**	**Room: 111/113**	**Room: 201**	**Room: 203**	**Room: 205**	**Room: 207**	**Room: 210/212**
	S21: Electric Drivetrain	**S22: Energy Storage and PF Control**	**S23: Design and Active Damping of Filters for Grid Converters**	**S24: Converter Modeling and Control II**	**S25: 3-phase Inverters**	**S26: DC-DC Non-isolated II**	**S27: High Power Drives**	**S28: Control Issues in Permanent Magnet Motor Drives**	**S29: Wind Energy Systems**	**S30: SR Machines**	**S31: Wide Bandgap Semiconductors I**
8:00 am – 8:25 am	Engine-generator Sizing for Re-engineering an Electric Vehicle into an Extended Range Electric Vehicle	Capacity Fade Estimation in Electric Vehicles Lithium-ion Batteries using Artificial Neural Networks	Discrete-time Optimal Active Damping of LCL Resonance in Grid Connected Converters by Proportional Capacitor Current Feedback	Passive Cancellation in a Flyback for Effective CM Reduction	Harmonic Elimination by Adaptive Phase-shift Optimization in Interleaved Converters	Novel High Voltage Conversion Ratio "Rainstick" DC-DC Converters	Design Challenges of Industrial High-power Converters with Low Pulse-ratios	High Frequency Injection-based Stator Flux Linkage and Torque Estimation for DB-DTFC Implementation on IPMSMs Considering Cross-saturation Effects	Gearbox and Drivetrain Models to Study Dynamic Effects of Modern Wind Turbines	Comparison of Low-cost Wound-field Switched-flux Machines	Modeling of a 1200 V 6 A SiC Bipolar Junction Transistor
8:25 am – 8:50 am	Reluctance Synchronous and Field Intensified-PM Motors for Variable-gear Electric Vehicle Drives	Improved Performance of a DC-DC Converter for Supercapacitor Energy Storage System	Design of the LCL+Trap Filter for the Two-level VSC Installed in a Large-scale Wave Power Plant	SLR Converter Design for Multi-cell Battery Charging	Pulse Width Modulation of Three Phase Switched Boost Inverter	A Hybrid Interleaved/ Switched-capacitor Boost Converter	Performance Investigation of Hybrid Converter Systems for Mobile Mining Applications	Variable Flux Machine Torque Estimation and pulsating Torque Mitigation During Magnetization State Manipulation	Design Specifications and Optimisation of a Directly Grid-connected PM Wind Generator	Adaptive Flux Weakening Control of Switched Reluctance Machines in Rotating Reference Frame	Real Field Mission Profile Oriented Design of a SiC-based PV-inverter Application
8:50 am – 9:15 am	Off-vehicle Evaluation of Active Oscillation Damping Schemes	Accelerated Lifetime Testing Methodology for Lifetime Estimation of Lithium-ion Batteries Used in Augmented Wind Power Plants	LC Filter Design for On-grid and Off-grid Distributed Generating Units	A Stepping On-time Adjustment Method for Interleaving Three-channel Critical Mode Boost PFC Converter	Dead Time Compensation Method Based on Current Ripple Estimation	Multiple Conversion Ratio Resonant Switched-capacitor Converter with Active Zero Current Detection	Test-Bench for Very High Power Variable Frequency Drives Working under Constrained Grid Conditions	Comprehensive PM Motor Controller Design for Electrically Assisted Turbo-charger Systems	Simulation Tool to Assess Mechanical and Electrical Stresses on Wind Turbine Generators	Finite Element Based Analytical Model for Controller Development of Switched Reluctance Machines	Guidelines for Developing Power Stage Layouts using Normally-off SiC JFETs Based on Parasitic Analysis
9:15 am – 9:40 am	Economic Influence of Prolonging Fuel Cell Stack Lifetime of Fuel Cell Hybrid Vehicles Based on Optimal Control Theory	Rapid Bidirectional Power Flow of Supercapacitor Energy Storage Systems through Grid-tied Inverters for Improved Renewables Integration	Robust Capacitor-current-feedback Active Damping for the LCL-type Grid-connected Inverter	Symmetrical Tuning for Resonant Controllers in Inverter based Micro-grid Applications	Active Power Control for Minimum Switching of 3-phase Electrolytic Capacitor-less PWM Converter	The DCM Stability Issue of Voltage Regulators Using a Current-mode Constant On-time Controller Control	Common-mode Voltage Reduction for Medium-voltage Current Source Converters by Optimizing Switching Sequences	Extended MTPA with Cross Coupling Inductances for Electrically Excited Synchronous Motors	A New Modular Flux-switching Permanent Magnet Drive for Large Wind Turbines	Design Considerations of Switched Reluctance Motors with Bipolar Excitation for Low Torque Ripple Applications	Comparative Performance Evaluation of SiC Power Devices for High Temperature and High Frequency Matrix Converter
9:00 am – 6:00 pm	**Exhibit Hall Open** ..... *Exhibit Hall A*										
9:40 am – 10:00 am	**AM Break** ..... *Exhibit Hall A*										
10:00 am – 11:30 am	**Poster Session II** ..... *Exhibit Hall A*										
11:30 am – 12:00 pm	**Ford Motor Company Industrial Seminar** ..... *Exhibit Hall Stage*										
12:00 pm – 2:00 pm	**Lunch** ..... *Exhibit Hall A*										
2:00 pm – 2:30 pm	**OPAL RT Industrial Seminar** ..... *Exhibit Hall Stage*										
2:30 pm – 3:00 pm	**Powerex, Inc. Industrial Seminar** ..... *Exhibit Hall Stage*										
3:00 pm – 3:30 pm	**Allegro MicroSystems, LLC Industrial Seminar** ..... *Exhibit Hall Stage*										
3:30 pm – 5:00 pm	**Poster Session III** ..... *Exhibit Hall A*										

Tuesday, September 17 *(Continued)*

4:15 pm – 4:30 pm	PM Break ..... *Exhibit Hall A*
5:00 pm – 5:30 pm	Ingersoll Rand Industrial Seminar ..... *Exhibit Hall Stage*
5:30 pm – 6:00 pm	Littelfuse Industrial Seminar ..... *Exhibit Hall Stage*

Townhall Meetings • 7:30 pm – 9:00 pm

Room: 110/112	Room: 107/109
Renewable Energy Technologies	Emerging Converter Design Technologies

Wednesday, September 18

7:00 am – 7:00 pm — Registration ..... *Lobby A*

Oral Sessions • 8:00 am – 9:40 am

	Room: 102	Room: 103/105	Room: 104/106	Room: 107/109	Room: 108	Room: 110/112	Room: 111/113	Room: 201	Room: 203	Room: 205	Room: 207	Room: 210/212
	SS3: Advances in Wireless Power for Electric Vehicles I	S32: Control of Multilevel Converters II	S33: PV Generation I	S34: Microgrids	S35: Converter Modeling and Control III	S36: Power Converters for Transportation Applications I	S37: Power Converters for Utility Applications I	S38: Fault Detection and Fault Tolerant Drives	S39: Predictive Control of Drives	S40: Non-conventional Electric Machines	S41: IPM Machines I	S42: Power Electronic Modules II
8:00 am – 8:25 am	A Past, Present and Future Perspective on Wireless Power Transfer for Electric Vehicles	Repetitive Control Scheme for Circulating Current Suppression in Modular Multilevel Converters	Control of PV Generation Systems using a Synchronous Power Controller	Cost-Prioritized Droop Schemes for Autonomous Microgrids	Ineffectiveness of Orthogonal Axes Cross-coupling Decoupling Technique in Dual Sequence Current Control	Design of a High-efficiency 12V/1kW 3-phase BLDC Motor Drive System for Diesel Engine Emissions Reductions	Multi-mode Interleaved Boost Converter for Photovoltaic Power Systems with Low-voltage Ride-Through Capability	Ground Fault Location Identification for Multiple Drive High Resistance Grounding Systems	Multistep Direct Model Predictive Control for Power Electronics — Part 1: Algorithm	Analytical Stiffness Calculations of a Cone-shaped Magnetic Vibration Isolator for a Micro Balance	Brushless AC Interior-permanent Magnet Motor Design: A Comparison of Slot/Pole Combinations and Distributed vs. Concentrated Windings	High Frequency Integrated Point of Load (POL) Module with PCB Embedded Inductor Substrate
8:25 am – 8:50 am	The Development and Deployment of On-line Electric Vehicles (OLEV)	Average Power Balancing Control of a STATCOM based on the Cascaded H-bridge PWM Converter with Star Configuration	Minimum DC-link Capacitance Requirement of a Two-stage Photovoltaic Inverter	Implementing PCC Voltage Estimation Utilising Cascaded PI Controllers in the dq Rotating Reference Frame for Microgrid Inverter Control	Modeling and Controller Design for Series-connected Output Universal Link Converter	Design of A 2.5kW 400V/12V High-efficiency DC-DC Converter Using A Novel Synchronous Rectification Control for Electric Vehicles	Bidirectional Series AC-link Inverter	Post-Fault Operation of an Asymmetrical Six-phase Induction Machine with Single and Two Isolated Neutral Points	Multistep Direct Model Predictive Control for Power Electronics — Part 2: Analysis	Efficiency Improvement of a High Dynamic BLDC Linear Motor by Multiphase Control	Reduction of Rotor Losses in Multi Layer Interior Permanent Magnet Synchronous Motors by Introducing Novel Topology of Rotor Flux Barriers	Component Proximity Effects in High Density and High Switching Speed Power Converters
8:50 am – 9:15 am	A High Performance 50kW Inductive Charger for Electric Buses	Closed-Loop Current Control of Multilevel Converters Formed by Parallel Complementary Unidirectional Phase-legs	Hot Spotting and Second Breakdown Effects on Reverse I-V Characteristics for Mono-crystalline Si Photovoltaics	Coordinated Power Control Strategy based on Primary-frequency-signaling for Islanded Microgrids	Modulated Model Predictive Control (M2PC) For A 3-phase Active Front-end	Centralized Control of Parallel Connected Power Conditioning System for Battery Energy Storage System in Charge-discharge-storage Power Station	Modeling and Analysis of a Micro-inverter Configuration for High Power Phosphoric Acid Fuel Cell Application	Fault Tolerant AC Multi-drive System	Predictive Torque Control for AC Drives: Improvement of Parametric Robustness using Two-degree-of-freedom Control	Design of a Novel Homopolar Bearingless Slice Motor with Reluctance Rotor	Analysis of Stator Iron Loss in Interior PM Machines under Open and Short-circuit Conditions	Parasitic Modeling for Accurate Inductive Switching Simulation of Converters using SiC Devices
9:15 am – 9:40 am	ORNL Developments in Stationary and Dynamic Wireless Charging	Implementation of a Single Space Vector Control Strategy for a Seven-level Inverter	PV Ground-fault Detection Using Spread Spectrum Time Domain Reflectometry (SSTDR)	Virtual Impedance Current Limiting for Inverters in Microgrids with Synchronous Generators	Repetitive Scheme Plugged-in Parallel with Deadbeat Controller for VFD Fed by Cascaded Multilevel Inverter	High-efficiency Soft-switching PWM DC-DC Converter for Electric Vehicle Battery Chargers	Smart High Voltage Circuit Breaker in Overhead Power Lines for Smart Grid Applications	Short-circuit Fault-tolerant Control of Bearingless Permanent Magnet Slice Machine	Torque Ripple Reduction of Model Predictive Torque Control of Induction Motor Drives	Improvement of Torque Density of Variable Reluctance Vernier Machine for Hybrid Electric Vehicle	Rotor Saturation Impact in Synchronous Reluctance and PM Assisted Reluctance Motors	Detailed Derivation and Minimization of the Equivalent Parasitic Capacitance of a High Voltage Multiplier Based on the Complete Model

Wednesday, September 18 *(Continued)*

9:40 am – 10:00 am	**AM Break** ..... *Lobby A*											
	Oral Sessions • 10:00 am – 11:40 am											
	Room: 102	**Room: 103/105**	**Room: 104/106**	**Room: 107/109**	**Room: 108**	**Room: 110/112**	**Room: 111/113**	**Room: 201**	**Room: 203**	**Room: 205**	**Room: 207**	**Room: 210/212**
	SS4: Advances in Wireless Power for Electric Vehicles II	**S43: Multilevel Converter Topologies**	**S44: PV Generation II**	**S45: Microgrids Systems**	**S46: Converter Modeling and Control IV**	**S47: Power Converters for Transportation Applications II**	**S48: Power Converters for Utility Applications II**	**S49: Current Regulation in Drives**	**S50: High Power Drives and Multilevel Power Converters**	**S51: Thermal Analysis of Electric Machines**	**S52: PM Machines**	**S53: Wide Bandgap Semi-conductors II**
10:00 am – 10:25 am	Key Challenges in EV Wireless Charging	A Multilevel Converter Topology with Common Flying Capacitors	Leakage Current Suppression for PV Cascaded Multilevel Inverter Using GaN Devices	Reducing Fuel Consumption in a Forward Operating Base using an Energy Management System	Phase-oriented Control of a Modular 3-phase 3-level 4-leg Inverter AC Power Source Supplying Floating or Grounded Loads	Propulsion System Architecture and Power Conditioning Topologies for Fuel Cell Vehicles	A Power Efficiency Improvement Technique for A Bidirectional Dual Active Bridge DC-DC Converter at Light Load	Current Control Method with Control Inputs in Polar Coordinates for SPMSM Based on Linearized Model	A Speed-Sensorless Startup Method of an Induction Motor Driven by a Modular Multilevel Cascade Inverter (MMCI-DSCC)	Thermal Modelling of a Fractional-slot Concentrated-winding Kaman Type Axial-flux Permanent-magnet Machine	High Power Factor Vernier Permanent Magnet Machines	Active Current Balancing for Parallel-connected Silicon Carbide MOSFETs
10:25 am – 10:50 am	German Activities on Contactless Inductive Power Transfer	New Five-level Active Neutral Point Clamped Converter	Two-switch Voltage Equalizer Using Series-resonant Inverter and Voltage Multiplier for Partially-shaded Series-connected Photovoltaic Modules	An Accurate Autonomous Islanding Microgrid Reactive Power, Imbalance Power and Harmonic Power Sharing Scheme	Uncoupled Direct Power Control Based on Improved Sector Selection Algorithm for Three-level PWM Rectifier	Soft Switching, Frequency Control, and Bidirectional Power Flow of an Isolated Quasi-switched-capacitor DC-DC Converter for Automotive Applications	Considerations for the Design of Power Electronic Modules for Hybrid Distribution Transformers	Optimized Harmonic Current Control Strategy for Nonlinearities Compensation in Multiphase AC Drives	Control Strategy for Improved Dynamic Performance of Variable-speed Drives with the Modular Multilevel Converter	On the Improvement of the Thermal Behavior of Electric Motors	A Two-Axis Actively Regulated Consequent-Pole Bearingless Motor with Wide Magnetic Gaps	Maximum Switching Frequency Characterization of 4.5kV-400A SiC-PiN Diode and Si-IEGT Hybrid Pair Power Module
10:50 am – 11:15 am	Characteristic Comparison Between H-shaped Core and Circular Core in Wireless Power Transfer Systems for Electric Vehicle	Comparative Evaluation of T-type Topologies Comprising Standard and Reverse-blocking IGBTs	Improving Output Current Distortion in Hybrid BCM Current Controlled 3-phase Micro-inverter	Microgrid System with Voltages in Quadrature	Observer-based State-space Current Control for a 3-phase Grid-connected Converter Equipped With an LCL Filter	Performance Analysis of Bidirectional DC-DC Converters for Electric Vehicles and Charging Infrastructure	Active Voltage Control of SiC-SIT Circuit Breakers for Overvoltage Suppression	New Model Based Predictive Current Control Strategy for Doubly Salient Permanent Magnet Synchronous Machines	Damping Concepts of LCL Filter for a Multi-level Medium Voltage Adjustable Speed Drive with Low Pulse Ratio	Conjugate Heat Transfer Analysis of Integrated Brushless Generators for More Electric Engines	Design Methodology for Variable-flux, Flux-intensifying Interior Permanent Magnet Machines for an Electric Vehicle Class Inverter Rating	Experimental Evaluation of 10 kHz Switching Operation of 4.5kV-400A SiC-PiN Diode and Si-IEGT Hybrid Pair Module
11:15 am – 11:40 am	Wireless EV Charging, Optimum Operating Frequency Selection for Power Range 3.3 and 6.6 kW	Performance Evaluation among Four types of Five-level Topologies using Pareto Front Curves	Enhanced Experimental PV Plant Grid-integration with a MW Lithium-ion Energy Storage System	Design and Development of a Reconfigurable Hybrid Microgrid Testbed	Command Generation for Wide Range Operation of Hysteresis Controlled Vienna Rectifiers	Second Harmonic Current Reduction by using a Resonant Circuit in a Single-phase Battery Charger	Stable Operation of Multiple Power Routers	A Simple Tuning Method Aimed at Optimal Settling Time and Overshoot for Synchronous PI Current Control in Electric Machines	Investigation of Harmonics Interaction in High-power PWM Current-source Motor Drives	Determination of Rotor-stator Heat Exchange Coefficients in the Case of Totally Enclosed Machines: Application to an Integrated Starter-Generator	Cogging Torque Reduction in Flux Switching Permanent Magnet Machines by Rotor Pole Shaping	Experimental Validation of Newly Fabricated Normally-on GaN High-electron-mobility Transistor
11:40 am – 1:30 pm	**Lunch on Own**											

Wednesday, September 18 *(Continued)*

Oral Sessions • 1:30 pm – 3:10 pm

	Room: 102	Room: 103/105	Room: 104/106	Room: 107/109	Room: 108	Room: 110/112	Room: 111/113	Room: 201	Room: 203	Room: 205	Room: 207	Room: 210/212
	S54: Charging Systems	**SS5: Recent Advances in Switched Capacitor Circuits I**	**S55: PV Generation III**	**S56: Microgrid Control**	**S57: Converters EMI**	**S58: Power Converters for Renewable Energy Applications I**	**S59: Multilevel Converters I**	**S60: Hardware-in-the-loop, Simulation, and Hardware Issues**	**S61: Direct Torque Control**	**S62: DC-DC Non-isolated III**	**S63: Synchronous Reluctance Machines**	**S64: Passive Components**
1:30 pm – 1:55 pm	An Integrated Onboard Charger and Accessory Power Converter for Plug-in Electric Vehicles	Switched-capacitor/ Multilevel DC-DC Converters — Advance and Applications	Simulation Platform for Dynamic Photovoltaic Arrays	Modeling and Control of a Natural Gas Generator Set in the CERTS Microgrid	Impact of Interleaving on Common Mode EMI Filter Weight Reduction of Paralleled 3-phase Voltage-source Converters	High Power Solid-state Step-up Resonant Marx Modulator with Continuous Output Current for Offshore Wind Energy Systems	Power Loss and Thermal Characterisation of IGBT Modules in the Alternate Arm Converter	High-fidelity Real-time Hardware-in-the-loop Emulation of PMSM Inverter Drives	Deadbeat, Direct Torque and Flux Control of IPMSM Drives using a Minimum Time Ramp Trajectory Method at Voltage and Current Limits	Performance Analysis of Generalized Algebraic Switched Capacitor Converters	Winding Configurations and Performance Investigations of 12-stator Pole Variable Flux Reluctance Machines	Reliability of Capacitors for DC-link Applications — An Overview
1:55 pm – 2:20 pm	A Utility Interfaced Half-bridge Based Capacitively Coupled Power Transfer Circuit with Automatic Frequency Control	Calculation Program Supporting Switched Capacitor DC-DC Charge Pump Design	An Optimized Common Mode Voltage Reduction PWM Strategy for T-type 3-phase Three Level Photovoltaic Grid-tied Inverter	Improving Microgrid Performance by Cooperative Control of Distributed Energy Sources	Characterising and Modelling Extended Conducted Electro-magnetic Interference In Densely Packed DC-DC Converters	Multi-resonant based Sliding Mode Control of Grid-connected Converter under Distorted Grid Conditions	Fault Tolerant Cost-effective Carrierless Stochastic Synthesis of Voltages and Currents in Multi-cell Multilevel Converters via the Central Limit Theorem	FPGA Based Detailed Real-time Simulation of Power Electronic Converters and Electric Machines for EV HIL Applications	Deadbeat-direct Torque and Flux Control on Low Switching Frequency Induction Machine Drives Using the Enhanced Flux Observer and Torque Model	27.12 MHz Large Voltage Gain Resonant Converter with Low Voltage Stress	Sensitivity Analysis of Torque Ripple Reduction of Synchronous Reluctance and Interior PM Motors	Planar Integrated Multilayer Capacitive Substrate for DC-DC Converter Applications
2:20 pm – 2:45 pm	A Seal Lead-acid Battery Charger For Prolonging Battery Lifetime Using Superimposed Pulse Frequency Technique	Soft Charging Operation of Switched Capacitor Converters — Increasing Power Density and Efficiency	Graph-based Semi-supervised Learning for Fault Detection and Classification in Solar Photovoltaic Arrays	A Nonlinear Disturbance Observer Based DC Bus Voltage Control for a Hybrid AC/DC Microgrid	Shaping Pulse Transitions by Active Voltage Control fore Reduced EMI Generation	Open-switch Fault Detection Method of an NPC Converter for Wind Turbine Systems	A Component-minimized Dual-output Multilevel Converter and its Applications	Hardware-in-the-loop Simulation Verification of a Smooth Transition Algorithm Between Maximum Torque per Ampere Control and Single Current Regulator	Discrete-time Physical Limits-based Enhanced Finite-settling-step Direct Torque and Flux Control for IPMSM Drives	Mitigation and Utilization of the Inductor Coupling Effect in Interleaved Multiphase DC-DC Converters	BLDC Multiphase Reluctance Machines: A Revival Attempt with 2D FEM Investigation and Standstill Tests	Comprehensive Design of DC Busbars for Medium Voltage Applications
2:45 pm – 3:10 pm	Design and Implementation of a 75 KW Mobile Charging System for Electric Vehicles	Performance Modeling of Switched-capacitor Converters	A Novel Second Harmonic Current Reduction Method for Dual Active Bridge Used in Photovoltaic Power System	Construction of Nonlinear Droop Relations to Optimize Islanded Microgrids Operation	The Input Impedance of Common Mode and Differential Mode Noise Separators	An Inrush Current Mitigation Method for the Grid-connected Converters in the Low-voltage Ride-through Operation	Enhanced FPGA Based Three-level Space Vector Pulse Width Modulation with Active Neutral Point Balancing	Analysis of Current Sampling Errors in PWM, VSI Drives	Square-wave Operation of Direct Torque Controlled PMSM Drive System	A Novel Switched-coupled-inductor DC-DC Step-up Converter	Design of Synchronous Reluctance Machines with Multi-objective Optimization Algorithms	A Frequency-domain Study on the Effect of DC-link Decoupling Capacitors
3:10 pm – 3:30 pm	**PM Break** ..... *Lobby A*											

Wednesday, September 18 *(Continued)*

Oral Sessions • 3:30 pm – 5:10 pm

	Room: 102	Room: 103/105	Room: 104/106	Room: 107/109	Room: 108	Room: 110/112	Room: 111/113	Room: 201	Room: 203	Room: 205	Room: 207	Room: 210/212
	S65: Special Power Converters in Transportation	**SS6: Recent Advances in Switched Capacitor Circuits II**	**S66: PV Converters**	**S67: Control Under Unbalanced Grid Conditions**	**S68: AC-DC Multi-phase I**	**S69: Power Converters for Renewable Energy Applications II**	**S70: Resonant DC-DC**	**S71: Control Issues in Electric Drives**	**S72: Assorted Issues in Electric Drives**	**S73: Modeling and Control V**	**S74: Magnetic Gears**	**S75: Thermal Management**
3:30 pm – 3:55 pm	Novel Bidirectional Snubberless Soft-switching Naturally Clamped Zero Current Commutated Current-fed Dual Active Bridge (CFDAB) Converter for Fuel Cell Vehicles	Modulation and Reconfiguration Techniques for Modular Capacitor-clamped Converters	A Single-stage Multi-string Quasi-resonant Inverter for Grid-tied Photovoltaic Systems	Fault Ride Through Control of Medium-voltage Converters with LCL Filter in Distributed Generation Systems	Current Source Rectifiers in Discontinuous Conduction Modes of Operation	A Dual-input Boost-buck Converter with Coupled Inductors for TEG Applications	Loss Reduction in a Medium Frequency Series Resonance Converter by Forced Evacuation	Unified Direct-flux Vector Control of Induction Motor Self-commissioning Drive with Analysis of Parameter Detuning Effects	Stability Analysis and Improvements for Combined Voltage and Current Mode Flux Observer of Induction Machine	Evaluation of Alternative Modulation Schemes for Three-level Neutral-point-clamped 3-phase Inverters	Slip Recovery and Prevention in Pseudo Direct Drive Permanent Magnet Machines	Weight Optimization of a Cooling System Composed of Fan and Extruded Fin Heat Sink
3:55 pm – 4:20 pm	Wireless Power Transfer Using Class E Inverter with Saturable DC Feed Inductor	Suppression of Spurious Triggering in Synchronous Buck Converter With Switched-capacitor Gate	Central Multilevel Current-fed Inverter with Module Integrated DC-DC Converters for Grid-connected PV Plant	Control of Active Mobile Substations under System Faults	Reduced Switch Multi-level Unidirectional Rectifiers	A Simple Flyback Microinverter for Solar Energy Systems with Variable Frequency Controlled ZVS	VHF Series-input Parallel-output Interleaved Self-oscillating Resonant SEPIC Converter	Single External Source Control of Doubly-fed Induction Machine Using Dual Inverter	Modeling of Permanent Magnet Synchronous Machine Including Torque Ripple Effects	Component Cost Models for Multi-objective Optimizations of Switched-mode Power Converters	Motor Integrated Permanent Magnet Gear in a Battery Electrical Vehicle	Thermoelectric Cooling for Power Electronics Circuits: Small Signal Modeling and Controller Design
4:20 pm – 4:45 pm	A Novel Slow-switching Control for Multiple Pickup IPT Systems	Switched Capacitor Energy Buffers	Modular Multilevel Converter for Large-scale Multistring Photovoltaic Energy Conversion System	Oscillatory Angle Control Scheme for PWM Static Synchronous Compensators under Unbalanced Conditions and System Faults	Analysis and Design of 3-phase Buck-boost Quasi-resonant Reduced Switch Rectifier	WITHDRAWN: An On-chip Hysteretic-current-controlled LED Driver with Synchronous Rectification and Lossless Peak and Valley Current Sensing for High-brightness Lighting Applications	New Optimal Design Methodology of Medium-frequency Soft-switching Converters	Predictive Direct Flux Vector Control of Permanent Magnet Synchronous Motor Drives	A DC-flux-injection Approach for Thermal Monitoring of Induction Machines with Direct Torque Control	A Comparison between Dead-beat and Predictive Control for a 7-level Back-to-back Cascaded H-bridge under Fault Conditions	Construction of a Low Speed Flux Focusing Magnetic Gear	A Real-time Thermal Model for Monitoring of Power Semiconductor Devices
4:45 pm – 5:10 pm	Efficient, MHz Frequency, Resonant Converter for Sub-meter (30cm) Distance Wireless Power Transfer	Next Generation Switched-capacitor Circuits based on Wide Bandgap Devices	Design of Module-integrated Converters for Photovoltaic Strings	Smart Impedance Application on Unbalanced Harmonic Mitigation in 3-phase Four-wire Systems	Volume Minimization of the Main DM/CM EMI Filter Stage of a Bidirectional 3-phase Three-level PWM Rectifier System	Bidirectional Modular Multilevel DC-DC Converter Control and Efficiency Improvements through Separate Module Control Method	A Load/Line Adaptive Zero Voltage Switching DC-DC Converter used in Electric Vehicles	Fluctuating Current Control for a PMSM under Reduced DC Link Capacitance	Fault Tolerant Rotor Position and Velocity Estimation Using Binary Hall-effect Sensors for Low Cost Vector Control Drives	An Innovative Current Sensor-less Continuous Conduction Mode PFC Control	Theoretical and Experimental Loss and Efficiency Studies of a Magnetic Lead Screw	A Comparison of Thermal Vias Patterns used for Thermal Management in Power Converter
7:00 pm – 9:00 pm	**ECCE Banquet** ..... *Mile High Ballroom*											

Thursday, September 19

7:00 am – 3:00 pm Registration ..... *Lobby A*

Oral Sessions • 8:00 am – 9:40 am

	Room: 102	Room: 103/105	Room: 104/106	Room: 107/109	Room: 108	Room: 110/112	Room: 111/113	Room: 201	Room: 203	Room: 205	Room: 207	Room: 210/212
	S76: Wireless Power Transfer I	**S77: Power Quality**	**S78: Wind Energy: DFIG Control and Operation**	**S79: Distributed Generation I**	**S80: DC-DC Isolated II**	**S81: AC-AC Converters**	**S82: Power Converters for Photovoltaics**	**S83: Maximum Power Point Tracking I**	**S84: Power Converters for Electric Drives**	**S85: Magnetic Bearings and Bearingless Machines**	**S86: Diagnostics and Fault Analysis of Electric Machines I**	**S87: Converter-level Power Electronic Device Integration**
8:00 am – 8:25 am	Design and Implementation of Removable and Closed-shape Dual Ring Pickup for Contactless Linear Inductive Power Track System	Application of Matrix Pencil Method in Sub-cycle Voltage Dip Classification	Harmonic Analysis of Doubly Fed Induction Generator Based Utility Interactive Wind Turbine Systems During Fault Conditions	Coordinated Operation of Parallel-connected Inverters for Active Islanding Detection Using High Frequency Signal Injection	Rapid Push Pull Resonant Charger for High Power High Voltage Application Using Low Input Voltage	A Novel Single-phase PWM AC-AC Converters Without Commutation Problem	A Single-phase Grid-connected PV Converter with Minimal DC-link Capacitor and Low-frequency Ripple-free Maximum Power Point Tracking	New Overall Control Strategy for Wind Energy Conversion Systems in MPPT and Stall Regions	A Novel Indirect Quasi-Z-source Matrix Converter Applied to Induction Motor Drives	Design and Test Result of Novel Single-drive Bearingless Motor with Cylindrical Radial Gap	A Novel High Sensitivity Differential Current Transformer for Online Health Monitoring of Industrial Motor Ground-wall Insulation	Evaluation of 15 kV SiC N-IGBT and P-IGBT for Complementary Inverter Topology with Zero dv/dt Stress on Gate Drivers
8:25 am – 8:50 am	Frequency Splitting Analysis of Magnetically-coupled Resonant Wireless Power Transfer	Electric Arc Furnace (EAF) Compensation using LaGrange Minimization	Research on LVRT Capability of DFIG with Demagnetization Control	Implementation and Control of a Residential Microgrid Based on Renewable Energy Sources, Hybrid Storage Systems and Thermal Controllable Loads	Experimental Discussions on Operating Frequencies of a Bidirectional Isolated DC-DC Converter for a Battery Energy Storage System	Design of 400V Class Inverter Drive Using SiC 6-in-1 Power Module	Control Strategies for Utility-scale Cascaded Photovoltaic System	Small Wind Turbines Sensorless MPPT: Robustness analysis and Lossless Approach	AC-AC 3-phase Drive System Based on Twelve-leg DC-link Converter	A Principle and a Test Result of a Novel Bearingless Motor with Motor Parallel Winding Structure	Interior Permanent Magnet Synchronous Machine Rotor Demagnetization Characteristics under Fault Conditions	Characterization of 15 kV SiC n-IGBT and its Application Considerations for High Power Converters
8:50 am – 9:15 am	8-type Contactless Transformer Applied in Railway Inductive Power Transfer System	Improvement of Conservation Voltage Reduction Energy Savings via Local Voltage Regulation	Enhanced Operation for DFIG-based WECS using Resonant Feedback Compensators under Grid Unbalance	Enhanced Power Quality Control Strategy for Paralleled Inverters in Distributed Generation	A Modular DC-DC Converter with Collapsible Input Voltage of Series Connected Modules without Additional Bypass Switch	A 3-phase Back-to-back Converter for Reactive Power Compensation, Current Harmonic Filtering and Active Power Compensation	Nonlinear Control Design for the Photovoltaic Isolated-port Architecture with Submodule Integrated Converters	Maximum-Voltage-unit-guided MPPT Algorithm for Improved Performance under Partial Shading	Stability Analysis and Dynamic Response of a DC-link Module with a Series Voltage Compensator	Suitability Investigation of a Bearingless Disk Drive for Micro Turbine Applications	Reliable Detection of Induction Motor Rotor Faults under the Rotor Axial Air Duct Influence	A Gate Assist Circuit for Cross Talk Suppresion of SiC Devices in a Phase-leg Configuration
9:15 am – 9:40 am	Impedance Transformers for Compact and Robust Coupled Magnetic Resonance Systems	Adaptive Notch Filter Applied to Hybrid Active Var Compensator under Nonsinusoidal and Unbalanced Conditions	A Class of Flux Observers for Doubly-fed Induction Generators used in Small Power Wind Generation Systems	An Effective Smooth Transition Control Strategy using Droop Based Synchronization for Parallel Inverters	A LCL-resonant Isolated Multiport DC-DC Converter for Power Management of Multiple Renewable Energy Sources	In-situ Reconfiguration for Flexible Distribution of Energy and Storage Resources	A High Efficiency and Reliability Single-phase Photovoltaic Micro-inverter with High Magnetics Utilization for Nonisolated AC-module Applications	High Efficient Variable step Size Incremental Resistance Maximum Power Point Tracker for PV Battery Charging Applications	Single-phase Active Power Filtering Method Using Diode-rectifier-fed Motor Drive	Compact and Low Cost Magnetic Bearing with Saturated Coil for Gas Turbine Generators	Fault Type Detection using Frequency Pattern of Stator Current in IPM-type BLDC Motor under Stator Inter-turn, Dynamic Eccentricity, and Coupled Faults	Validation of the Plug-and-play AC/AC Power Electronics Building Block (AC-PEBB) for Medium Voltage Grid Control Applications

9:40 am – 10:00 am AM Break ..... *Lobby A*

Thursday, September 19 *(Continued)*

Oral Sessions • 10:00 am – 11:40 am

	Room: 102	Room: 103/105	Room: 104/106	Room: 107/109	Room: 108	Room: 110/112	Room: 111/113	Room: 201	Room: 203	Room: 205	Room: 207	Room: 210/212
	S88: Wireless Power Transfer II	**S89: HVDC and FACTS**	**S90: Wind Farm Connection**	**S91: Distributed Generation II**	**S92: Converter Applications**	**S93: Matrix Converters**	**S94: Single Phase DC to AC Inverters I**	**S95: Maximum Power Point Tracking II**	**S96: Drive Topologies and Packaging for Hybrid and Electric Vehicles**	**S97: Noise and Vibration in Electric Machines**	**S98: IPM Machines II**	**S99: Power Electronic Modules III**
10:00 am – 10:25 am	Analysis and Control of S/SP Compensation Contactless Resonant Converter with Constant Voltage Gain	Multi-module Bidirectional Buck-boost Inverter-based HVDC Back-to-back Transmission System	A Boost Conversion System Consisting of Multiple DC-DC Converter Modules for Interfacing Wind Farms and HVDC Transmission	Synchronization in Highly Distorted 3-phase Grids using Selective Notch Filters	Miniature Self-powered Stick-on Wireless Sensor Node for Monitoring of Overhead Power Lines	Comparison of 3-phase AC-AC Matrix Converter and Voltage DC-link Back-to-back Converter Topologies Based on EMI Filter	Novel Soft-switching Snubberless Naturally Clamped Current-fed Full-bridge Front-end Converter Based Bidirectional Inverter for Renewable, Microgrid, and UPS Applications	Current-Sensorless Power-angle-based MPPT for Single-stage Grid-connected Photovoltaic Voltage-source Inverters	A High Temperature Traction Inverter with Reduced Cooling and Improved Efficiency for HEV Applications	Analytical Expression of Pulsating Torque harmonics due to PWM Drives	Multi-objective Tradeoffs in the Design Optimization of a Brushless Permanent Magnet Machine with Fractional-slot Concentrated Windings	Gate Drive Investigations of IGBT Modules with SiC-Schottky Freewheeling Diodes
10:25 am – 10:50 am	A Novel Fast-switching Control for Multiple Pickup IPT Systems	Power Flow Router Sensitivities for Post-contingency Corrective Control	An Adaptive Phase-locked Loop Algorithm for Faster Fault Ride Through Performance of Interconnected Renewable Energy Sources	Islanding Detection in Grid-connected Power Converters using Harmonics Due to the Non-ideal Behavior of the Inverter	A Low-cost Electric-field Energy Harvester for an MV/HV Asset-monitoring Smart-sensor	Efficiency and Damping Control Evaluation of a Matrix Converter with a Boost-up AC Chopper in Adjustable Speed Drive System	A Soft-switching Full-bridge Inverter with High Efficiency	Maximum Power Point Tracking Algorithm with Advanced State Detection and Regression Analysis for Small Wind Energy Systems	A Variable Voltage Converter with Direct Bypass for Traction Drive Inverters	Suppression Control of Radial Force Vibration due to Fundamental Permanent-magnet Flux in IPMSM	Circulating Current in Parallel Connected Stator Windings due to Rotor Eccentricity in Permanent Magnet Motors	A High Temperature, Double-sided Cooling SiC Power Electronics Module
10:50 am – 11:15 am	Contactless Slipring System based on Rotating Magnetic Field Principle for Rotary Applications	Experimental Validation of Modular Transformer Converter Based Convertible Static Transmission Controller for Transmission Grid Management	Comprehensive Modeling of Turbine Systems from Wind to Electric Grid	Decentralized Control of MTDC Networks with Energy Storage and Distributed Generation	Design and Analysis of Integrated Driver for Piezoelectric Actuators	New Control Strategy for Indirect Matrix Converters Operating in Boost Mode	Impedance Design of Quasi-Z Source Network to Limit Double Fundamental Frequency Voltage and Current Ripples in Single-phase Quasi-Z Source Inverter	A Maximum Power Point Tracking Method for PV Systems Supplying a Periodic Nonlinear Load	An Inverter Packaging Scheme for an Integrated Segmented Traction Drive System	Multi-physics Analysis of Double Stator Switched Reluctance Machines	Impact of Interior Permanent Magnet Rotor Design on Signal Injection Based Sensorless Control and Power Conversion	Advanced Packaging of SiC Power Module for Automotive Applications
11:15 am – 11:40 am	Experimental Verifications and Design Procedure of an AC-DC Converter with Input Impedance Matching for Wireless Power Transfer Systems	A Control Structure for Line-frequency-switched STATCOMs under System Faults	Multi-megawatt Wind Turbine Converter Configurations Suitable for Off-shore Applications, Combining 3-L NPC PEBBs	Control System Tuning and Stability Analysis of Virtual Synchronous Machines	A Low Power Consumption Driver with Low Acoustics for Piezoelectric Synthetic Jets	A Modulation Strategy for Matrix Converter with Extended Control Range and Reduced Switching Power Losses	Current-fed DC-DC Topology Based Inverter	A Distributed Approach to MPPT for PV Sub-module Differential Power Processing	Low Voltage and High Power DC-AC Inverter Topologies for Electric Vehicles	Influence of Pole and Slot Number Combinations on Cogging Torque in Permanent Magnet Machines with Static and Rotating Eccentricities	Design and Control of IPMSM Sensorless Drive for Mechanical Rotor Position Detection Capability	Anti-series Normally-on SiC JFETs Operating as Bidirectional Switches
12:00 pm – 1:30 pm	**Awards Lunch** ..... *Mile High Ballroom*											

Thursday, September 19 *(Continued)*

Oral Sessions • 1:30 pm – 3:10 pm

	Room: 102	Room: 103/105	Room: 104/106	Room: 107/109	Room: 108	Room: 110/112	Room: 111/113	Room: 201	Room: 203	Room: 205	Room: 207	Room: 210/212
	S100: **Wireless Power Transfer III**	S101: **Grid Connected Converters I**	S102: **Wind Energy Converters**	S103: **Distributed Generation III**	S104: **AC-DC Multi-phase II**	S105: **Multilevel Converters II**	S106: **Single Phase DC to AC Inverters II**	S107: **Lighting Technologies I**	S108: **Energy Efficient Motor Drives**	S109: *Norio Takahashi Memorial Session:* **Losses in Electrical Machines**	S110: **Axial Flux Machines**	S111: **Wide Bandgap Semiconductors III**
1:30 pm – 1:55 pm	Analysis and Comparison of Secondary Series- and Parallel-compensated IPT Systems	Analysis on Capability of Harmonic Damping using Active Filter Acting as Resistive Harmonic Impedance	Nonlinear Control of Wind Energy Conversion System Based on Control-Lyapunov Function	On the Use of Real-time Simulation Technology in Smart Grid Research and Development	Discrete-time One Cycle Control of VIENNA Rectifiers Considering the DC-link Neutral-point Voltage Balance	A Concept of Multi-level Converter Building Modules to Realize Higher Number of Output Levels	A Multilevel Energy Buffer and Voltage Modulator for Grid-interfaced Micro-inverters	A Review and Classification of LED Ballasts	Energy Saving Start-up Method by Combined Use of Two Position Sensorless Controls	Analysis of the Temperature Dependence of Losses in Electrical Machines	Operation Characteristics of Ferrite Permanent Magnet In-wheel Axial-gap Motor with Coreless Rotor Structure for Electric City Commuters	A 3600V,80A Single External-driver Series Connected Circuit with Three Silicon Carbide MOSFETs
1:55 pm – 2:20 pm	Wireless Fleet Charging System for Electric Bicycles	Anti-islanding Detector based on a Robust PLL	Lifetime Estimation for the Power Semi-conductors Considering Mission Profiles in Wind Power Converter	Parameter Design and Impacts on Power Quality of a Q-f Droop Curve Based Islanding Detection Method	Evaluation of LCL Filter Inductor and Active Front End Rectifier Losses Under Different PWM Method	Scaling the Controllable Network Transformer (CNT) to Utility-level Voltages with Direct-AC/AC Power Electronic Building Blocks (PEBBs)	Quasi Variable Capacitor Applied to Soft Switching Inverter for Induction Heating	A High-frequency Digitally Controlled LED Driver for Automotive Applications with Fast Dimming Capabilities	Maximum Efficiency Drives of Synchronous Reluctance Motors with On-line Stator Resistance Estimator	Impact of Dead-time on Iron Losses in Inverter-fed Magnetic Materials	Omega Shaped Axial-flux Permanent-magnet Machine for Direct-drive Applications with Constrained Shaft Height	Performance Consideration of an AC Coupled Gate Drive Circuit with Forward Bias for Normally-on SiC JFETs
2:20 pm – 2:45 pm	Inductive Power Transfer by Means of Multiple Frequencies in the Magnetic Link	Auto-tuning based Resonance Damping of Gridconnected Voltage Source Inverters with Long Transmission Cable	Current-based Eccentricity Detection for Direct-drive Wind Turbines via Synchronous Sampling	Reactive Power Scheduler for Voltage Regulation of Distributed Energy Systems	Optimization and Comparison of Two Soft Switched High Voltage Converter Modulator Topologies	Bidirectional Three Port, 3-phase Multilevel Inverter Based on Switched Capacitor Cells	Common-mode Voltage Reduction Method of PWM Current Source Inverter Modifying the Distribution of Zero Current	Daisy-chain Transformer Structure for Current-balancing Multiple LED Strings	Multi-mode Control Strategy in Small-scale Wind Turbine Generators for Wider Operating Speed Range and Higher Efficiency Operation	The Minor Hysteresis Loop under Rotating Magnetic Fields in Machine Laminations	FEA Estimation and Experimental Validation of Solid Rotor and Magnet Eddy Current Loss in Single-sided Axial Flux Permanent Magnet Machines	Performance Comparison of 1200V 100A SiC MOSFET and 1200V 100A Silicon IGBT
2:45 pm – 3:10 pm	Self-oscillating Contactless Resonant Converter with Phase Detection Contactless Current Transformer	Test Bed Implementation of 380V DC Distribution System Using Isolated Bidirectional Power Converters	Permanent-magnet Synchronous-generator Wind-energy Systems with Boost Matrix Converters	Broadband Methods for Online Grid Impedance Measurement	Comparative Evaluation of SiC Devices for PWM Buck Rectifier Based Active Front End Converter for MV Grid Interface	Low-voltage-ride-through (LVRT) Capability of a Phase-shifted-PWM STATCOM Using the Modular Multilevel Cascade Converter Based on Single-star Bridge-cells (MMCC-SSBC)	A Single-phase Current Source PV Inverter with Power Decoupling Capability using an Active Buffer	A Dimmable LED Driver Using Resistive DAC Feedback Control for Adaptive Voltage Regulation	Numerical Design Methodology of Optimal Trajectories for Efficient Induction Motor Drive based on a Loss Map	A Combined Hysteresis and Eddy-current Model Developed for a Wide Frequency Range in Electric Machine Applications	Line-start Axial-flux Permanent-magnet Synchronous Motor	High-temperature Characterization and Comparison of 1.2 kV SiC Power MOSFETs
3:20 pm – 3:40 pm	**PM Break** ..... *Lobby A*											

Thursday, September 19 *(Continued)*

Oral Sessions • 3:30 pm – 5:10 pm

	Room: 102	Room: 103/105	Room: 104/106	Room: 107/109	Room: 108	Room: 110/112	Room: 111/113	Room: 201	Room: 203	Room: 205	Room: 207	Room: 210/212
	S112: Wireless Power Transfer IV	**S113: Grid Connected Converters II**	**S114: Wind Energy Technologies**	**S115: AC-DC Multi-phase III**	**S116: Modular Multilevel Converters**	**S117: Single Phase AC-DC**	**S118: Single Phase DC to AC Inverters III**	**S119: Lighting Technologies II**	**S120: Model-based Sensorless Control**	**S121: High Frequency Effects in Electric Machines**	**S122: Diagnostics and Fault Analysis of Electric Machines II**	**S123: Gallium Nitride Devices**
3:30 pm – 3:55 pm	High Efficiency Contactless Power Transfer System for Electric Vehicle Battery Charging Application	Forward-type Micro-inverter with Current Decoupling	Variable Speed Wind Power Plant Operating with Reserve Power Capability	Control Algorithm of High Power Rectifier System in DC Arc Furnace for Improved Arc Stability	Modular Multilevel Converter based on Current Source H-bridge Cells Implemented with Low Cost Reversing Conducting IGCT	PFC Converter with Novel Integration of both EMI Filter and Boost Inductors	Modulation Scheme for a Differential-mode Cuk Inverter for Loss Mitigation	A Single-inductor, Multiple-channel Current-balancing LED Driver for Display Backlight Applications	Stability and Dynamic Performance Improvement of a Sensorless IPMSM Drive via Adaptive Estimated-speed-assisted Position Prediction and Current Quality Evaluation	Experimental and Analytical Determination of Proximity Losses in a High-speed PM Machine	Accurate and Simple Diagnosis Algorithm for Inter-turn Fault in the BLDC Motor	Gallium Nitride Based High Power-density Automotive HID Electronic Ballast
3:55 pm – 4:20 pm	Vehicle-to-grid Scheme based on Inductive Power Transfer for Advanced Distribution Automation	Inverter Control Strategy for DG Systems based on the Conservative Power Theory	Modeling of a Hydraulic Wind Power Energy Transfer System Utilizing a Proportional Valve	A Generalized DQ Impedance Model of 3-phase Diode Rectifier	Optimal Selection of the Average Capacitor Voltage for Modular Multilevel Converters	A Power Supply Reaching Titanium Level Efficiency for a Wide Range of Input Voltages	DSPIC Microcontroller Based Implementation of a Flyback PV Microinverter Using Direct Digital Synthesis	Zero Ripple Single Stage AC-DC LED Driver With Unity Power Factor	Comparative Analysis of Feedback Gains for Adaptive Full-order Observers in Sensorless Induction Motor Drives	Rotor Impedance of the High-frequency Circulating Bearing Current Path in Inverter-fed AC Machines	A Novel Online Stator Groundwall Insulation Monitoring Scheme for Inverter-fed AC Motors	Evaluation of 600 V Cascode GaN HEMT in Device Characterization and All-GaN-based LLC Resonant Converter
4:20 pm – 4:45 pm	Single-phase Active Boost Rectifier with Power Factor Correction for Wireless Power Transfer Applications	15 kV SiC IGBT based 3-phase, Three-level, Modular-leg Power Converter	Estimation of Wake Effect in Wind Farms Using Design of Experiment Methodology	DC-link Current Control Scheme for Paralleled 3-phase Current Source Rectifiers in High Efficiency Power Supply System	Development of a 500-kW Modular Multilevel Cascade Converter for Battery Energy Storage Systems	A Primary-side-control Quasi-resonant Flyback Converter with Tight Output Voltage Regulation and Self-calibrated Valley Switching	Load Impedance Estimation and Iterative-learning Control for a Single-phase Three-wire Inverter	A Novel Pulse Current Driving; High Power Factor LED Driver Without Electrolytic Capacitors	Signal-injection Assisted Full-order Observer with Parameter Adaptation for Synchronous Reluctance Motor Drives	Skin effect and Proximity Losses in High Speed Brushless Permanent Magnet Motors	A Detailed Transient Model of Interior Permanent Magnet Motor Accounting for Saturation under Stator Turn Fault	Simulation Model Development and Verification for High Voltage GaN HEMT in Cascode Structure
4:45 pm – 5:10 pm	Optimal Design Method to Achieve Both Good Robustness and Efficiency in Loosely-coupled Wireless Charging System Employing Series-parallel Resonant Tank with Asymmetrical Magnetic Coupler	Grid Harmonics and Voltage Unbalance Effect Elimination for 3-phase PLL Grid Synchronization Algorithm	Analysis of Grid Current Control in Consideration of Voltage Feedforward and Cable Capacitance Demonstrated on a Fully Sized Wind Turbine Installed in a Wind Park	Analysis of Nonlinear Sideband Effects in Small-signal Input dq Admittance of Twelve-pulse Diode Rectifiers	A Parallel-redundant BTB (Back-to-back) System using Modular Multilevel Cascade Converters for Power Transmission Grids	Full-bridge Single-stage PFC with Reduced DC Bus Capacitor and Improved Light Load Operation as a Solution for Modern SMPS	Parallel Operation of Digital Controlled Modified Sine Wave Inverters	Digital Implementation of the Feedforward Loop of the Asymmetrical Half-bridge Converter for LED Lighting Applications	A Novel Approach to the Design of Back-EMF Observer Based Sensorless Control of Non-salient PMSM: Theoretical Analysis and Experimental Investigations	A Stator Turn-fault Detection Method for Inverter-fed IPMSM with High-frequency Current Injection	Fault Diagnosis of Mechanical Unbalance for PMSM Drive System Under Nonstationary Condition	Analytical Loss Model of High Voltage GaN HEMT in Cascode Configuration

Registration

Sunday through Thursday
Lobby A

On-site registration will be open during the following hours:

Sunday, September 15	7:00 am – 7:00 pm
Monday, September 16	7:00 am – 7:00 pm
Tuesday, September 17	7:00 am – 6:00 pm
Wednesday, September 18	7:00 am – 7:00 pm
Thursday, September 19	7:00 am – 3:00 pm

Full Conference Registration

Full Conference Registration admits one entrance into all technical sessions, plenary sessions, townhall meetings, access to the exhibition and all social functions. Additional guest tickets for receptions can be purchased at the Registration Desk.

Full Conference Registration Rates

IEEE Member	$775.00
Student IEEE Member	$325.00
Society Member	$725.00
Life Member	$400.00
Non-Member	$1,000.00

One-Day Registration

One-Day Registration admits one entrance into that day's technical sessions, the plenary sessions*, townhall meetings*, industrial seminars*, and access to the exhibition.

One-Day Registration Rates

Society Member	$325.00
IEEE Member	$375.00
Non-Member	$425.00

Certificate of Attendance

Certificates of Attendance will not be provided for ECCE 2013.

Receipts

All who register online will receive a receipt/confirmation via email. All registrants will also receive a receipt attached to their badge, which can be obtained upon check-in. If you need additional paperwork, please contact the customer service staff, located in the Registration Desk.

Tutorial Registration*

Tutorials will take place on Sunday, September 15, 2013. You may select one morning session and one afternoon session. The rates are outlined below. The registration rate is the same if you choose to attend either one or two tutorials. The registration fee includes materials for all 12 tutorials.

Society Member	$365.00
IEEE Member	$390.00
Non-Member	$415.00

**Access to specified sessions is permitted only if applicable for that day's activities.*

Expo Only

Expo Only Registration allows access to the Expo only on Tuesday, September 17. Attendees may have access to the Expo hall for complimentary after 2:00 pm on September 17th. If you choose to attend the Expo prior to 2:00 pm, the registration fee is $25 for Expo Only access from 9:00 am – 2:00 pm. You may purchase an Expo Only Registration at the Registration Desk located just outside the Exhibit Hall.

Guest Tickets

Guests may purchase a registration for $175, which includes admission to the opening reception, awards luncheon and conference banquet. A limited number of awards luncheon and conference banquet tickets will be sold onsite. You can still include your guests' name on the registration form, even if he or she does not want to attend the social functions. You may also purchase individual event tickets per the rates below.

Opening Reception Ticket	$60.00
ECCE Banquet Ticket	$100.00
Awards Luncheon Ticket	$60.00
Industry Student Dinner	$250.00

Badges

Badges should be worn at all official functions of the meeting. Badge checkers will be stationed throughout the meeting areas. Only those with technical registrations will be allowed into sessions. If you forget or lose your badge, you may obtain a second badge at the Registration Desk with proof of registration.

Consent to Use of Photographic Images

Registration and attendance at, or participation in, ECCE constitutes an agreement by the registrant to ECCE's use and distribution (both now and in the future) of the registrant or attendee's image or voice in photographs, videotapes, electronic reproductions and audiotapes of such events and activities.

Creative Digressions

Sunday through Thursday
Room: 204

Creative Digressions is what we call a space reserved for those conference attendees who need to go someplace to think, to discuss, to organize their minds around the hubbub of activities around them. ECCE 2013 is packed with activities that fully engage all the mental capacities of the participants, the din of activity and the excitement of absorbing and understanding new information and knowledge can sometimes be overwhelming. Think of Creative Digressions as an oasis within the conference. The room has been set aside with large tables set up for relaxed conversations rather than for presentation purposes; note pads, easels and white boards are provided in place of cocktail napkins and backs of envelopes to facilitate one-on-one discussions, idea generation sessions, business meetings, or social interactions. Coffee and tea, the lifeblood of engineering, will be provided to fuel the physical mind so that the innovative process can continue apace.

Accessibility for Registrants with Disabilities

The meeting staff will work with attendees to provide reasonable accommodations for those who require special needs. To request assistance on-site, please check in at the Registration Desk.

Business Center

The Convention Center has a Business Center located off Lobby A — near the front door of 14th and California. The Business center will be accessible to all attendees. There is a log-on charge and each attendee is charged for usage by the minute.

Cameras and Recording Devices

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.

First Aid

If you are in need of emergency services or hospital care, the nearest hospitals are as follows:

Presbyterian-Saint Lukes Medical Hospital
1719 East 19th Avenue
Denver, CO 80218
(303) 839-6000

Denver Health Medical Center
777 Bannock Street
Denver, CO 80204
(303) 436-6000

Hotels

The ECCE 2013 headquarters hotel is the Hyatt Regency Denver at Colorado Convention Center:

Hyatt Regency Denver at Colorado Convention Center
650 15th Street
Denver, CO 80202
(402) 592-6464 or (888) 421-1442

Internet Access

Guest Room Internet is complimentary in IEEE Guestrooms at the Hyatt Regency Denver at Colorado Convention Center. Internet at the Convention Center is complimentary and can be accessed in the lobbies, Ballroom Prefunction spaces and the Grand Concourse by connecting to the "Complimentary WIFI" network.

Local Transportation

Taxis Stands are located on Front Drive for convenient access. There is also a free shuttle that picks up and runs along the 16th Street Mall. For more local transportation information please visit www.rtd-denver.com.

Lost & Found

Lost and found is located at the event registration desk Colorado Convention Center.

Visitor Information Desk

VISIT DENVER has a Visitor Desk at the Colorado Convention Center. The desk is located inside on the 14th Street side near the Big Blue Bear- Lobby A/F. This desk is staffed between 8:00 am and 5:00 pm Monday through Thursday. The staff specialize in Denver recommendations: restaurants, dining reservations, attractions, tours, things to do, and transportation options. The desk is also stocked with brochures, Denver Official Visitor Guides, and Discover Denver Discount Brochures.

Parking

Daily Convention Center Parking

0-8 Hours	$12.00
8-12 Hours	$15.00
12-18 Hours	$17.00
18-24 Hours	$25.00

Hotel Parking

Self-Parking 0-1 hours	$10.00
1-3 hours	$15.00
3-5 hours	$20.00
5-24 hours and overnight	$26.00
Valet Parking 0-4 hours	$20.00
4-8 hours	$26.00
8+ hours	$32.00

Meals & Refreshments

Full conference registration includes all meals, refreshments and social functions (except the Industry Student Dinner) provided by ECCE 2013.

Morning Refreshments

Monday, Wednesday and Thursday – *Lobby A*
Tuesday – *Exhibit Hall A*

Monday, September 16	10:00 am – 10:20 am
Tuesday, September 17	9:40 am – 10:00 am
Wednesday, September 18	9:40 am – 10:00 am
Thursday, September 19	9:40 am – 10:00 am

Lunch

Tuesday – *Exhibit Hall A*

Tuesday, September 17	12:00 pm – 2:00 pm

Awards Luncheon

Thursday – *Mile High Ballroom*

Thursday, September 19	12:00 pm – 1:30 pm

Afternoon Refreshments

Wednesday and Thursday – *Lobby A*
Tuesday – *Exhibit Hall A*

Tuesday, September 17	4:15 pm – 4:30 pm
Wednesday, September 18	3:10 pm – 3:30 pm
Thursday, September 19	3:20 pm – 3:40 pm

Newcomers Session (A Guide to ECCE 2013)

Sunday, 4:00 pm – 5:00 pm
Room: 210/212

This is a new part of the program, consisting of a short session intended to act as a guide for those who are new to ECCE. The content of this session, however, contains information that should be of interest to anyone who wishes to organize their conference calendar in a meaningful way or to gain a behind-the-curtains feel for the content and organization of the conference. Many members of the organizing committee will describe the program elements that they were responsible for. Vice chairs of the Technical Programs Committee will briefly discuss the trends and topics that they felt dominated the submissions in various tracks, as well as the submissions to the Special Sessions and the Vendors and Products Session. The Town Hall meeting, the Student program are discussed, as well as the exhibition program; the Industrial Seminars will also be one of the featured areas. We hope to give everyone present a concise briefing on the upcoming conference.

Meet and Greet the Fellows Reception

Sunday, 5:00 pm – 7:00 pm
Mile High Prefunction

Join us for a Meet and Greet the Fellows Reception within the Sunday evening Opening Reception of ECCE 2013. A chance to chat, take photos and congratulate the 2013 IEEE Power Electronics Society Class of Fellows that have chosen to receive their award at ECCE.

PELS Fellows

Ali Emadi
McMaster University

Honored for contributions to electric power conversion and control for electric and hybrid vehicles.

Donald Grahame Holmes
Royal Melbourne Institute of Technology University

Honored for contributions to the modulation and control of solid-state power electronic conversion equipment.

Yan-Fei Liu
Queens University, Department of Electrical and Computer Engineering

Honored for contributions to digital control techniques of power electronics converters.

Cian Mathuna
Tyndall National Institute, University College Cork

Honored for leadership in the development of power supply using micromagnetics on silicon.

David Perreault
Massachusetts Institute of Technology

Honored for contributions to design and application of very high frequency power electronic converters.

Leon Tolbert
The University of Tennessee

Honored for contributions to multilevel power electronic converter technology.

Dehong Xu
Zhejiang University, College of Electrical Engineering

Honored for contributions to power electronic applications to renewable energy systems.

IAS Fellows

Ahmed Elantably

Honored for contributions to AC machinery for electrical traction.

Ayman EL-Refaie
GE Global Research Center

Honored for contributions to high-speed permanent magnet machines for transportation and aerospace systems.

Dan Ionel
Vestas Wind Turbines R&D

Honored for contributions to the analysis, design and manufacturing of high efficiency electric machines.

Sreenivasa Murthy
Indian Institute of Technology Delhi

Honored for contributions to self-excited induction generators and renewable energy applications.

Opening Reception

Sunday, 5:00 pm – 7:00 pm
Mile High Prefunction

Catch up with your industry partners and friends! Grab a drink and relax before the week ahead.

Expo Reception

Monday, 4:00 pm – 6:30 pm
Exhibit Hall A
Supported by OPAL RT

Enjoy a drink and light snacks while 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.

ECCE on Social Media

@ieee_ecce.com #ecce_2013

facebook.com/ieee.ecce

Join the **IEEE Energy Conversion and Exposition Group**.

Student Paper Awards

A special thank you to the following companies who have funded this years' student paper awards:

- **United Technologies Research Center**
  Best Student Papers
- **US Hybrid Corporation**
  Best Paper in Transportation Technologies
- **Wiley**
  Best Student Papers

Industry Student Dinner

Monday, 7:00 pm – 9:30 pm
Mile High Prefunction
Supported by GE Global Research and Nexteer Automotive

The Industry Student Dinner will bring together students and industry for an information exchange session. Leading industry representatives will present information on the latest technologies and products they are developing and provide opportunity for the student community to see how their learning experiences are applied in the industry.

All ECCE 2013 student registrants can participate free in this event. All exhibitors will be given three free tickets to the dinner and will be able to purchase additional tickets for $50. Tickets will be available for $250 for industry engineers, with full conference registrations, who would like the opportunity to network with the students during the event. Tickets can be purchased at the ECCE Registration Desk. This is a great opportunity for ECCE exhibitors to network with students and provide information relating to their companies.

We look forward to you joining us for a productive evening!

IEEE-PELS Student Design Competition Workshop: The SOLAR SPLASH

Tuesday, 5:30 pm – 6:30 pm
Room: 108

This session/meeting will provide an overview of the rules, events and operations of the IEEE-PELS sponsored student "design, build and compete" solar/electric boat competition, now in its 21st year. Staff members of Solar Splash will discuss advantages and challenges associated with preparing for and competing in the Solar Splash for 2014.

Industry Tours

Tuesday and Wednesday
Lobby A

Join your colleagues for one of the following exciting tours. Tours will depart from the Lobby A entrance at the start times listed below for each tour. Please inquire at the registration desk for more information.

National Wind Technology Center, NREL – Boulder, Colorado
Tuesday, September 17
1:00 pm - 3:30 pm Cost: $40/person
Limited to 20 people

NWTC facilities are contained within a 305-acre area that comprises field test sites, test laboratories, industrial high-bay work areas, machine shops, electronics and instrumentation laboratories, and office areas. In addition, there are hundreds of test articles and supporting components such as turbines, meteorological towers, custom test apparatus, test sheds, storage areas, and calibration and measurement instruments. We also have data acquisition systems, load frames, computers and electronics, machine tools, supporting heavy equipment, and associated required infrastructure including electrical power, water, fire protection, and fiber optic communications.

SMA America LLC., PV Inverter manufacturer
Wednesday, September 18
10:00 am - 12:30 pm Cost: $40/person
Limited to 50 people

SMA Solar Technology AG is a global leader in the development, production and sales of PV inverters and, as an energy management group, offers innovative key technologies for future power supply structures. SMA is represented in all important photovoltaics markets in 19 countries on four continents. The company has a staff of over 5,500 and reached a sales volume of EUR 1.7 billion in 2011.

ECCE Banquet

Wednesday, 7:00 pm – 9:00 pm
Mile High Ballroom

Join your colleagues for great food, drinks, entertainment and networking.

Oral Presenters

Speaker Ready Room
Saturday through Thursday
Room: 202

ALL Oral Presenters must check in at the Speaker Ready Room at least 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.

The hours of operation of the Speaker Ready Room are:
Saturday, September 14..... 3:00 pm – 5:00 pm
Sunday, September 15 ..... 8:30 am – 5:00 pm
Monday, September 16 ..... 8:30 am – 5:00 pm
Tuesday, September 17 ..... 8:30 am – 12:00 pm
Wednesday, September 18..... 8:30 am – 6:00 pm
Thursday, September 19 ..... 8:30 am – 12:00 pm

You may also edit your presentation during speaker ready room hours and re-upload it if it is more than 4 hours prior to your session. When you are finished, AV personnel will upload your presentation onto the laptop in your scheduled session room. Please note, if you have edits to your presentation less than 4 hours before your session, you will need to bring them with you on a flash drive directly to the session room.

Oral Presenters' Orientation and Breakfast
A presenters' orientation will be held for oral presenters and session chairs from 7:00 am – 8:00 am, Monday through Thursday, at the Colorado Convention Center. The location for the breakfast is as follows:
- Monday and Tuesday – *Room 103/105*
- Wednesday and Thursday – *Mile High Ballroom*

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
Tuesday
Exhibit Hall A

Poster Session I .....Monday, September 16, 5:00 pm – 6:30 pm
Poster Session II ...Tuesday, September 17, 10:00 am – 11:30 am
Poster Session III.....Tuesday, September 17, 3:30 pm – 5:00 pm

Posters will be on display on Monday and Tuesday in Exhibit Hall A at the Colorado Convention Center. The poster presenters should be available for questions at their display boards during their scheduled poster presentation time. If you are unsure in which session your poster should be presented, please review the complete Technical Session schedule starting on page 35.

Poster Presenters will have access to Exhibit Hall A at the Colorado Convention Center to set up and tear down their posters at the times listed below for each of the Poster Sessions.

Poster Session I Setup
Setup .....Monday, September 16, 2:00 pm – 4:00 pm
Poster Session.....Monday, September 16, 4:00 pm – 6:30 pm
Breakdown.....Monday, September 16, 6:30 pm – 7:30 pm

Presenters for Poster Session I must have their posters set-up no later than 4:00 pm. Any posters that remain on the poster boards at 7:30 pm, and do not belong in Poster Session II will be removed and kept at the Registration Desk.

Poster Session II Setup
Setup .....Tuesday, September 17, 8:00 am – 9:00 am
Poster Session.....Tuesday, September 17, 10:00 am – 11:30 am
Breakdown.....Tuesday, September 17, 11:30 am – 12:30 pm

Presenters for Poster Session II must have their posters set-up no later than 9:00 am. Any posters that remain on the poster boards at 12:30 pm, and do not belong in Poster Session III will be removed and kept at the Registration Desk.

Poster Session III Setup
Setup .....Tuesday, September 17, 2:00 pm – 3:00 pm
Poster Session.....Tuesday, September 17, 3:30 pm – 5:00 am
Breakdown.....Tuesday, September 17, 6:00 pm – 7:00 pm

Presenters for Poster Session I must have their posters set-up no later than 3:00 pm. Any posters that remain on the poster boards at 7:00 pm, will be removed and kept at the Registration Desk. Uncollected posters will be discarded.

Poster Boards & Push-pins
4' x 8' poster boards will be provided, so please keep these dimensions in mind when printing your posters. Push pins will be provided for all poster presenters.

Poster Presenter's Orientation
A presenters' orientation will be held for poster presenters on Monday and Tuesday at the Colorado Convention Center. The orientation will be located at the stage in *Exhibit Hall A* as follows:
- Monday – 1:30 pm – 2:00 pm *(Snack Provided)*
- Tuesday – 7:30 am – 8:00 am *(Breakfast Provided)*

Poster Presenters should attend the orientation each day that they are scheduled to provide a poster presentation; you may only attend on days on which you are scheduled to present.

All of the following meetings will be held at the Colorado Convention Center (except where otherwise noted).

IAS and IAS/PELS Joint Committee Meetings

IAS Industrial Power Conversion Systems Department
Sunday, September 15
7:00 pm – 8:00 pm
Room: 201

IAS Industrial Drives Committee and PELS Technical Committee on Motor Drives and Actuators
Monday, September 16
6:00 pm – 7:00 pm
Room: 201

IAS Industrial Power Converter Committee
Monday, September 16
7:00 pm – 8:00 pm
Room: 203

IAS Transportation Systems Committee and PELS Technical Committee on Vehicle and Transportation Systems
Tuesday, September 17
10:00 am – 12:00 pm
Room: 710

IAS PEDCC
Tuesday, September 17
5:00 pm – 6:00 pm
Room: 201

IAS Electric Machines Committee
Tuesday, September 17
5:00 pm – 6:00 pm
Room: 203

IAS Renewable Energy Systems Committee
Tuesday, September 17
6:00 pm – 7:00 pm
Room: 205

ECCE Committee Meetings

2013/2014/2015 ECCE Organizing Committees
Wednesday, September 18
10:00 am – 12:00 pm
Room: 710

ECCE Steering Committee America and PELS Meetings Committee Lunch
(Committee Members Only — Companions Welcome)
Wednesday, September 18
11:30 am – 1:30 pm
Room: 708

ECCE Steering Committee (America)
Wednesday, September 18
12:00 pm – 2:00 pm
Room: 710

PELS Committee Meetings

PELS Magazine Editorial Board
Sunday, September 15
12:00 pm – 3:00 pm
Room: 206

PELS Bylaws Committee
Sunday, September 15
2:00 pm – 4:00 pm
Room: 208

PELS Industry Advisory Committee
Sunday, September 15
3:00 pm – 6:00 pm
Room: 207

PELS Technical Committee and Standing Committee Chairs
Monday, September 16
12:00 pm – 1:30 pm
Room: 206

PELS Southern Conference Steering Committee
Tuesday, September 17
9:00 am – 10:00 am
Room: 208

PELS Technical Committee on Vehicle and Transportation Systems and IAS Transportation Systems Committee
Tuesday, September 17
11:00 am – 12:00 pm
Room: 710

PELS TC7 Communication Energy Systems (INTELEC) IEC Board Meeting *(Committee Members Only)*
Tuesday, September 17
11:00 am – 3:00 pm
Room: 207

PELS Committee Meetings *(Continued)*

PELS TC6 on High Performance and Emerging Technologies Technical Committee
Tuesday, September 17
12:00 pm – 1:30 pm
Room: 208

PELS TC1 on Power and Control Core Technologies Technical Committee
Tuesday, September 17
12:00 pm – 2:00 pm
Room: 206

PELS TC2 Power Conversion Systems and Components Technical Committee
Tuesday, September 17
2:00 pm – 3:30 pm
Room: 208

PELS Standards Committee
Tuesday, September 17
3:30 pm – 5:00 pm
Room: 208

PELS TC7 Communication Energy Systems Technical Committee (INTELEC)
Tuesday, September 17
4:00 pm – 5:00 pm
Room: 206

Solar Splash Workshop
Tuesday, September 17
5:30 pm – 6:30 pm
Room: 108

PELS TC5 Sustainable Energy Technical Committee
Tuesday, September 17
6:30 pm – 7:30 pm
Room: 206

PELS EXEC Team
Wednesday, September 18
7:30 am – 9:00 am
Room: 208

PELS JESTPE Editorial Board
Wednesday, September 18
8:00 am – 10:00 am
Room: 710

PELS Fincom *(Committee Members Only)*
Wednesday, September 18
9:00 am – 10:00 am
Room: 208

Awards Committee including Nominations
Wednesday, September 18
9:00 am – 10:30 am
Room: 206

PELS Women in Engineering Breakfast (PELS WiE)
Wednesday, September 18
9:00 am – 11:00 am
Room: HYATT REGENCY
Speaker: Karen Butler-Purry, *Professor, Associate Provost for Graduate Studies, Assistant Director, Power System Automation Laboratory*

PELS/ECCE Global Partnership *(Committee Members Only)*
Wednesday, September 18
10:00 am – 11:00 am
Room: 208

IEEE Transactions on Power Electronics Editorial Board
Wednesday, September 18
11:30 am – 1:30 pm
Room: 206

PELS Meetings Committee and ECCE Steering Committee America Lunch *(Committee Members Only)*
Companions Welcome
Wednesday, September 18
11:30 pm – 1:30 pm
Room: 708

PELS Nominations Committee
(Committee Members Only)
Wednesday, September 18
12:00 pm – 2:00 pm
Room: 208

PELS Meetings Committee
Wednesday, September 18
2:00 pm – 5:00 pm
Room: 710

PELS Membership Committee: Students/ Liaisons & Chapter Chairs
Wednesday, September 18
3:00 pm – 4:30 pm
Room: 206

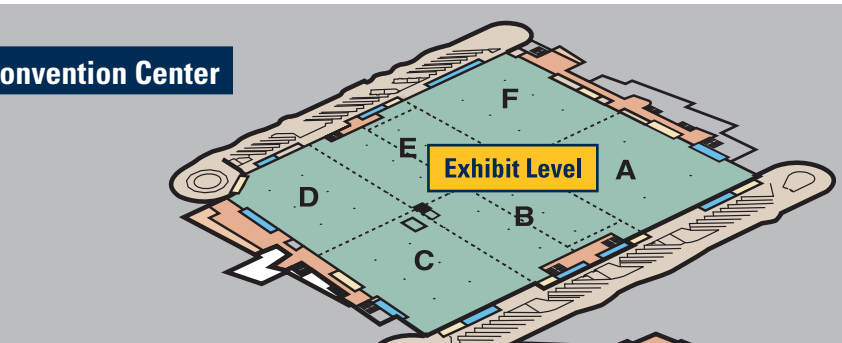
PELS Education Committee Meeting
Thursday Sept 19, 2013
9:40 am – 11:00 am
Room: 208

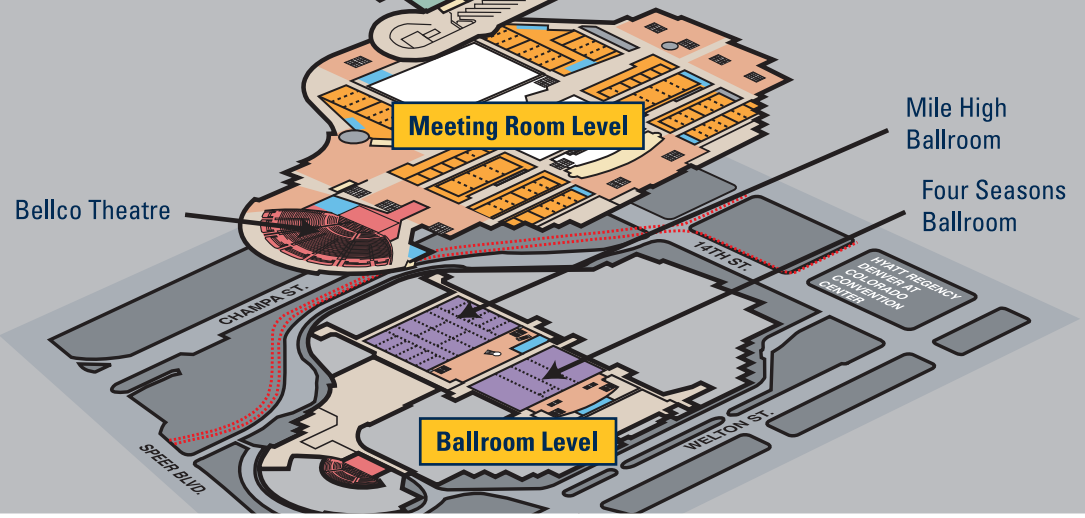
PELS Operations & Products Committee
Thursday, September 19
2:00 pm – 6:00 pm
Room: 710

Dinner AdCom *(Committee Members Only)*
Thursday, September 19
6:30 pm – 11:00 pm
Room: OFFSITE

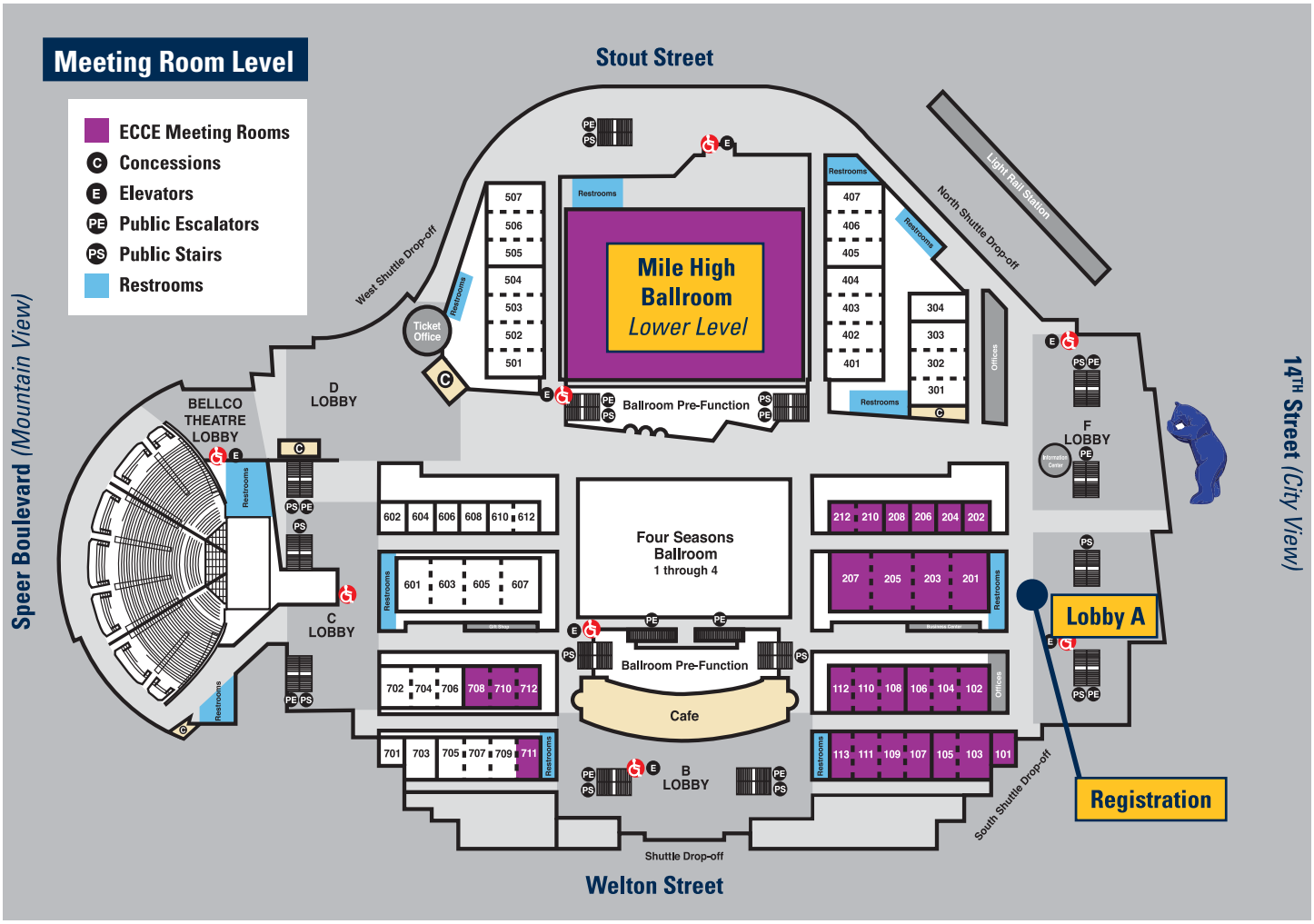
PELS Administrative Committee
Friday, September 19
8:00 am – 3:00 pm
Room: HYATT REGENCY

Colorado Convention Center





Meeting Room Level



VISIT DENVER
The Convention & Visitors Bureau

1 Hyatt Regency at Colorado Convention Center

MAJOR ATTRACTIONS

1 U.S. Mint
2 Denver City & County Building
3 Civic Center Park
4 Denver Art Museum
5 Denver Public Library
6 History Colorado Center
7 Colorado State Capitol Building
8 Cherry Creek Shopping

ⓘ VISIT DENVER Information Center

Monday, September 16 **8:00 am – 10:00 am**

Mile High Ballroom

The distinguished plenary speakers were invited this year to share their insights on the future of energy conversion, with a special emphasis on sustainable innovations and integrated systems. This diverse mix of thought leaders and innovators plan to set the tone for this year's conference with a plenary session that will be engaging for attendees. The organizing committee is pleased to welcome each of these speakers and offers warm appreciation for their contribution to the success of the conference.

Sam Baldwin

Dr. Baldwin is a PhD. Physicist and currently serves as the Chief Science Officer for the Office of Energy Efficiency and Renewable Energy at the U.S. Department of Energy (DOE). In previous positions he has served with the White House Office of Science and Technology Policy (OSTP), the National Renewable Energy Laboratory, the Congressional Office of Technology Assessment (OTA), Princeton University, the U.S. Senate, and elsewhere. Dr. Baldwin is the author or co-author of nine books and monographs at OSTP, OTA, DOE, and elsewhere, and more than 30 papers and technical reports on energy technology and policy, physics, and other issues. He is a Fellow of the American Association for the Advancement of Science. Dr. Baldwin will address Renewable Electricity Futures: Opportunities and Challenges.

Benjamin Kroposki

Dr. Kroposki is the Director of Energy Systems Integration at the National Renewable Energy Laboratory (NREL). At NREL he leads NREL's strategic research in the design and performance optimization of electrical, thermal, and fuel pathways for energy systems at all scales. He received his BS and MS in Electrical Engineering from Virginia Tech and PhD in Engineering Systems from the Colorado School of Mines. His expertise is in the design and testing of renewable and distributed power systems and grid integration. He has written more than 100 publications in these areas and is the guest editor for *IEEE Power & Energy Magazine* special issues on solar energy integration. Dr. Kroposki is also an Editor for both the *IEEE Transactions on Sustainable Energy* and *IEEE PV Journal*. Dr. Kroposki also participates in the development of distributed power and renewable standards and codes and served as the Chairman for IEEE 1547.4 *"Guide for Design, Operation, and Integration of Distributed Resource Island Systems with Electric Power Systems"*.

James Lyons

Dr. Lyons entered the venture capital business in 2008 after a 30-year technology career at General Electric. Jim currently serves as chief technologist for the venture investment teams at both the Capricorn Investment Group and Novus Energy Partners focused on the creation and growth of clean/renewable energy companies. Formerly, Jim was Chief Engineer for Electrical Technologies at GE Research serving as technology leader and mentor for a 250-member global team. He was a leading advocate for renewables within GE and corporate champion behind the formation of GE Wind Energy in 2002 - subsequently serving as chief technologist for the wind business, which quickly grew to annual revenues of $8B. Dr. Lyons was also the technology leader behind the creation of GE's Digital Energy business unit in 2000. While at GE, Jim served on the board of directors of Powerex, the Electric Drive Trade Association, and the US Offshore Wind Collaborative as well as becoming a principal company spokesperson for renewable energy. In 2006, Jim was co-chair of the American Wind Energy Conference, initiating the AWEA/DOE 20% wind energy roadmap. Dr. Lyons has led new business initiatives on waste gasification, electric vehicles, advanced batteries, solid-state lighting, solar PV, and rural electrification. During his GE chief engineer tenure Jim led many technology due diligence investigations and has most recently led technology investigations in silicon metal, high efficiency PV, quantum dots, nanowires, and energy storage. Dr. Lyons is currently a reviewer for the National Science Foundation - serves on the boards of Encell Technologies and Boulder Windpower. He holds 40 patents and a BSEE degree from RPI, an MSEE from Virginia Tech, and a Ph.D. from Cornell University.

Ramón Guitart

Ramón Guitart holds a BSEE from the University of Wisconsin at Milwaukee, and a Master of Science in Engineering Sciences from Marshall University in Huntington, West Virginia. Mr. Guitart has over 25 years of experience in rotating machinery. He has held engineering positions in well-known companies like Westinghouse Electric Corporation, Rockwell Automation, Trane, General Electric, and Converteam. Ramon currently manages the Research and Development Department of Round Rock, TX based TECO-Westinghouse Motor Company where he is directing research of High Temperature Superconductivity based electric machines. His areas of interest also include high density cooling techniques, renewable power generation, and systems integration.

Tuesday, September 17 **7:30 pm – 9:00 pm**

There will be two Townhall meetings (formerly Rap Sessions) this year at ECCE for attendees to engage in debate concerning critical issues in the state of the art and emerging technologies. These sessions will be different in structure from the previous "Rap Sessions" in that the sessions are designed to be more interactive than just another oral session with formalized presentations. The format is much more informal in order to put the attendees at ease so that open discussion and engagement with expert panelists flourishes. The meetings will be led by a moderator in order to keep the meandering digressions to a minimum, yet also to stimulate and promote innovative tangents. Participants are strongly encouraged to contribute to the debate, discussion, and discourse surrounding the selected topics. We are hoping for honest debate about the topics in a passionate and intelligent way.

The two sessions this year will focus on renewable energy and converter design technologies.

Townhall: Renewable Energy Technologies

Room: 110/112

Renewable energy is vital for society to become independent from fossil fuels and many technologies have been proposed and developed to meet this desire. However there are challenges and uncertainties to be overcome. This meeting will focus on the latest technologies, policies and future of renewable energy.

Moderator
Sudipta Chakraborty, *NREL, USA*

Panelists
Frede Blaabjerg, *Aalborg University, Denmark*
Marcelo Simoes, *Colorado School of Mines, USA*
Annabelle Pratt, *Intel, USA*
Dezso Sera, *Aalborg University, Denmark*
Daniel M. Saban, *Halliburton, USA*

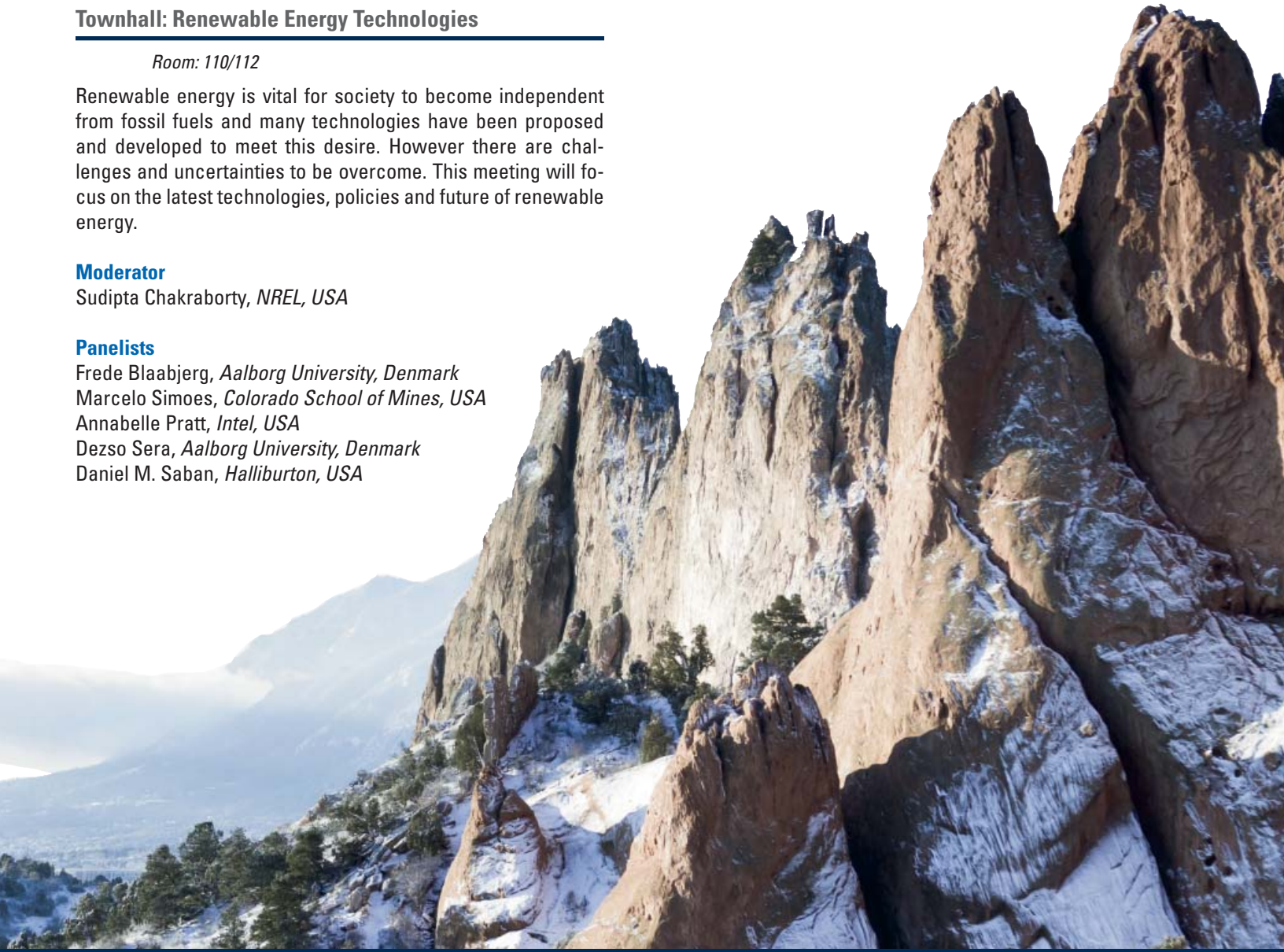
Townhall: Emerging Converter Design Technologies

Room: 107/109

Power electronics are an enabling technology for almost every modern electrical system from the smart grid to consumer electronics. One reason for the success and implementation of power electrics is there ever increasing efficiency, performance and reliability. This meeting will focus on current trends and the state of the art in power electronic converter design technologies.

Moderator
Petar J. Grbović, *Huawei Technologies, Germany*

Panelists
Johhan W. Kolar, *Eidgenossische Technische Hochschule, Switzerland*
Thierry Meynard, *CNRS, France*
Martin Schulz, *Infineon Technologies, Germany*
Robert (Bob) White, *Embedded Power Labs, USA*
Tobias Geyer, *ABB Corporate Research, USA*



Note: All tutorials are held on September 15, 2013. Pre-registration for each tutorial is required. Please visit the Registration Desk for space availability.

Sunday, September 15 **8:00 am – 12:00 pm**

Morning Sessions

T1-1 Stability of Power Conversion Systems

Room: 103/105

Instructors: Pierre Magne, Babak Nahid-Mobarakeh, Serge Pierfederici, *University of Lorraine, France*

On-board energy management in small optimized grids is an important issue in the next generation of electrified transportation systems. On one hand, design engineers are looking for minimizing the size and the weight of power systems and the passive components (inductors and capacitors) are a part of the first elements that should be reduced. On the other hand, it is known that unstable oscillations on the grid may appear under overload conditions when small capacitances are used. This tutorial focuses at first on the stability analysis of interconnected power converters in a microgrid. Linear and nonlinear tools will be presented and applied to a DC microgrid developed for an aeronautic application. This practical example allows attendees to derive the relationship between the stability (small and large signal) and the passive components of the system. Then, the same microgrid will be stabilized using passive and active stabilizers. Attendees will design first a passive stabilizer, then an active one. Discussions on how each stabilizer improves the stability margins of the system will conclude the tutorial.

T1-2 Advanced Power Semiconductors: Art of Control, From Theory to Practice

Room: 104/106

Instructor: Dr. Petar J. Grbovic, *HUAWEI Technologies Dusseldorf GmbH, Germany*

The gate driver is a key element that links power semiconductor switches and control system of a power converter. Main functions of a gate driver are: 1) to control state of the power semiconductor switch, 2) to optimize transition from one state to another (conducting to blocking and blocking to conducting state), and 3) to protect the semiconductor switch and entire converter in a case of an unexpected event. In this tutorial we will learn what "the art of control of advanced semiconductor switches" is. We will learn how an advanced semiconductor switch has to be driven in order to achieve maximum performance of the device and how the device as well as entire power converter can be protected. This tutorial is aimed at power electronics engineers who want to improve their knowledge and understanding of art of driving advanced power semiconductor switches and their application in power conversion, nowadays as well as in the near future. Also, the tutorial can be recommended as literature for graduate and PhD students.

T1-3 Model Predictive Control of Industrial Drives

Room: 108

Instructors: Tobias Geyer, Nikolaos Oikonomou, *ABB Corporate Research, Switzerland*

In recent years, model predictive control (MPC) for power electronics and drives has become a very popular research topic. However, the majority of MPC schemes proposed so far tend to be of a simplistic nature and of limited applicability to industrial and high power electrical drives. Bridging this gap, this tutorial focuses on high-performance MPC schemes that have been developed, implemented and tested for industrial MW drives. These MPC schemes combine the very fast transient response times of deadbeat controllers with the superior steady-state performance of optimized pulse patterns. The main emphasis of this tutorial is on the development of MPC algorithms for cases, where the absence of a modulator and hence the use of discrete-valued control variables (the switch positions) together with the need to reduce the converter switching frequency (losses) necessitates the use of very long prediction horizons and the development of tailored control problem formulations and solution algorithms. The key benefit of these approaches is that the control and modulation problem is addressed in one computational stage. As a result, the current harmonic distortions and the switching losses can be reduced simultaneously, when compared to carrier-based PWM. Indeed, at low switching frequencies, the resulting steady-state behaviour is similar to the one obtained by optimized pulse patterns. During transients, however, very fast current and torque response times are achieved, similar to deadbeat control.

T1-4 Testing and Diagnostics of Induction Machines in an Industrial Environment

Room: 107/109

Instructors: Sang Bin Lee, Ernesto Wiedbrig, Karim Younsi, *Korea University, Korea (South), Wiedenbrug LLC, USA, General Electric Global Research Center, USA*

The goal of this tutorial is to offer valuable information about the diagnostic reality in industry. The target audience is practicing research and development engineers in the area of reliability, diagnostics and prognostics for electrical machines in industrial environments. The wide gap between the predictive maintenance professional's situation, and methods deemed suitable in a research laboratory will become apparent, opening to candid discussions during this tutorial. Researchers will benefit by being able to target their future work to the needs of industry, thus raising the odds for their research growing into commercially available solutions. The tutorial covers electrical diagnostic techniques used in the field, putting them into perspective with non-electrical diagnostic methods also being used.

T1-5 Switched Reluctance Machines — Design and Control

Room: 110/112

Instructors: Iqbal Husain, Yilmaz Sozer, David Torrey, *NC State University, USA, University of Akron, USA, GE Global Research, USA*

The switched-reluctance machine (SRM) has intrigued the electric machines community for over thirty years. The SRM possesses a few unique features that make it a strong competitor to induction and PM motor drives in various adjustable speed drive and servo applications including traction. The primary advantages are low construction costs and energy efficiency, and high fault tolerance. The maximum permissible rotor temperature is higher, since there are no permanent magnets (in PM machines) or windings (in induction machines) on the rotor. Lower rotor losses make thermal management relatively easier in SRMs. The SRM has not penetrated many markets due to the lack of technical know-how in the industry, higher electronics cost and targeting the wrong applications. The electronics requirement for the SRM is slightly more than that of induction and PM motor drives, but that cost has dramatically come down over the years. Thus, comparing motor costs became imperative for the industry in recent years. The uncertainty with rare earth magnet material imports can be eliminated with SRMs. There are several niche applications where SRMs are being used such as mining equipment, portable generators, starter-generators etc. SRM is demonstrating value in applications that take advantage of the inherent ability of the SRM to support a broad constant power speed range; traction drives are a specific example. The tutorial plans to cover the fundamentals of the SRM along with practical examples of machine and controller designs. Topics to be covered include: SRM Basics; SRM Design; Drive Technology; Control and Applications.

T1-6 Dynamic Modeling of Renewable Energy Generator and Power Plant

Room: 111/113

Instructors: Ed Muljadi, Vahan Gevorgian, Mohit Singh, YC Zhang, Longya Xu, *NREL, USA, OSU, USA*

This tutorial will cover the challenges and methods of dynamic modeling of single renewable energy generators and whole renewable energy plants (wind power plants, large PV arrays). Also, modeling aspects of other auxiliary systems (FACTS, protection, etc.) and energy storage will be covered as well. Another modeling area included into the tutorial is related to dynamic aspects of offshore wind integration. The deployment of offshore wind power plants requires power transmission from the plant to the load center inland. Some modeling aspects of AC and DC transmission options will be discussed during this tutorial.

Sunday, September 15 1:00 pm – 5:00 pm

Afternoon Sessions

T2-1 Matrix Converters: Implementation and Industrial Applications

Room: 103/105

Instructors: Dr. Liliana de Lillo, Dr. Lee Empringham, *University of Nottingham, United Kingdom*

The challenges and practical implementation of a matrix converter considering three input and three output applications are addressed together with its control. The contribution of guest speakers, from both academia and especially representatives from industry involved in the advancement of matrix converter technology will offer a comprehensive view on this topology of power converters with the intent of highlighting how most of the hardware and control issues in a real matrix converter implementation have been overcome leading to real-world products and prototypes, already available on the market. Also with the advancement of SiC devices together with improved availability, have enabled exploration of new power density challenges for this technology which has the inherent feature of being more compact than a DC-link inverter.

T2-2 Characteristics and Application of IGBT Power Modules

Room: 104/106

Instructors: John Donlon, Eric Motto, Nick Clark, Bill Kephart, *Powerex, Inc., USA*

Information provided on IGBT module data sheets varies considerably between manufacturers and can leave the designer with many questions regarding device selection. Issues the designer must deal with include interpretation of device ratings, gate drive requirements, and providing device and system protection. The intent of this tutorial is to aid the designer in applying an IGBT to a new product. Questions and concerns a designer might have will be addressed by the various techniques and circuit examples that will be presented. IGBT chip technology and device packaging options will also be discussed. The attendee should leave the course with a better understanding of the IGBT, both specifically as a device and how it functions in an application. The goal will be to impart an understanding of the features, characteristics, and limitations of the IGBT power module and how to ensure a successful application. This will include the application of IGBTs in power circuits, protecting the IGBT from internal and external disturbances, and an understanding of thermal design, handling, and reliability considerations. The tutorial is intended for design engineers new to IGBTs as the main switch in power conversion equipment as well as refresher for the experienced designer with questions about confusing or conflicting information on the data sheets from various manufacturers.

T2-3 Power Electronics Solutions for Electric and Plug-in Hybrid Electric Vehicle Battery Charging and Energy Management

Room: 108

Instructor: Sheldon S. Williamson, *Concordia University, Canada*

This tutorial will initially review some current as well as futuristic charging methodologies for EV/PHEV batteries and energy storage systems. The presentation will discuss the modeling, sizing, design, and implementation of a high-efficiency, single-stage, PV/grid based charging infrastructure for EVs/PHEVs. This tutorial will be useful for engineers and managers with entry-level and/or medium-level knowledge of power electronics and motor drives. The talk would also be suitable for engineers with entry-level knowledge of power electronics and motor drives applications towards energy storage systems, electric vehicles, and renewable energy systems.

T2-4 The Role of Thermal Simulation in Electric Machine Optimization

Room: 107/109

Instructor: Dr. David Staton, *Motor Design Ltd, United Kingdom*

The objective of this course is to explain the different methods available for modelling heat transfer, flow and losses in electric machines. The course also gives an overview of the benefits and limitations of the different cooling types available. The tutorial is divided into 3 sections. Section 1 examines the need for thermal analysis to optimize the design, maximize efficiency and/or motor life, minimize weight or ensure a motor is sized correctly for its intended load duty. The first section also highlights and compares the different analytical and numerical methods used in thermal analysis. Section 2 covers the key issues in electric machine thermal simulations, such as conduction, convection and radiation, loss prediction, winding heat transfer and temperature rise and interface thermal resistances. Section 3 shows how thermal analysis has been used to optimize electric machine designs for automotive, aerospace and industrial applications.

T2-5 Permanent Magnet Fundamentals

Room: 110/112

Instructor: Dr. Stan Trout, *Spontaneous Materials, USA*

Starting with the things we learned in the first grade, this seminar will present the basics of permanent magnets and magnetic materials more broadly. Attendees will understand the definitions and arcane units of magnetism. They will learn how magnets are processed, magnetized, characterized and affected by temperature. This small investment of your time will increase your magnet "IQ" and make the technology easier to navigate.

T2-6 Photovoltaic Panels: Technology, Modeling and Characterisation

Room: 111/113

Instructor: Dezso Sera, *Aalborg University, Denmark*

The objective of this tutorial is to offer a comprehensive review of essential aspects involved in the design and exploitation of modern PV power plants. A review of PV panels' technology will offer a vision of the PV technology currently installed by integrators, as well new trends. Modeling and characterization of PV panels and arrays will also be presented. PV inverters will be presented by describing both their hardware and control structures. A special attention will be paid to the control system of grid-interactive PV power plants. The synchronous power control concept will be presented as an effective solution to integrate PV power plants in distributed power systems. Design of PV plants, including design optimizations will also be covered. Finally, the methodology for defining a PV plant business model, considering the influence of both technical and financial factors, will be presented.

Monday, September 16 10:20 am – 12:00 pm

S1 Marine and Aerospace Systems

Room: 102
Chair: Pierluigi Tenca

10:20 am • Performance Evaluation of 3-phase Buck-type PWM Rectifiers with Integrated and Symmetrical Boost Converter Using SIC Mosfets for Aircraft Applications
Andrew Trentin, Pericle Zanchetta, Patrick Wheeler and Jon Clare, The University of Nottingham, United Kingdom; University of Nottingham, United Kingdom

10:45 am • Medium Voltage Current Source Converter Drives for Marine Propulsion System using a Dual-winding Synchronous Machine
Jingya Dai, Sang Woo Nam, Manish Pande and Ghodrat Esmaeili, Rockwell Automation, Canada

11:10 am • Consideration of Active-front-end Rectifier for Electric Propulsion Navy Ship
So-Yeon Kim, Byung-Geuk Cho and Seung-Ki Sul, Seoul National University, Korea (South)

11:35 am • Time-delay Effects in a HIL Aircraft Power System Emulator
Chengwei Gan, Rebecca Todd and Judith Apsley, The University of Manchester, United Kingdom

S2 Renewable Energy Storage

Room: 104/106
Chair: Behrooz Mirafzal

10:20 am • New Control Strategy for Bidirectional LLC Resonant Converter in Energy Storage Systems
Tianyang Jiang, Junming Zhang and Yousheng Wang, Zhejiang University, China

10:45 am • Experimental Verification of Flywheel Power Leveling System Oriented to Low Cost and General Purpose Use
Jun-ichi Itoh, Kenta Tanaka, Soya Matsuo and Noboru Yamada, Nagaoka University of Technology, Japan

11:10 am • Quantitative and Qualitative Evaluation of Flexible Distribution of Energy and Storage Resources
Hussam Khasawneh and Mahesh Illindala, The Ohio State University, United States

11:35 am • Determination of the Optimal Battery Capacity Based on a Life Time Cost Function in Wind Farm
Cong-Long Nguyen, Tae-Won Chun and Hong-Hee Lee, University of Ulsan, Korea (South)

S3 Operation and Control of DC-grids

Room: 107/109
Chair: Terrence Summers

10:20 am • A Generalized Voltage Droop Strategy for Control of Multi-terminal DC Grids
Kumars Rouzbehi, Arash Miranian, Alvaro Luna and Pedro Rodriguez, UPC, Spain; University of Tehran, Iran

10:45 am • Optimization with System Damping Restoration for Droop Controlled DC-DC Converters
Lexuan Meng, Tomislav Dragicevic, Juan Carlos Vasquez and Josep Maria Guerrero, Aalborg University, Denmark

11:10 am • Design and Verification of Smart and Scalable DC Microgrids for Emerging Regions
P. Achintya Madduri, Javier Rosa, Eric A. Brewer, Seth R. Sanders and Matthew Podolsky, University of California, Berkeley, United States

11:35 am • Using Apparent Resistance for Fault Discrimination in Multi-terminal DC Systems
Pietro Cairoli and Roger Dougal, University of South Carolina, United States

S4 Modulation of Multilevel Converters

Room: 108
Chair: Luca Zarri

10:20 am • Space Vector Modulation for Cascaded Asymmetrical Multilevel Converters Under Fault Conditions
Fernanda Carnielutti, Humberto Pinheiro and Cassiano Rech, Federal University of Santa Maria, Brazil

10:45 am • Phase-shifted Pulse-width-amplitude Modulation for Quasi-Z-source Cascade Multilevel Inverter Based PV Power Systems
Yushan Liu, Haitham Abu-Rub, Baoming Ge and Fang Zheng Peng, Beijing Jiaotong University, China; Texas A M University at Qatar, Qatar; Michigan State University, United States

11:10 am • Optimization of the Pulse-width-modulation Strategy for Redundant and Non-redundant Multi-level Cascaded-cell Converters
Marco Stieneker, Stefan Engel, Hanno Stagge and Rik De Doncker, RWTH Aachen University, Germany

11:35 am • Modeling and Voltage Method for Modular Multilevel Converter
Lucas Mondardo Cunico, Yales Rômulo de Novaes and Sergio Vidal Garcia Oliveira, Santa Catarina State University, Brazil

S5 Converter Modeling and Control I

Room: 110/112
Chair: Liming Liu

10:20 am • V2 Control with Capacitor Current Ramp Compensation using Lossless Capacitor Current Sensing
Yingyi Yan, Pei-Hsin Liu, Fred Lee, Qiang Li and Shuilin Tian, Virginia Tech, United States

10:45 am • State-machine Realization of Second-order Sliding-mode Control for Synchronous Buck DC-DC Converters
Rui Ling, Dragan Maksimovic and Ramon Leyva, Chongqing University, China; University of Colorado - Boulder, United States; Universitat Rovira i Virgili, Spain

11:10 am • Ripple Minimization in Asymmetric Multiphase Interleaved DC-DC Switching Converters
Marcel Schuck and Robert C.N. Pilawa-Podgurski, University of Illinois at Urbana-Champaign, United States

11:35 am • Bang-bang Charge Control for LLC Resonant Converters
Zhiyuan Hu, Laili Wang, Yan-Fei Liu and P. C. Sen, Queen's University, Canada

S6 DC-DC Isolated I

Room: 111/113
Chair: Dragan Maksimovic

10:20 am • Piezoelectric Transformer-based DC-DC Converter with Improved Burst-mode Control
Dejan Vasic, Yuan-Ping Liu, Francois Costa and Denis Schwander, SATIE ENS Cachan, France; CNES, France

10:45 am • Cycle-by-cycle Average Input Current Sensing Method for LLC Resonant Topologies
Zhiyuan Hu, Yan-Fei Liu and Paresh Sen, Queen's University, Canada

11:10 am • Design of an Interleaved Isolated Boost Converter with Coupled Inductors for High Step-up Applications
Giorgio Spiazzi and Simone Buso, University of Padova, Italy

11:35 am • A Series-input Forward Converter with Shared RCD Cell for High-reliability and Wide Input Voltage Range Applications
Xiaoqing Qin, Haibing Hu, Hongfei Wu, Yan Xing and Xudong Ma, Nanjing University of Aeronautics and Astronautics, China; Southeast University, China

SS1 Special Session: Products and Service Session I

Room: 201
Chair: Craig Winterhalter

10:20 am • Dy-free Rare Earth Magnets
Nimit Sheth, Molycorp Magnequench, United States

10:45 am • ASIC Based Current Transducers
Eric Lange, LEM USA, Inc., United States

11:10 am • 450 MVA GCT-STATCOM for Stability Improvement and Over-voltage Suppression
Toshiyuki Fuji, Mitsubishi Electric Corporation, Japan

11:35 am • Overview of a Family Power Stack Development Process
Igor Larrazabal, Ingeteam Power Technology, Spain

S7 Drive Control Topics in Transportation Applications

Room: 203
Chair: Lei Hao

10:20 am • An Accurate Torque Control of Permanent Magnet Brushless Motor Using Low-resolution Hall-effect Sensors for Light Electric Vehicle Applications
Ming-Shi Huang, Chin-Hao Chen, Hsin-Hung Chou, Guen-Zheng Chen and Wen-Ko Tsai, NTUT, Taiwan

10:45 am • Dynamic DC-link Voltage Adaptation for Thermal Management of Traction Drives
Joris Lemmens, Johan Driesen and Piet Vanassche, KU Leuven, Belgium; Triphase NV, Belgium

11:10 am • Suppression Method of Rising DC Voltage for the Halt Sequence of an Inverter in the Motor Regeneration
Jun-ichi Itoh, Wataru Aoki, Teck Chiang Goh and Akio Toba, Nagaoka University of Technology, Japan; Fuji Electric Co. Ltd, Japan

11:35 am • Impact of Position Sensor Accuracy on the Performance of IPM Drives
Lei Hao, Suresh Gopalakrishnan, Chandra Namuduri and Khwaha Rahman, General Motors, United States

S8 Grid Integration of Wind Energy

Room: 205
Chair: Lixiang Wei

10:20 am • Medium Voltage Inverter to Establish Grid Interface and Provide Ancillary Support for DC Distributed Wind Farms
Yogesh Patel and Adel Nasiri, Rockwell Automation, United States; University of Wisconsin - Milwaukee, United States

10:45 am • Resonance Issues and Active Damping in HVAC Grid-connected Offshore Wind Farm
Shuai Jiang, Shao Zhang, Xi Lu, Baoming Ge and Fang Zheng Peng, Michigan State University, United States

11:10 am • Hybrid Control Strategy for a Doubly Fed Induction Generator in Medium Voltage Wind Power System under Unbalanced Grid Conditions
Daesu Han, Yonggyun Park and Yongsug Suh, Chonbuk National University, Korea (South)

11:35 am • Analysis, Design, and Implementation of Multi-function Interfaced Inverters for Distributed Generation
Zhixiang Zou, Zheng Wang and Ming Cheng, Southeast University, China

S9 *Jimmie J. Cathey Memorial Session:* Induction Machines

Room: 207
Chairs: Uday Deshpande, Emmanuel Agamloh

10:20 am • Efficiency Determination of Converter-Fed Induction Motors: Waiting for the IEC 60034-2-3 Standard
Aldo Boglietti, Andrea Cavagnino, Marco Cossale, Alberto Tenconi and Silvio Vaschetto, Politecnico di Torino, Italy

10:45 am • A Grid-connected Induction Machine Capable of Operation at Unity and Leading Power Factor
Andrew Knight, John Salmon, Reaz ul Haque, Nirmans Perera and Mohammad Sedigh Toulabi, University of Alberta, Canada

11:10 am • Analysis of Pulsating Torque in Squirrel Cage Induction Machines by Investigating Stator Slot and Rotor Bar Dimensions for Traction Applications
Yingjie Li, Silong Li and Bulent Sarlioglu, Wempec, University of Wisconsin-Madison, United States

11:35 am • Finite Element Analysis of End Ring Impedance in Squirrel Cage Induction Machines
Dmitry Svechkarenko, Wenliang Chen, Yujing Liu and Olli Liukkonen, ABB Corporate Research Center, Sweden; Chalmers University of Technology, Sweden; ABB Oy, Finland

S10 Power Electronic Modules I

Room: 210/212
Chair: Jean-Luc Schanen

10:20 am • Characterization of 4.5 kV/2.4 kA Press Pack IGBT Including Comparison with IGCT
Rodrigo Alvarez, Felipe Filsecker, Martin Buschendorf and Steffen Bernet, Dresden University of Technology, Germany

10:45 am • A Novel IGBT Package to Reduce Current Imbalance with Pinfin Baseplate
Yulin Zhong, Xuhui Wen, Wei Sun, Wei Su and Jinlei Meng, CAS, China

11:10 am • Device Characterization and Performance of 1200V/45A SiC JFET
Vinay Baliga, Samir Hazra, Shikhar Singh, Sudhin Roy, Subhashish Bhattacharya, Joseph Paulakonis and Shailesh Notani, North Carolina State University, United States; Eaton Corporation, United States

11:35 am • Simple Spice Based Modeling Platform for 4.5 kV Power IGBT Modules
Muhammad Nawaz, Filippo Chimento, Niccollo' Mora and Massimo Zannoni, ABB Corporate Research, Sweden; University of Parma, Italy

Monday, September 16 1:30 pm – 3:35 pm

S11 Battery and Battery Management

Room: 102
Chair: Chris Mi

1:30 pm • Cell Balancing Control Using Adjusted Filters in Flyback Converter with Single Switch
Jin-Woong Kim, Jong-Won Shin and Jung-Ik Ha, Seoul National University, Korea (South)

1:55 pm • Online SOC and SOH Estimation for Multicell Lithium-ion Batteries Based on an Adaptive Hybrid Battery Model and Sliding-mode Observer
Taesic Kim, Wei Qiao and Liyan Qu, University of Nebraska-Lincoln, United States

2:20 pm • Design Considerations for Hybrid Battery/Supercapactior Systems for Pulsed Power
Anton Steyerl, Steven Bastien and Raymond Sepe, Electro Standards Laboratories, United States

2:45 pm • On-line Adaptive Tuning of a Lithium-Ion Battery Cell State of Charge Observer
Laurent Gagneur, Christophe Forgez and Ana Lucia Driemeyer Franco, Université de Technologie de Compiègne-Renault, France; Université de Technologie de Compiègne, France; Renault, France

3:10 pm • Effects of Pulse and DC Charging on Lithium Iron Phosphate (LiFePO4) Batteries
Hui Zhi (Zak) Beh, Grant Covic and John Boys, University of Auckland, New Zealand

S12 Wave Energy Technology

Room: 104/106
Chair: Yilmaz Sozer

1:30 pm • Adaptive Damping Power Take-off Control for a Three-body Wave Energy Converter
Zhe Zhang, Ted Brekken, Ken Rhinefrank, Al Schacher, Joe Prudell, Erik Hammagren and Pukha Lenee-Bluhm, Oregon State University, United States; Columbia Power Technologies, Inc., United States

1:55 pm • Modeling of a Two-body Wave Energy Converter Driven by Spectral JONSWAP Waves
Timothy Lewis, Bret Bosma, Annette von Jouanne and Ted Brekken, Oregon State University, United States

2:20 pm • Experimental Testing and Model Validation for Ocean Wave Energy Harvesting Buoys
Douglas Gemme, Steven Bastien, Raymond Sepe, John Montgomery, Stephan Grilli and Annette Grilli, Electro Standards Laboratories, United States; University of Rhode Island, United States

2:45 pm • Power Converter and Control System Developed in the Ocean Sentinel Instrumentation Buoy for Testing Wave Energy Converters
Terry Lettenmaier, Ean Amon and Annette von Jouanne, Oregon State University, United States

3:10 pm • Medium-voltage Power Converter Interface for Wave Dragon Wave Energy Conversion System
Nicolas Muller, Samir Kouro, Mariusz Malinowski and Jaime Glaria, Universidad Tecnica Federico Santa Maria, Chile; Warsaw University of Technology, Poland

S13 Modular Topologies for Solid-State Transformers

Room: 107/109
Chair: Pericle Zanchetta

1:30 pm • Optimum Number of Cascaded Cells for High-Power Medium-voltage Multilevel Converters
Jonas Huber and Johann Kolar, ETH Zurich, Switzerland

1:55 pm • A Modular Multilevel Converter-based Power Electronic Transformer
Ali Shojaei and Geza Joos, McGill University, Canada

2:20 pm • A Cost Effective Power Sharing Strategy for a Cascaded Multilevel Converter Based Solid State Transformer
Xu She, Alex Huang and Xijun Ni, North Carolina State University, United States

2:45 pm • Review of Modular Power Converters Solutions for Smart Transformer in Distribution System
Rafael Pena-Alzola, Ghanshyamsinh Gohil, Laszlo Mathe, Marco Liserre and Frede Blaabjerg, Aalborg University, Denmark

3:10 pm • Power Flow Analysis for 3-port 3-phase Dual Active Bridge DC-DC Converter and Design Validation Using High Frequency Planar Transformer
Seunghun Baek, Sungmin Kim, Sudhin Roy and Subhashish Bhattacharya, North Carlina State University, United States; Seoul National University, Korea (South)

S14 Control of Multilevel Converters I

Room: 108
Chair: Stefano Bifaretti

1:30 pm • Analysis and Operation of Modular Multilevel Converters with Phase-shifted Carrier PWM
Kalle Ilves, Lennart Harnefors, Staffan Norrga and Hans-Peter Nee, KTH Royal Institute of Technology, Sweden

1:55 pm • Decoupled Control of a 3-phase to 3-phase Modular Multilevel Converter
David Arancibia, Marcelo Perez and Jose Rodriguez, Universidad Tecnica Federico Santa Maria, Chile

2:20 pm • Experimental Verification of Direct Dead-time Control and DC-link Neutral-point Balancing of a Three Level Neutral-point-clamped (3L-NPC) VSC
Michael Sprenger, Tobias Barth, Rodrigo Alvarez, Marvin Tannhaeuser and Steffen Bernet, Dresden University of Technology, Germany

2:45 pm • Capacitor Balance in a Five-level Based Half-bridge Converter by Use of a Mixed Active-cell
Edison R.C. da Silva, Joao H.G. Muniz, Ranoyca N.A. Silva, Euzeli C. dos Santos Jr. and Luiz H. Barreto, Federal University of Campina Grande, Brazil; Universidade Federal do Piaui, Brazil; IUPUI, United States; Universidade Federal do Ceara, Brazil

3:10 pm • Current Control of a Phase-shifted-PWM STATCOM Using the Modular Multilevel Cascade Converter Based on Single-star Bridge-cells (MMCC-SSBC)
Joao Inacio Yutaka Ota, Yuji Shibano, Naoto Niimura and Hirofumi Akagi, Tokyo Institute of Technology, Japan; Toshiba Mitsubishi-Electric Industr. Syst. Corp., Japan

S15 Stability and Power Quality

Room: 110/112
Chair: Masayoshi Yamamoto

1:30 pm • Optimization of LCL Filter based on THD Estimation Model
Xinxin Zheng, Lan Xiao, Xiaoli Meng, Fanghua Zhang and Yangtian Tian, Nanjing University of Aeronautics and Astronautics, China

1:55 pm • Stability Issues of Z+Z or Y+Y Type Cascade System
Liu Fangcheng, Liu Jinjun, Zhang Haodong, Xue Danhong, Hasan Saad UL and Zhou Linyuan, Xi'an Jiaotong University, China

2:20 pm • Modified Norm Type Stability Criterion for Cascade AC System
Liu Fangcheng, Liu Jinjun, Zhang Haodong, Xue Danhong, Hasan Saad UL and Zhou Linyuan, Xi'an Jiaotong University, China

2:45 pm • Stability Analysis of Damping Control to Suppress Filter Resonance in Multi-modular Matrix Converter
Hiroki Takahashi and Jun-ichi Itoh, Nagaoka University of Technology, Japan

3:10 pm • A Hybrid Damping Method for LLCL-Filter Based Grid-tied Inverter with a Digital Filter and an RC Parallel Passive Damper
Weimin Wu, Zhe Lin, Yunjie Sun, Xiongfei Wang, Min Huang, Huai Wang, Frede Blaabjerg and Henry Shu-hung Chung, Shanghai Maritime University, China; Aalborg University, Denmark; City University of Hong Kong, Hong Kong

S16 DC-DC Non-Isolated I

Room: 111/113
Chair: Robert Pilawa

1:30 pm • Buck Derived Converters Based on Gallium Nitride Devices for Envelope Tracking Applications
Pablo Fernandez Miaja, Alberto Rodriguez and Javier Sebastian, University of Oviedo, Spain

1:55 pm • Switching Performance Comparison of the SiC JFET and the SiC JFET/Si MOSFET Cascode Configuration
Alberto Rodriguez, Marcos Fernandez, Marta M. Hernando, Diego. G. Lamar, Manuel Arias and Javier Sebastian, University of Oviedo, Spain

2:20 pm • Impact of Parasitic Elements on the Spurious Triggering Pulse in Synchronous Buck Converter
Jianjing Wang and Henry Shu-hung Chung, City University of Hong Kong, Hong Kong

2:45 pm • High Frequency Synchronous Buck Converter Using GaN-on-SiC HEMTs
Yuanzhe Zhang, Miguel Rodriguez and Dragan Maksimovic, University of Colorado, United States

3:10 pm • Evaluation of the Lagrangian Method for Deriving Equivalent Circuits of Integrated Magnetic Components: A Case Study Using the Integrated Winding Coupled Inductor
Kazuhiro Umetani, Seikoh Arimura, Tetsuo Hirano, Jun Imaoka, Masayoshi Yamamoto, DENSO Corporation, Japan; Shimane University, Japan

SS2 Special Session: Products and Service Session II

Room: 201
Chair: Adam Skorek

1:30 pm • Transfer Molded IGBT for Hybrid Vehicle with Improved Cycling Durability
John Donlon, Powerex, Inc., United States

1:55 pm • Standard Packages and Features for DIP-IPMs in Small Motor Drive Applications
Eric Motto, Powerex, Inc., United States

2:20 pm • Cree All-SiC Power Modules Enables Higher Performance Power Conversion Solutions at a Lower System Cost than State-of-the-Art Si IGBT Modules
Mrinal Das, Cree, Inc., United States

2:45 pm • All SiC Power Module with Advanced Structure and its Solar Inverter Application
Eiji Mochizuki, Fuji Electric, Japan

3:10 pm • Boost Inductors, Design for Cost and Loss Minimization
Weyman Lundquist, West Coast Magnetics, USA

S17 *Alfio Consoli Memorial Session:* High Frequency Injection Sensorless Control

Room: 203
Chairs: Thomas Lipo and Guiseppe Scarcella

1:30 pm • Sensorless Control of Doubly-Fed Induction Generators Based on Stator High Frequency Signal Injection
David Reigosa, Fernando Briz, Cristian Blanco and Juan Manuel Guerrero, University of Oviedo, Spain

1:55 pm • Arbitrary injection for Permanent Magnet Synchronous machines with multiple Saliencies
Dirk Paulus, Peter Landsmann, Sascha Kuehl and Ralph Kennel, Technische Universitaet Muenchen, Germany

2:20 pm • A Pulse Injection Based Sensorless Position Estimation Method for a Switched Reluctance Machine over a Wide Speed Range
Ernest Ofori, Tausif Husain, Yilmaz Sozer and Iqbal Husain, University of Akron, United States; North Carolina State University, United States

2:45 pm • Initial Rotor Position Detection for Delta-Connected Synchronous Reluctance Motor
Shaohua Suo, Anton H.C. Smith, Michael Harke, Thomas Flygare and Michael Laursen, Danfoss Power Electronics, United States; Danfoss Power Electronics, Denmark

3:10 pm • Low-Speed Position Sensorless Drive for Highly Efficient Permanent Magnet Synchronous Motor without Rare-Earth Metals
Yoshitaka Iwaji, Ryoichi Takahata, Takahiro Suzuki, Hirooki Tokoi and Enomoto Yuji, Hitachi, Ltd., Japan

S18 Grid Integration of Solar PV

Room: 205
Chair: Josep Guerrero

1:30 pm • Model Predictive Control of Grid-connected Inverters for PV Systems with Flexible Power Regulation and Switching Frequency Reduction
Jiefeng Hu, Jianguo Zhu and David Dorrell, University of Technology, Sydney, Australia

1:55 pm • A Single-stage Buck-boost 3-level Neutral-point-clamped Inverter for the Grid-tied Photovoltaic Power Generation
Feng Gao, XueFeng Ge and JianBo Wang, Shandong University, China; Wulian Power Supply Company, China

2:20 pm • Mitigating Variability of High Penetration Photovoltaic Systems in a Community Smart Microgrid using Non-flat Photovoltaic Modules
Mohammad B. Shadmand and Robert Balog, Texas A and M University, United States

2:45 pm • Grid Impacts and Mitigation Measures for Increased PV Penetration Levels using Advanced PV Inverter Regulation
Valentina Cecchi, Melanie Miller, Sukumar Kamalasadan and Johan Enslin, The University of North Carolina at Charlotte, United States; Duke Energy, United States

3:10 pm • Controlling of Medium Voltage Power-Factor of Photovoltaic Power Plants from the Low Voltage Side
Benjamin Krueger, Sebastian Gruber and Stefan Soter, University of Wuppertal, Germany

S19 IPM Machines for Electric Vehicles

Room: 207
Chair: Nicola Bianchi

1:30 pm • A Comparison of IPM Traction Machines with Different PM Materials
Jian Luo, Cheng Zhao, Ronghai Qu, Lingyun Gu and Xiaobo Zhang, Shanghai Zhongke Shengjiang EV Co. Ltd., China; Huazhong University of Science and Technology, China

1:55 pm • Advanced High Power-Density Interior Permanent Magnet Motor for Traction Applications
Ayman EL-Refaie, James P. Alexander, Steven Galioto, Patel Reddy, Kum-Kang Huh, Peter De Bock and Xiaochun Shen, GE Global Research, United States

2:20 pm • Efficiency Contours and Loss Minimization over a Driving Cycle of a Variable-Flux Flux-Intensifying Interior Permanent Magnet Machine
Takashi Fukushige, Natee Limsuwan, Takashi Kato, Kan Akatsu and Robert Lorenz, Nissan Motor Co., Ltd., Japan; University of Wisconsin - Madison, United States; Shibaura Institute of Technology, Japan

2:45 pm • Design and Analysis of IPM Machine with Bar Wound Fractional Slot Distributed Winding for Automotive Traction Application
Lei Hao, General Motors, United States

3:10 pm • Rotor Structure in 50 kW Spoke-Type Interior Permanent Magnet Synchronous Motor with Ferrite Permanent Magnets for Automotive Applications
Wataru Kakihara, Masatsugu Takemoto and Satoshi Ogasawara, Hokkaido University, Japan

S20 Magnetic Materials and Design

Room: 210/212
Chair: Charlie Sullivan

1:30 pm • Measured Performance and Micro-Fabrication of Racetrack Power Inductors
Daniel V. Harburg, Alex J. Hanson, Yue Song, Jizheng Qiu, Rui Tian, Christopher G. Levey, Charles R. Sullivan and David Otten, Thayer School of Engineering at Dartmouth, United States; Massachusetts Institute of Technology, United States

1:55 pm • Laminated Low Temperature Co-fired Ceramic Ferrite Materials and the Applications for High Current POL Converters
Mingkai Mu, Wenli Zhang, Fred Lee and Yipeng Su, Virginia Tech, United States

2:20 pm • Complex Permeability Measurements of Radial-Anisotropy Thin-Film Magnetic Toroidal Cores
Jizheng Qiu, Haider Syed and Charles Sullivan, Thayer School of Engineering at Dartmouth, United States

2:45 pm • CCTT-Core Split-Winding Integrated Magnetic Interleaved Boost Converter for Renewable Energy Applications
Kevin Hartnett, John G. Hayes, Michael Egan, Marek Rylko and Jerzy Maslon, UCC, Ireland; Dtw sp z.o.o, Poland

3:10 pm • Leakage Inductance Calculation for Planar Transformers with a Magnetic Shunt
Jun Zhang, Ziwei Ouyang, M. C. Duffy, M. A. E. Andersen and W. G. Hurley, National University of Ireland, Ireland; Technical University of Denmark, Denmark

Tuesday, September 17 8:00 am – 9:40 am

S21 Electric Drivetrain

Room: 102
Chair: Khwaja Rahman

8:00 am • Engine-generator Sizing for Re-engineering an Electric Vehicle into an Extended Range Electric Vehicle
Hari Ambaripeta, Yilmaz Sozer and Iqbal Husain, University of Akron, United States; North Carolina State University, United States

8:25 am • Reluctance Synchronous and Field Intensified-PM Motors for Variable-Gear Electric Vehicle Drives
Michiel H.A. Prins, Chris Vorster and Maarten Kamper, Stellenbosch University, South Africa

8:50 am • Off-Vehicle Evaluation of Active Oscillation Damping Schemes
Shuang Zhao, Oskar Wallmark, Mats Leksell and Anders Lasson, KTH Royal Institute of Technology, Sweden; Volvo Car Corporation, Sweden

9:15 am • Economic Influence of Prolonging Fuel Cell Stack Lifetime of Fuel Cell Hybrid Vehicles Based on Optimal Control Theory
Chunhua Zheng, Guoqing Xu and Yimin Zhou, Shenzhen Key Laboratory of Electric Vehicle Powertrain Platform and Safety Technology, China; Chinese University of Hong Kong, China

S22 Energy Storage and PF Control

Room: 104/106
Chair: Ted Brekken

8:00 am • Capacity Fade Estimation in Electric Vehicles Lithium-ion Batteries using Artificial Neural Networks
Ala Hussein, United Arab Emirates University, United Arab Emirates

8:25 am • Improved Performance of a DC-DC Converter for Supercapacitor Energy Storage System
Wei Jiang, Renjie Hu, Wu Chen and Lan Xiao, Southeast University, China; Nanjing Univ. of Aeronautics and Astronautics, China

8:50 am • Accelerated Lifetime Testing Methodology for Lifetime Estimation of Lithium-ion Batteries Used in Augmented Wind Power Plants
Daniel Stroe, Maciej Swierczynski, Ana-Irina Stan and Remus Teodorescu, Aalborg University, Denmark

9:15 am • Rapid Bidirectional Power Flow of Supercapacitor Energy Storage Systems through Grid-tied Inverters for Improved Renewables Integration
Arne Bostrom, Annette von Jouanne, Ted Brekken and Alex Yokochi, Oregon State University, United States

S23 Design and Active Damping of Filters for Grid Converters

Room: 107/109
Chair: Fang Zheng Peng

8:00 am • Discrete-time Optimal Active Damping of LCL Resonance in Grid Connected Converters by Proportional Capacitor Current Feedback
Martin Wagner, Tobias Barth, Chester Ditmanson, Rodrigo Alvarez and Steffen Bernet, TU Dresden, Germany

8:25 am • Design of the LCL+Trap Filter for the Two-level VSC Installed in a Large-scale Wave Power Plant
Antoni M. Cantarellas, Elyas Rakhshani, Daniel Remon and Pedro Rodriguez, Abengoa Research, Technical University of Catalonia, Spain

8:50 am • LC Filter Design for On-grid and Off-grid Distributed Generating Units
Giovanni Lo Calzo, Alessandro Lidozzi, Luca Solero and Fabio Crescimbini, University of Roma Tre, Italy

9:15 am • Robust Capacitor-current-feedback Active Damping for the LCL-type Grid-connected Inverter
Donghua Pan, Xinbo Ruan, Xuehua Wang, Chenlei Bao and Weiwei Li, Huazhong University of Science and Technology, China

S24 Converter Modeling and Control II

Room: 108
Chair: Jiangang Hu

8:00 am • Passive Cancellation in a Flyback for Effective CM Reduction
Juergen Stahl, Sebastian Wieczorek, Martin Schmidt and Manfred Albach, University Erlangen-Nuremberg, Germany

8:25 am • SLR Converter Design for Multi-cell Battery Charging
Alexander Julian, Giovanna Oriti and Mark Pfender, Naval Postgraduate School, United States

8:50 am • A Stepping On-time Adjustment Method for Interleaving Three-channel Critical Mode Boost PFC Converter
Hong-Jyun Chen, Shen-Yang Lee, Yaow-Ming Chen, Yang-Lin Chen and Kwang H. Liu, National Taiwan University of Science and Tech., Taiwan

9:15 am • Symmetrical Tuning for Resonant Controllers in Inverter Based Micro-grid Applications
Alessandro Lidozzi, Giovanni Lo Calzo, Luca Solero and Fabio Crescimbini, University of Roma Tre, Italy

S25 3-phase Inverters

Room: 110/112
Chair: Radu Bojoi

8:00 am • Harmonic Elimination by Adaptive Phase-shift Optimization in Interleaved Converters
Mark Caris, Henk Huisman and Jorge Duarte, Eindhoven University of Technology, Netherlands

8:25 am • Pulse Width Modulation of 3-phase Switched Boost Inverter
Ravindranath Adda, Avinash Joshi and Santanu Mishra, Indian Institute of Technology Kanpur, India

8:50 am • Dead Time Compensation Method Based on Current Ripple Estimation
Tomoyuki Mannen and Hideaki Fujita, Tokyo Institute of Technology, Japan

9:15 am • Active Power Control for Minimum Switching of 3-phase Electrolytic Capacitor-less PWM Converter
Hojoon Shin, Jung-Ik Ha and Wook-Jin Lee, Seoul National University, Korea (South)

S26 DC-DC Non-Isolated II

Room: 111/113
Chair: Brandon Pierquet

8:00 am • Novel High Voltage Conversion Ratio "Rainstick" DC-DC Converters
Matthias Kasper, Dominik Bortis and Johann Kolar, ETH Zurich, Switzerland

8:25 am • A Hybrid Interleaved/Switched-capacitor Boost Converter
Julio Rosas-Caro, Hilda Torres-Espinosa, Fernando Mancilla-David and Antonio Valderrabano-Gonzalez, Universidad Panamericana Campus Guadalajara, Mexico; Madero City Technological Institute, Mexico; University of Colorado Denver, United States

8:50 am • Multiple Conversion Ratio Resonant Switched-capacitor Converter with Active Zero Current Detection
Eli Hamo, Alon Cervera and Mor Mordechai Peretz, Ben Gurion University of the Negev, Israel

9:15 am • The DCM Stability Issue of Voltage Regulators Using a Current-mode Constant On-time Controller Control
Guan-Yu Lin, Dan Chen and Yung-Jen Chen, National Taiwan University, Taiwan; Richtek Technology Corporation, Taiwan

S27 High Power Drives

Room: 201
Chair: Mahesh Swamy

8:00 am • Design Challenges of Industrial High-power Converters with Low Pulse-ratios
Jie Shen, Stefan Schroeder, Hanno Stagge and Rik De Doncker, GE Global Research, Germany; RWTH Aachen University, Germany

8:25 am • Performance Investigation of Hybrid Converter Systems for Mobile Mining Applications
Hesam Mirzaee, Richard Beddingfield, Babak Parkhideh and Subhashish Bhattacharya, North Carolina State University, United States; University of North Carolina - Charlotte, United States

8:50 am • Test-Bench for Very High Power Variable Frequency Drives Working under Constrained Grid Conditions
Stefan Schroeder, Jie Shen, Fan Zhang, Kunlun Chen, Laigui Qin and Richard Zhang, GE Global Research, Germany; GE Power Conversion, China; GE Power Conversion, France

9:15 am • Common-Mode Voltage Reduction for Medium-Voltage Current Source Converters by Optimizing Switching Sequences
Anping Hu, Ning Zhu, Dewei Xu, Bin Wu and Jianhui Su, Hefei University of Technology, China; Ryerson University, Canada

S28 Control Issues in Permanent Magnet Motor Drives

Room: 203
Chair: Gianmario Pellegrino

8:00 am • High Frequency Injection-based Stator Flux Linkage and Torque Estimation for DB-DTFC Implementation on IPMSMs Considering Cross-Saturation Effects
Wei Xu and Robert Lorenz, University of Wisconsin Madison, United States

8:25 am • Variable Flux Machine Torque Estimation and Pulsating Torque Mitigation during Magnetization State Manipulation
Chen Yen Yu, Takashi Fukushige, Natee Limsuwan, Takashi Kato, David Reigosa and Robert Lorenz, University of Wisconsin-Madison, United States; Nissan Motor Co., Ltd., Japan; University of Oviedo, Spain

8:50 am • Comprehensive PM Motor Controller Design for Electrically Assisted Turbo-charger Systems
SeHwan Kim and Jul-Ki Seok, YeungNam University, Korea (South)

9:15 am • Extended MTPA with Cross Coupling Inductances for Electrically Excited Synchronous Motors
Ilsu Jeong, Junwoo Kim, Yoonjae Kim and Kwanghee Nam, POSTECH, Korea (South)

S29 Wind Energy Systems

Room: 205
Chair: Dan Ionel

8:00 am • Gearbox and Drivetrain Models to Study Dynamic Effects of Modern Wind Turbines
Irving Girsang, Jaspreet Dhupia, Eduard Muljadi, Mohit Singh and Lucy Pao, Nanyang Technological University, Singapore; National Renewable Energy Laboratory, United States; University of Colorado, Boulder, United States

8:25 am • Design Specifications and Optimisation of a Directly Grid-connected PM Wind Generator
Johannes Potgieter and Maarten Kamper, Stellenbosch University, South Africa

8:50 am • Simulation Tool to Assess Mechanical and Electrical Stresses on Wind Turbine Generators
Mohit Singh, Eduard Muljadi, Vahan Gevorgian and Jason Jonkman, National Renewable Energy Laboratory, United States

9:15 am • A New Modular Flux-Switching Permanent Magnet Drive for Large Wind Turbines
Chester Ditmanson, Peter Hein, Stefan Kolb, Joaquin Molck and Steffen Bernet, Technische Universitaet Dresden, Germany; Venpower GmbH, Germany; Enasys GmbH, Germany

S30 SR Machines

Room: 207
Chair: Akira Chiba

8:00 am • Comparison of Low-cost Wound-field Switched-flux Machines
Y.J. Zhou and Zi-Qiang Zhu, University of Sheffield, United Kingdom

8:25 am • Adaptive Flux Weakening Control of Switched Reluctance Machines in Rotating Reference Frame
Tausif Husain, Ali Elrayyah, Yilmaz Sozer and Iqbal Husain, University of Akron, United States; North Carolina State University, United States

8:50 am • Finite Element Based Analytical Model for Controller Development of Switched Reluctance Machines
Rajib Mikail, Iqbal Husain and Mohammad Islam, North Carolina State University, United States; Nexteer Automotive, United States

9:15 am • Design Considerations of Switched Reluctance Motors with Bipolar Excitation for Low Torque Ripple Applications
Cong Ma and Liyan Qu, University of Nebraska-Lincoln, United States

S31 Wide Bandgap Semiconductors I

Room: 210/212
Chair: Filippo Chimento

8:00 am • Modeling of a 1200 V 6 A SiC Bipolar Junction Transistor
Yizhe Huang, Shidong Cheng, Weicheng Zhou and Kuang Sheng, Zhejiang University, China

8:25 am • Real Field Mission Profile Oriented Design of a SiC-Based PV-Inverter Application
Nicolae-Cristian Sintamarean, Frede Blaabjerg, Huai Wang and Yongheng Yang, Aalborg University, Denmark

8:50 am • Guidelines for Developing Power Stage Layouts using Normally-Off SiC JFETs Based on Parasitic Analysis
Corris Stewart, Andres Escobar-Mejia and Juan Carlos Balda, University of Arkansas, United States

9:15 am • Comparative Performance Evaluation of SiC Power Devices for High Temperature and High Frequency Matrix Converter
Saeed Safari, Alberto Castellazzi and Patrick Wheeler, University of Nottingham, United Kingdom

Wednesday, September 18 **8:00 am – 9:40 am**

SS3 Special Session: Advances in Wireless Power for Electric Vehicles I

Room: 102
Chair: Grant Covic

8:00 am • A Past, Present and Future Perspective on Wireless Power Transfer for Electric Vehicles
Grant A. Covic, The University of Auckland, New Zealand

8:25 am • The development and deployment of On-Line Electric Vehicles (OLEV)
Chun T. Rim, Korea Advanced Institute of Science and Tech., Korea (South)

8:50 am • A High Performance 50kW Inductive Charger for Electric Buses
Hunter H. Wu, Utah State University, United States

9:15 am • ORNL Developments in Stationary and Dynamic Wireless Charging
Omer C. Onar, John M. Miller, P.T. Jones, Oak Ridge National Laboratory, United States

S32 Control of Multilevel Converters II

Room: 103/105
Chair: Axel Mertens

8:00 am • Repetitive Control Scheme for Circulating Current Suppression in Modular Multilevel Converters
Liqun He, Kai Zhang, Jian Xiong and Shengfang Fan, Huazhong University of Science and Technology, China

8:25 am • Average Power Balancing Control of a STATCOM based on the Cascaded H-bridge PWM Converter with Star Configuration
Shih-Feng Chou, Bo-Siang Wang, Sheng-Wan Chen, Chia-Tse Lee, Po-Tai Cheng, Hirofumi Akagi and Peter Barbosa, Delta Electronics, Inc., Taiwan; National Tsing Hua University, Taiwan; Hon Hai Precision Industry Co., Ltd., Taiwan; Tokyo Institute of Technology, Japan

8:50 am • Closed-loop Current Control of Multilevel Converters Formed by Parallel Complementary Unidirectional Phase-legs
Carlos Teixeira, Brendan McGrath and Grahame Holmes, RMIT University, Australia

9:15 am • Implementation of a Single Space Vector Control Strategy for a Seven-level Inverter
Jazmin Ramirez-Hernandez, Ismael Araujo-Vargas, Kevin Cano-Pulido and Jesus Medina-Jurado, National Polytechnic Institute of Mexico, Mexico

S33 PV Generation I

Room: 104/106
Chair: Dezso Sera

8:00 am • Control of PV Generation Systems using a Synchronous Power Controller
Pedro Rodriguez, J. Ignacio Candela and Alvaro Luna, Abengoa Research, Spain; Technical University of Catalonia, Spain

8:25 am • Minimum DC-link Capacitance Requirement of a Two-Stage Photovoltaic Inverter
Tuomas Messo, Juha Jokipii and Teuvo Suntio, Tampere University of Technology, Finland

8:50 am • Hot Spotting and Second Breakdown Effects on Reverse I-V Characteristics for Mono-Crystalline Si Photovoltaics
Katherine Kim and Philip Krein, University of Illinois at Urbana-Champaign, United States

9:15 am • PV Ground-fault Detection Using Spread Spectrum Time Domain Reflectometry (SSTDR)
Mohammed Alam, Faisal Khan, Jay Johnson and Jack Flicker, University of Utah, United States; Sandia National Laboratories, United States

S34 Microgrids

Room: 107/109
Chair: Ashwin Khambadkone

8:00 am • Cost-Prioritized Droop Schemes for Autonomous Microgrids
*Inam Ullah Nutkani, Poh Chiang Loh and Frede Blaabjerg, Experimental Power Grid Centre, A*STAR/ NTU, Singapore; Aalborg University, Denmark*

8:25 am • Implementing PCC Voltage Estimation Utilising Cascaded PI Controllers in the dq Rotating Reference Frame for Microgrid Inverter Control
Christopher Rowe, Terrence Summers, Robert Betz and Timothy Moore, University of Newcastle / CSIRO Energy Centre, Australia

8:50 am • Coordinated Power Control Strategy based on Primary-Frequency-Signaling for Islanded Microgrids
Dan Wu, Josep Maria Guerrero, Juan Carlos Vasquez, Tomislav Dragicevic and Fen Tang, Aalborg University, Denmark; Beijing Jiaotong University, China

9:15 am • Virtual Impedance Current Limiting for Inverters in Microgrids with Synchronous Generators
Andrew Paquette and Deepak Divan, Georgia Institute of Technology, United States

S35 Converter Modeling and Control III

Room: 108
Chair: Pericle Zanchetta

8:00 am • Ineffectiveness of Orthogonal Axes Cross-Coupling Decoupling Technique in Dual Sequence Current Control
Alejandro G. Yepes, Ana Vidal, Jano Malvar, Oscar Lopez, Jesus Doval-Gandoy and Francisco D. Freijedo, University of Vigo, Spain; Gamesa Innovation and Technology, Spain

8:25 am • Modeling and Controller Design for Series-connected Output Universal Link Converter
Myoungho Kim, Seung-Ki Sul and Anno Yoo, Samsung Heavy Industries, Korea (South); Seoul National University, Korea (South); LSIS, Korea (South)

8:50 am • Modulated Model Predictive Control (M2PC) for a 3-phase Active Front-end
Luca Tarisciotti, Pericle Zanchetta, Alan Watson, Jon Clare, Marco Degano and Stefano Bifaretti, University of Nottingham, United Kingdom; University of Rome "Tor Vergata", Italy

9:15 am • Repetitive Scheme Plugged-in Parallel with Deadbeat Controller for VFD Fed by Cascaded Multilevel Inverter
Mohamed Trabelsi, Lazhar Ben-Brahim, Tomoki Yokoyama, Atsuo Kawamura, Teruo Yoshino and Ryoichi Kurosawa, Qatar University, Qatar; Tokyo Denki University, Japan; Yokohama National University, Japan; Tmeic, Japan

S36 Power Converters for Transportation Applications I

Room: 110/112
Chair: Tony O'Gorman

8:00 am • Design of a High-efficiency 12V/1kW 3-phase BLDC Motor Drive System for Diesel Engine Emissions Reductions
Allan Taylor, Chenguang Jiang, Kevin Bai, Adam Kotrba, Argun Yetkin and Arda Gundogan, Kettering Univ, United States; Tenneco, Inc, United States

8:25 am • Design of A 2.5kW 400V/12V High-Efficiency DC-DC Converter Using A Novel Synchronous Rectification Control for Electric Vehicles
Chen Duan, Wei Guo, Kevin Bai, Zhong Nie, Mengyang Zhang, Fred Householder and Dennis Krozek, Kettering Univ, United States; Chrysler LLC, United States

8:50 am • Centralized Control of Parallel Connected Power Conditioning System for Battery Energy Storage System in Charge-discharge-storage Power Station
Changsong Chen, Baoqi Liu, Shanxu Duan and Changyue Zou, Huazhong University of Science and Technology, China

9:15 am • High-efficiency Soft-switching PWM DC-DC Converter for Electric Vehicle Battery Chargers
Min-Kwon Yang, Hyoung-Sup Cho, Seung-Jae Lee and Woo-Young Choi, Chonbuk National University, Korea (South)

S37 Power Converters for Utility Applications I

Room: 111/113
Chair: Jul-Ki Seok

8:00 am • Multi-mode Interleaved Boost Converter for Photovoltaic Power Systems with Low-voltage Ride-through Capability
Cheng-Yu Tang, Yao-Ting Chen, Yen-Fu Chen, Yaow-Ming Chen and Yung-Ruei Chang, National Taiwan University, Taiwan; Institute of Nuclear Energy Research, Taiwan

8:25 am • Bidirectional Series AC-link Inverter
Mahshid Amirabadi, Hamid A. Toliyat and Jeihoon Baek, Texas A and M University, United States; Samsung Advanced Institute of Technology, Korea (South)

8:50 am • Modeling and Analysis of a Micro-inverter Configuration for High Power Phosphoric Acid Fuel Cell Application
Somasundaram Essakiappan, Harish S. Krishnamoorthy, Jorge Ramos-Ruiz, Prasad Enjeti, Mohamed Arifujjaman and Tejinder Singh, Texas A and M University, United States; UTC Power, United States

9:15 am • Smart High Voltage Circuit Breaker in Overhead Power Lines for Smart Grid Applications
Amir Pasdar and Yilmaz Sozer, University of Akron, United States

S38 Fault Detection and Fault Tolerant Drives

Room: 201
Chair: A.J. Marques Cardoso

8:00 am • Ground Fault Location Identification for Multiple Drive High Resistance Grounding Systems
Lixiang Wei, Jiangang Hu, Jeffrey McGuire and Zhijun Liu, Rockwell Automation, United States

8:25 am • Post-fault Operation of an Asymmetrical Six-phase Induction Machine with Single and Two Isolated Neutral Points
Hang Seng Che, Mario Duran, Emil Levi, Martin Jones, Wooi Ping Hew and Nasrudin Bin Abd Rahim, LJMU, United Kingdom; University of Malaga, Spain; University of Malaya, Malaysia

8:50 am • Fault Tolerant AC Multi-drive System
Mario Pulvirenti, Giuseppe Scarcella, Giacomo Scelba, Mario Cacciato and Antonio Testa, University of Catania, Italy; University of Messina, Italy

9:15 am • Short-circuit Fault-tolerant Control of Bearingless Permanent Magnet Slice Machine
Xiaolin Wang, Xinyu Ren and Julia Zhang, Nanjing Univ. of Aeronautics and Astronautics, China; Oregon State University, United States

S39 Predictive Control of Drives

Room: 203
Chair: Tobias Geyer

8:00 am • Multistep Direct Model Predictive Control for Power Electronics — Part 1: Algorithm
Tobias Geyer and Daniel Quevedo, ABB Corporate Research, Switzerland; The University of Newcastle, Australia

8:25 am • Multistep Direct Model Predictive Control for Power Electronics — Part 2: Analysis
Tobias Geyer and Daniel Quevedo, ABB Corporate Research, Switzerland; The University of Newcastle, Australia

8:50 am • Predictive Torque Control for AC Drives: Improvement of Parametric Robustness using Two-degree-of-freedom Control
Jean-Francois Stumper, Sascha Kuehl and Ralph Kennel, Technical University of Munich, Germany

9:15 am • Torque Ripple Reduction of Model Predictive Torque Control of Induction Motor Drives
Yongchang Zhang and Haitao Yang, North China University of Technology, China

S40 Non-Conventional Electric Machines

Room: 205
Chair: Mircea Popescu

8:00 am • Analytical Stiffness Calculations of a Cone-shaped Magnetic Vibration Isolator for a Micro Balance
Dave van Casteren, Johan Paulides, Jeroen Janssen and Elena Lomonova, Eindhoven University of Technology, Netherlands

8:25 am • Efficiency Improvement of a High Dynamic BLDC Linear Motor by Multiphase Control
Joris Lemmens, Kristof Mulier, Johan Driesen, Kris Vanvallasselaer, Stijn Goossens and Wim Symens, KU Leuven, Belgium; Flanders' Mechatronics Technology Centre (FMTC), Belgium

8:50 am • Design of a Novel Homopolar Bearingless Slice Motor with Reluctance Rotor
Wolfgang Gruber, Michael Rothboeck and Reto Schoeb, Johannes Kepler University, Austria; Levitronix GmbH, Switzerland

9:15 am • Improvement of Torque Density of Variable Reluctance Vernier Machine for Hybrid Electric Vehicle
Masahiro Takano and Shoji Shimomura, Shibaura Institute of Technology, Japan

S41 IPM Machines I

Room: 207
Chair: Radu Bojoi

8:00 am • Brushless AC Interior-permanent Magnet Motor Design: A Comparison of Slot/Pole Combinations and Distributed Vs. Concentrated Windings
James Goss, Dave Staton, Rafal Wrobel and Phil Mellor, Motor Design Ltd, United Kingdom; University of Bristol, United Kingdom

8:25 am • Reduction of Rotor Losses in Multi Layer Interior Permanent Magnet Synchronous Motors by Introducing Novel Topology of Rotor Flux Barriers
Katsumi Yamazaki, Yusuke Kato, Takeshi Ikemi and Shunji Ohki, Chiba Institute of Technology, Japan; Nissan Motor Co., Ltd., Japan

8:50 am • Analysis of Stator Iron Loss in Interior PM Machines under Open and Short-circuit Conditions
Chun Tang, Wen Soong, Gene Liew, Nesimi Ertugrul and Thomas Jahns, University of Adelaide, Australia; University of Wisconsin - Madison, United States

9:15 am • Rotor Saturation Impact in Synchronous Reluctance and PM Assisted Reluctance Motors
Marco Ferrari, Nicola Bianchi and Emanuele Fornasiero, University of Padova, Italy

S42 Power Electronic Modules II

Room: 210/212
Chair: Enrico Santi

8:00 am • High Frequency Integrated Point of Load (POL) Module with PCB Embedded Inductor Substrate
Yipeng Su, Wenli Zhang, Qiang Li, Fred Lee and Mingkai Mu, CPES, Virginia Tech, United States

8:25 am • Component Proximity Effects in High Density and High Switching Speed Power Converters
Inus Grobler and Michael Gitau, University Pretoria, South Africa

8:50 am • Parasitic Modeling for Accurate Inductive Switching Simulation of Converters using SiC Devices
Ruiyun Fu, Alexander Grekov, Kang Peng and Enrico Santi, University of South Carolina, United States

9:15 am • Detailed Derivation and Minimization of the Equivalent Parasitic Capacitance of a High Voltage Multiplier Based on the Complete Model
Jianing Wang, Sjoerd W.H. de Haan and Jan Abraham Ferreira, Delft University of Technology, Netherlands

Wednesday, September 18 10:00 am – 11:40 am

SS4 Special Session: Advances in Wireless Power for Electric Vehicles II

Room: 102
Chair: Grant Covic

10:00 am • Key Challenges in EV Wireless Charging
Chris Mi, University of Michigan, United States

10:25 am • German Activities on Contactless Inductive Power Transfer
Jurgen Meins, Technical University of Braunschweig, Germany

10:50 am • Characteristic Comparison between H-shaped Core and Circular Core in Wireless Power Transfer Systems for Electric Vehicle
Yasuyoshi Kaneko, Saitama University, Japan

11:15 am • Wireless EV Charging, Optimum Operating Frequency Selection for Power Range 3.3 and 6.6 kW
Grzegorz Ombach, Qualcomm, Germany

S43 Multilevel Converter Topologies

Room: 103/105
Chair: Luca Solero

10:00 am • A Multilevel Converter Topology with Common Flying Capacitors
Hui Zhang, Wei Yan, Kazuya Ogura and Shota Urushibata, Meiden Singapore, Singapore; Meidensha Corporation, Japan

10:25 am • New Five-level Active Neutral Point Clamped Converter
Eduardo Burguete, Mikel Zabaleta and Jesus Lopez, Public University of Navarre, Spain; Ingeteam Power Technology, Spain

10:50 am • Comparative Evaluation of T-type Topologies Comprising Standard and Reverse-blocking IGBTs
Hirofumi Uemura, Florian Krismer and Johann W. Kolar, Swiss Institute of Technology, Switzerland

11:15 am • Performance Evaluation among Four Types of Five-level Topologies using Pareto Front Curves
Yugo Kashihara and Jun-ichi Itoh, Nagaoka University of Technology, Japan

S44 PV Generation II

Room: 104/106
Chair: Jonathan Bird

10:00 am • Leakage Current Suppression for PV Cascaded Multilevel Inverter Using GaN Devices
Yan Zhou and Hui Li, Florida State University, United States

10:25 am • Two-switch Voltage Equalizer Using Series-resonant Inverter and Voltage Multiplier for Partially-shaded Series-Connected Photovoltaic Modules
Masatoshi Uno and Akio Kukita, Japan Aerospace Exploration Agency, Japan

10:50 am • Improving Output Current Distortion in Hybrid BCM Current Controlled 3-phase Micro-inverter
Ahmadreza Amirahmadi, Haibing Hu, Anna Grishina, Lin Chen, John Shen and Issa Batarseh, University of Central Florida, United States

11:15 am • Enhanced Experimental PV Plant Grid-integration with a MW Lithium-ion Energy Storage System
Haizea Gaztanaga, Joseba Landaluze, Ion Etxeberria-Otadui, Asun Padros, Inigo Berazaluce and David Cuesta, IKERLAN-IK4 Technological Research Centre, Spain; ACCIONA Energia, Spain

S45 Microgrids Systems

Room: 107/109
Chair: Adel Nasiri

10:00 am • Reducing Fuel Consumption in a Forward Operating Base using an Energy Management System
Ryan Kelly, Giovanna Oriti and Alexander Julian, Naval Postgraduate School, United States

10:25 am • An Accurate Autonomous Islanding Microgrid Reactive Power, Imbalance Power and Harmonic Power Sharing Scheme
Jinwei He, Yun Wei Li and Frede Blaabjerg, University of Alberta, Canada; Aalborg University, Denmark

10:50 am • Microgrid System with Voltages in Quadrature
Euzeli Santos and Maryam Alibeik, Purdue School of Engineering and Technology, IUP, United States

11:15 am • Design and Development of a Reconfigurable Hybrid Microgrid Testbed
Feng Guo, Luis Herrera, Mohammed Alsolami, He Li, Pu Xu, Xintong Lu, Andong Lang, Zhijun Long and Jin Wang, The Ohio State University, United States; Wuhan University, China

S46 Converter Modeling and Control IV

Room: 108
Chair: Stefano Bifaretti

10:00 am • Phase-oriented Control of a Modular 3-phase 3-level 4-leg Inverter AC Power Source Supplying Floating or Grounded Loads
Patricio Cortes, David Olivier Boillat and Johann Kolar, ETH Zurich, Switzerland

10:25 am • Uncoupled Direct Power Control Based on Improved Sector Selection Algorithm for 3-level PWM Rectifier
Ting Lu, Zhengming Zhao, Liqiang Yuan and Fanbo He and Yingchao Zhang, Tsinghua University, China; Chongqing Communication Institute, China

10:50 am • Observer-based State-space Current Control for a 3-phase Grid-connected Converter Equipped with an LCL Filter
Jarno Kukkola and Marko Hinkkanen, Aalto University, School of Electrical Engineering, Finland

11:15 am • Command Generation for Wide Range Operation of Hysteresis Controlled Vienna Rectifiers
Nicole C. Foureaux, James H. Oliveira Junior, Filipe D. de Oliveira, Rafael S. de Faria and Braz de J. Cardoso Filho, Universidade Federal de Minas Gerais, Brazil; ESAB Brasil, Brazil

S47 Power Converters for Transportation Applications II

Room: 110/112
Chair: Suman Dwari

10:00 am • Propulsion System Architecture and Power Conditioning Topologies for Fuel Cell Vehicles
Udupi Rajagopal Prasanna, Pan Xuewei, Akshay Rathore and Kaushik Rajashekara, University of Texas, Dallas, United States; National University of Singapore, Singapore

10:25 am • Soft Switching, Frequency Control, and Bidirectional Power Flow of an Isolated Quasi-switched-capacitor DC-DC Converter for Automotive Applications
Xuan Zhang, Chengcheng Yao, Feng Guo, Cong Li, Lixing Fu, Cong Deng and Jin Wang, The Ohio State University, United States

10:50 am • Performance Analysis of Bidirectional DC-DC Converters for Electric Vehicles and Charging Infrastructure
Adeeb Ahmed, Mehnaz Khan, Mohamed Badawy, Yilmaz Sozer and Iqbal Husain, University of Akron, United States; North Carolina State University, United States

11:15 am • Second Harmonic Current Reduction by Using a Resonant Circuit in a Single-phase Battery Charger
Hyunsung An and Hanju Cha, Chungnam National University, Korea (South)

S48 Power Converters for Utility Applications II

Room: 111/113
Chair: Sandeep Bala

10:00 am • A Power Efficiency Improvement Technique for a Bidirectional Dual Active Bridge DC-DC Converter at Light Load
Mika Takasaki, Yoichi Ishizuka, Tamotsu Ninomiya, Yutaka Furukawa and Toshiro Hirose, Nagasaki University, Japan; Koga System Works, Japan; Nishimu Electronics Industries Co., Ltd., Japan

10:25 am • Considerations for the Design of Power Electronic Modules for Hybrid Distribution Transformers
Jyoti Sastry and Sandeep Bala, ABB Corporate Research Center, United States

10:50 am • Active Voltage Control of SiC-SIT Circuit Breakers for Overvoltage Suppression
Bao Cong Hiu, Toru Saito, Yukihiko Sato, Yasunori Tanaka, Akio Takatsuka and Akira Matsumoto, Chiba University, Japan; AIST, Japan; NTT Facilities, Inc., Japan

11:15 am • Stable Operation of Multiple Power Routers
Rajendra Prasad Kandula, Amrit Iyer and Deepak Divan, Georgia Institute of Technology, United States

S49 Current Regulation in Drives

Room: 201
Chair: Radu Bojoi

10:00 am • Current Control Method with Control Inputs in Polar Coordinates for SPMSM Based on Linearized Model
Takayuki Miyajima, Hiroshi Fujimoto and Masami Fujitsuna, University of Tokyo, Japan; DENSO Corporation, Japan

10:25 am • Optimized Harmonic Current Control Strategy for Nonlinearities Compensation in Multiphase AC Drives
Alejandro G. Yepes, Jano Malvar, Ana Vidal, Oscar Lopez and Jesus Doval-Gandoy, University of Vigo, Spain

10:50 am • New Model Based Predictive Current Control Strategy for Doubly Salient Permanent Magnet Synchronous Machines
Wei Xu, Ronghai Qu and Wenwu Yang, Huazhong University of Science and Technology, China; Sichuan Deyang Electric Power Bureau, China

11:15 am • A Simple Tuning Method Aimed at Optimal Settling Time and Overshoot for Synchronous PI Current Control in Electric Machines
Alejandro G. Yepes, Ana Vidal, Francisco D. Freijedo, Jano Malvar, Oscar Lopez and Jesus Doval-Gandoy, University of Vigo, Spain; Gamesa Innovation and Technology, Spain

S50 High Power Drives and Multilevel Power Converters

Room: 203
Chair: Stefan Schroeder

10:00 am • A Speed-sensorless Startup Method of an Induction Motor Driven by a Modular Multilevel Cascade Inverter (MMCI-DSCC)
Yuhei Okazaki, Makoto Hagiwara and Hirofumi Akagi, Tokyo Institute of Technology, Japan

10:25 am • Control Strategy for Improved Dynamic Performance of Variable-speed Drives with the Modular Multilevel Converter
Jae-Jung Jung, Hak-Jun Lee and Seung-Ki Sul, Seoul National University, Korea (South)

10:50 am • Damping Concepts of LCL Filter for a Multi-level Medium Voltage Adjustable Speed Drive with Low Pulse Ratio
Qingyun Chen, Jie Shen, Hanno Stagge, Stefan Schroeder and Rik De Doncker, GE Global Research, Germany; RWTH Aachen University, Germany

11:15 am • Investigation of Harmonics Interaction in High-power PWM Current-source Motor Drives
Ye Zhang and Yun Wei Li, University of Alberta, Canada

S51 Thermal Analysis of Electric Machines

Room: 205
Chair: Aldo Boglietti

10:00 am • Thermal Modelling of a Fractional-slot Concentrated-winding Kaman Type Axial-flux Permanent-magnet Machine
Gyula Vainel, Dave Staton, Fabio Giulii Capponi, Giulio De Donato and Federico Caricchi, Motor Design Ltd., United Kingdom; University of Roma "La Sapienza", Italy

10:25 am • On the Improvement of the Thermal Behavior of Electric Motors
Mohamed Rabie Guechi, Philippe Desevaux, Philippe Baucour, Christophe Espanet, Raphael Brunel and Marianne Poirot, University of Franche-Comte, France; INSA-Lyon, France

10:50 am • Conjugate Heat Transfer Analysis of Integrated Brushless Generators for More Electric Engines
Marco Tosetti, Paolo Maggiore, Andrea Cavagnino and Silvio Vaschetto, Politecnico di Torino, Italy

11:15 am • Determination of Rotor-stator Heat Exchange Coefficients in the Case of Totally Enclosed Machines: Application to an Integrated Starter-generator
Guy Friedrich, Stephane Vivier, Radhouanve Khlissa, Khadija El kadri Benkara and Bassel Asaad, Centre Technique des Industries Mécaniques, France

S52 PM Machines

Room: 207
Chair: Prabhakhar Neti

10:00 am • High Power Factor Vernier Permanent Magnet Machines
Dawei Li, Ronghai Qu and Thomas A. Lipo, Huazhong University of Science and Technology, China; University of Wisconsin-Madison, United States

10:25 am • A Two-axis Actively Regulated Consequent-pole Bearingless Motor with Wide Magnetic Gaps
Junichi Asama, Tomoyoshi Tatara, Takaaki Oiwa and Akira Chiba, Shizuoka University, Japan; Tokyo Institute of Technology, Japan

10:50 am • Design Methodology for Variable-flux, Flux-intensifying Interior Permanent Magnet Machines for an Electric Vehicle Class Inverter Rating
Natee Limsuwan, Takashi Fukushige, Kan Akatsu and Robert Lorenz, University of Wisconsin - Madison, United States; Nissan Motor Co., Ltd., Japan; Shibaura Institute of Technology, Japan

11:15 am • Cogging Torque Reduction in Flux Switching Permanent Magnet Machines by Rotor Pole Shaping
Chandan Sikder, Iqbal Husain and Wen Ouyang, NC State University, United States; ABB US Corporate Research Center, United States

S53 Wide Bandgap Semiconductors II

Room: 210/212
Chair: Craig Winterhalter

10:00 am • Active Current Balancing for Parallel-Connected Silicon Carbide MOSFETs
Yang Xue, Junjie Lu, Zhiqiang Wang, Leon Tolbert, Benjamin Blalock and Fred Wang, The University of Tennessee, United States

10:25 am • Maximum Switching Frequency Characterization of 4.5kV-400A SiC-PiN Diode and Si-IEGT Hybrid Pair Power Module
Kazuto Takao, Keiji Wada, Kyungmin Sung, Yuji Mastuoka, Yasunori Tanaka, Shinichi Nishizawa, Chiharu Ota, Takeo Kanai, Takashi Shinohe and Hiromichi Ohashi, Toshiba Corporation, Japan; Tokyo Metropolitan University, Japan; Ibaraki National College of Technology, Japan; Toshiba Mitsubishi-Electric Industrial System Corporation, Japan; National Institute of Advanced Industrial Science and Technology, Japan

10:50 am • Experimental Evaluation of 10 kHz Switching Operation of 4.5kV-400A SiC-PiN Diode and Si-IEGT Hybrid Pair Module
Kazuto Takao, Keiji Wada, Kyungmin Sung, Yuji Mastuoka, Yasunori Tanaka, Shinichi Nishizawa, Chiharu Ota, Takeo Kanai, Takashi Shinohe, and Hiromichi Ohashi, Toshiba Corporation, Japan; Tokyo Metropolitan University, Japan; Ibaraki National College of Technology, Japan; Toshiba Mitsubishi-Electric Industrial System Corporation, Japan; National Institute of Advanced Industrial Science and Technology, Japan

11:15 am • Experimental Validation of Newly Fabricated Normally-on GaN High-electron-mobility Transistor
Takaharu Ishibashi, Masayuki Okamoto, Eiji Hiraki, Toshihiko Tanaka, Tamotsu Hashizume, Daigo Kikuta and Tetsu Kachi, Yamaguchi University, Japan; Ube National College of Technology, Japan; Hokkaido University, Japan; Toyota Central R&D LABS., INC., Japan; JST, CREST, Japan

Wednesday, September 18 1:30 pm – 3:10 pm

S54 Charging Systems

Room: 102
Chair: Fabio Giulii Capponi

1:30 pm • An Integrated Onboard Charger and Accessory Power Converter for Plug-in Electric Vehicles
Gui-Jia Su and Lixin Tang, Oak Ridge National Laboratory, United States

1:55 pm • A Utility Interfaced Half-bridge Based Capacitively Coupled Power Transfer Circuit with Automatic Frequency Control
Saurabh Shekhar, Santanu Mishra and Avinash Joshi, Indian Institute of Technology Kanpur, India

2:20 pm • A Seal Lead-acid Battery Charger for Prolonging Battery Lifetime Using Superimposed Pulse Frequency Technique
Nattapat Praisuwanna and Surin Khomfoi, King Mongkut's Institute of Technology Ladkraban, Thailand

2:45 pm • Design and Implementation of a 75 KW Mobile Charging System for Electric Vehicles
Mohamed Badawy, Nayeem Arafat, Saeed Anwar, Adeeb Ahmed, Yilmaz Sozer and Ping Yi, University of Akron, United States

SS5 Special Session: Recent Advances in Switched Capacitor Circuits I

Room: 103/105
Chair: Jin Wang

1:30 pm • Switched-capacitor/Multilevel DC-DC Converters — Advance and Applications
Wei Qian, Dong Cao and Fang Zheng Peng, Magna Electronics, United States; Ford Motor Company, United States; Michigan State University, United States

1:55 pm • Calculation Program Supporting Switched Capacitor DC-DC Charge Pump Design
Marek S. Makowski and Pawel Maszota, Gdansk University of Technology, Poland

2:20 pm • Soft Charging Operation of Switched Capacitor Converters — Increasing Power Density and Efficiency
Robert Pilawa-Podgurski, University of Illinois at Urbana-Champaign, United States

2:45 pm • Performance Modeling of Switched-Capacitor Converters
Jonathan W. Kimball, Missouri University of Science and Technology, United States

S55 PV Generation III

Room: 104/106
Chair: John Salmon

1:30 pm • Simulation Platform for Dynamic Photovoltaic Arrays
Jonathan Storey, Peter Wilson and Darren Bagnall, University of Southampton, United Kingdom

1:55 pm • An Optimized Common Mode Voltage Reduction PWM Strategy for T-type 3-phase Three Level Photovoltaic Grid-tied Inverter
Li Zhang, Kai Sun and Yu Fang, Tsinghua University, China; Southeast University, China

2:20 pm • Graph-based Semi-supervised Learning for Fault Detection and Classification in Solar Photovoltaic Arrays
Ye Zhao, Brad Lehman, Roy Ball and Jean-Francois de Palma, Northeastern University, United States; Mersen USA Newburyport-MA LLC, United States

2:45 pm • A Novel Second Harmonic Current Reduction Method for Dual Active Bridge Used in Photovoltaic Power System
Wang Wentao, Ruan Xinbo and Wang Xuehua, Huazhong University of Science and Technology, China

S56 Microgrid Control

Room: 107/109
Chair: Thomas Jahns

1:30 pm • Modeling and Control of a Natural Gas Generator Set in the CERTS Microgrid
Ajit A Renjit, Mahesh Illindala, Robert Lasseter, Micah J Erickson and Dave Klapp, The Ohio State University, United States; University of Wisconsin - Madison, United States; American Electric Power, United States

1:55 pm • Improving Microgrid Performance by Cooperative Control of Distributed Energy Sources
Paolo Tenti, Alessandro Costabeber, Tommaso Caldognetto and Paolo Mattavelli, University of Padova, Italy

2:20 pm • A Nonlinear Disturbance Observer Based DC Bus Voltage Control for a Hybrid AC-DC Microgrid
Xialin Li, Chengshan Wang, Li Guo and Yunwei Li, Tianjin University, China; Alberta University, Canada

2:45 pm • Construction of Nonlinear Droop Relations to Optimize Islanded Microgrids Operation
Ali Elrayyah and Yilmaz Sozer, University of Akron, United States

S57 Converters EMI

Room: 108
Chair: Giovanna Oriti

1:30 pm • Impact of Interleaving on Common Mode EMI Filter Weight Reduction of Paralleled 3-phase Voltage-source Converters
Xuning Zhang, Dushan Boroyevich and Rolando Burgos, Virginia Polytechnic Institute and State University, United States

1:55 pm • Characterising and Modeling Extended Conducted Electromagnetic Interference In Densely Packed DC-DC Converters
Inus Grobler and Michael Gitau, University Pretoria, South Africa

2:20 pm • Shaping Pulse Transitions by Active Voltage Control fore Reduced EMI Generation
Xin Yang and Patrick Palmer, University of Cambridge, United Kingdom

2:45 pm • The Input Impedance of Common Mode and Differential Mode Noise Separators
Konstantin Kostov, Hans-Peter Nee and Martin Priecinsky, KTH Royal Institute of Technology, Sweden; University of Zilina, Slovakia

S58 Power Converters for Renewable Energy Applications I

Room: 110/112
Chair: Lei Xing

1:30 pm • High Power Solid-state Step-up Resonant Marx Modulator with Continuous Output Current for Offshore Wind Energy Systems
Amir Parastar, Ali Gandomkar, MingGuo Jin and Jul-Ki Seok, YeungNam University, Korea (South)

1:55 pm • Multi-resonant based Sliding Mode Control of Grid-connected Converter under Distorted Grid Conditions
Yu Quan and Heng Nian, Zhejiang University, China

2:20 pm • Open-Switch Fault Detection Method of an NPC Converter for Wind Turbine Systems
June-Seok Lee, Kyo-Beum Lee and Frede Blaabjerg, Ajou University, Korea (South); Aalborg University, Denmark

2:45 pm • An Inrush Current Mitigation Method for the Grid-connected Converters in the Low-voltage Ride-through Operation
Chih-Hsin Chen, Hsin-Cheng Ko and Po-Tai Cheng, National Tsing Hua University, Taiwan

S59 Multilevel Converters I

Room: 111/113
Chair: Edison da Silva

1:30 pm • Power Loss and Thermal Characterisation of IGBT Modules in the Alternate Arm Converter
Paul Judge, Michael M C Merlin, Paul Mitcheson and Tim Green, Imperial College London, United Kingdom

1:55 pm • Fault Tolerant Cost-effective Carrierless Stochastic Synthesis of Voltages and Currents in Multi-cell Multilevel Converters via the Central Limit Theorem
Pierluigi Tenca and Luca Peretti, IEEE Member (formerly at ABB Corporate Research), Germany; ABB Corporate Research, Sweden

2:20 pm • A Component-minimized Dual-output Multilevel Converter and its Applications
Wenping Zhang, Joshua Hawke, Prasad Enjeti, Dehong Xu and Changsheng Hu, Zhejiang University, China; Texas A-M University, United States

2:45 pm • Enhanced FPGA Based 3-level Space Vector Pulse Width Modulation with Active Neutral Point Balancing
Alexander Bartsch, Florian Senicar, Sascha Kratz and Stefan Soter, University of Wuppertal, Germany

S60 Hardware-in-the-loop, Simulation, and Hardware Issues

Room: 201
Chair: Tobias Geyer

1:30 pm • High-fidelity Real-time Hardware-in-the-loop Emulation of PMSM Inverter Drives
Jason Poon, Elaina Chai, Ivan Celanovic, Adrien Genic and Evgenije Adzic, University of Novi Sad, Serbia

1:55 pm • FPGA-based Detailed Real-time Simulation of Power Electronic Converters and Electric Machines for EV HIL Applications
Luis Herrera and Jin Wang, The Ohio State University, United States

2:20 pm • Hardware-in-the-loop Simulation Verification of a Smooth Transition Algorithm Between Maximum Torque per Ampere Control and Single Current Regulator
Dakai Hu, Feng Guo and Longya Xu, The Ohio State University, United States

2:45 pm • Analysis of Current Sampling Errors in PWM, VSI Drives
Christopher Wolf, Michael Degner and Fernando Briz, Ford Motor Company, United States; University of Oviedo, Spain

S61 Direct Torque Control

Room: 203
Chair: Mario Pacas

1:30 pm • Deadbeat, Direct Torque and Flux Control of IPMSM Drives Using a Minimum Time Ramp Trajectory Method at Voltage and Current Limits
Jae Suk Lee and Robert Lorenz, University of Wisconsin - Madison, United States

1:55 pm • Deadbeat-direct Torque and Flux Control on Low Switching Frequency Induction Machine Drives Using the Enhanced Flux Observer and Torque Model
Yukai Wang, Shunsuke Tobayashi and Robert Lorenz, University of Wisconsin-Madison, United States; TMEIC, Japan

2:20 pm • Discrete-time Physical Limits-based Enhanced Finite-settling-step Direct Torque and Flux Control for IPMSM Drives
SeHwan Kim and Jul-Ki Seok, YeungNam University, Korea (South)

2:45 pm • Square-wave Operation of Direct Torque Controlled PMSM Drive System
Yukinori Inoue, Yuichiro Maeda, Shigeo Morimoto and Masayuki Sanada, Osaka Prefecture University, Japan

S62 DC-DC Non-Isolated III

Room: 205
Chair: Pat Wheeler

1:30 pm • Performance Analysis of Generalized Algebraic Switched Capacitor Converters
Jonathan Kimball, Missouri University of Science and Technology, United States

1:55 pm • 27.12 MHz Large Voltage Gain Resonant Converter with Low Voltage Stress
Luke Raymond, Wei Liang, Jungwon Choi and Juan Rivas, University of Michigan, United States

2:20 pm • Mitigation and Utilization of the Inductor Coupling Effect in Interleaved Multiphase DC-DC Converters
Wenkang Huang and Brad Lehman, Northeastern University, United States

2:45 pm • A Novel Switched-coupled-inductor DC-DC Step-up Converter
Shih-Ming Chen, Tsorng-Juu Liang, Kai-Hui Chen, Man-Long Lao and Yi-Chien Shen, National Cheng-Kung University, Taiwan

S63 Synchronous Reluctance Machines

Room: 207
Chair: Andy Knight

1:30 pm • Winding Configurations and Performance Investigations of 12-Stator Pole Variable Flux Reluctance Machines
X. Liu and Zi-Qiang Zhu, University of Sheffield, United Kingdom

1:55 pm • Sensitivity Analysis of Torque Ripple Reduction of Synchronous Reluctance and Interior PM Motors
Nicola Bianchi, Michele Degano and Emanuele Fornasiero, University of Padova, Italy; University of Trieste, Italy

2:20 pm • BLDC Multiphase Reluctance Machines: A Revival Attempt with 2D FEM Investigation and Standstill Tests
Sorin Agarlita, Dragos Ursu, Lucian-Nicolae Tutelea, Ion Boldea and Babak Fahimi, Politehnica University of Timisoara, Romania; University Texas at Dallas, United States

2:45 pm • Design of Synchronous Reluctance Machines with Multi-objective Optimization Algorithms
Francesco Cupertino, Gianmario Pellegrino and Chris Gerada, Politecnico di Bari, Italy; Politecnico di Torino, Italy; University of Nottingham, United Kingdom

S64 Passive Components

Room: 210/212
Chair: Robert Pilawa

1:30 pm • Reliability of Capacitors for DC-link Applications — An Overview
Huai Wang and Frede Blaabjerg, Aalborg University, Denmark

1:55 pm • Planar Integrated Multilayer Capacitive Substrate for DC-DC Converter Applications
Thi Bang Doan, Thierry Lebey, Thierry Meynard and Francois Forest, Laplace, University of Toulouse, France; University of Montpellier, France

2:20 pm • Comprehensive Design of DC Busbars for Medium Voltage Applications
Martin Buschendorf, Marco Koebe, Rodrigo Alvarez and Steffen Bernet, Technical University of Dresden, Germany

2:45 pm • A Frequency-domain Study on the Effect of DC-link Decoupling Capacitors
Zheng Chen, Dushan Boroyevich, Paolo Mattavelli and Khai Ngo, Virginia Tech, United States

Wednesday, September 18 3:30 pm – 5:10 pm

S65 Special Power Converters in Transportation

Room: 102
Chair: Srdjan Lukic

3:30 pm • Novel Bidirectional Snubberless Soft-switching Naturally Clamped Zero Current Commutated Current-fed Dual Active Bridge (CFDAB) Converter for Fuel Cell Vehicles
Pan Xuewei and Akshay Rathore, National University of Singapore, Singapore

3:55 pm • Wireless Power Transfer Using Class E Inverter with Saturable DC Feed Inductor
Samer Aldhaher, Patrick Luk and James Whidborne, Cranfield University, United Kingdom

4:20 pm • A Novel Slow-switching Control for Multiple Pickup IPT Systems
Liang Chen, John Boys and Grant Covic, University of Auckland, New Zealand

4:45 pm • Efficient, MHz Frequency, Resonant Converter for Sub-meter (30cm) Distance Wireless Power Transfer
Ryan Calder, Seung-Hwan Lee and Robert Lorenz, University of Wisconsin-Madison, United States

SS6 Special Session: Recent Advances in Switched Capacitor Circuits II

Room: 103/105
Chair: Jin Wang

3:30 pm • Modulation and Reconfiguration Techniques for Modular Capacitor-Clamped Converters
Faisal Khan, The University of Utah, United States

3:55 pm • Suppression of Spurious Triggering in Synchronous Buck Converter With Switched-capacitor Gate
Henry Shu-hung Chung and Jianjing Wang, The City University of Hong Kong, Hong Kong

4:20 pm • Switched Capacitor Energy Buffers
Khurram Afridi, Massachusetts Institute of Technology, United States

4:45 pm • Next Generation Switched-capacitor Circuits based on Wide Bandgap Devices
Mark J. Scott and Jin Wang, The Ohio State University, United States

S66 PV Converters

Room: 104/106
Chair: Pragasen Pillay

3:30 pm • A Single-stage Multi-string Quasi-resonant Inverter for Grid-tied Photovoltaic Systems
Hamidreza Keyhani, Hamid A. Toliyat and William C. Alexander, Texas A-and-M University - College Station, United States; Ideal Power Converters Inc., United States

3:55 pm • Central Multilevel Current-fed Inverter with Module Integrated DC-DC Converters for Grid-connected PV Plant
Vishal Vekhande and B. G. Fernandes, Indian Institute of Technology Bombay, India

4:20 pm • Modular Multilevel Converter for Large-scale Multistring Photovoltaic Energy Conversion System
Sebastian Rivera, Ricardo Lizana, Samir Kouro, Marcelo Perez, Bin Wu and Jose Rodriguez, Ryerson University, Canada; Universidad Tecnica Federico Santa Maria, Chile

4:45 pm • Design of Module-integrated Converters for Photovoltaic Strings
Junjian Zhao, Huimin Zhou and Yehui Han, University of Wisconsin-Madison, United States

S67 Control Under Unbalanced Grid Conditions

Room: 107/109
Chair: Pedro Rodríguez

3:30 pm • Fault Ride Through Control of Medium-voltage Converters with LCL Filter in Distributed Generation Systems
Robert Meyer, Alexander Zlotnik and Axel Mertens, Leibniz University Hanover, Germany

3:55 pm • Control of Active Mobile Substations under System Faults
Nima Yousefpoor, Babak Parkhideh, Ali Azidehak and Subhashish Bhattacharya, North Carolina State University, United States; University of North Carolina - Charlotte, United States

4:20 pm • Oscillatory Angle Control Scheme for PWM Static Synchronous Compensators under Unbalanced Conditions and System Faults
Saman Babaei and Subhashish Bhattacharya, North Carolina State University, United States

4:45 pm • Smart Impedance Application on Unbalanced Harmonic Mitigation in 3-phase Four-wire Systems
Robson Bauwelz Gonzatti, Silvia Costa Ferreira, Carlos Henrique da Silva, Luiz Eduardo Borges da Silva, Germano Lambert-Torres and Luiz Gonzaga Fernandez Silva, Federal University of Itajuba, Brazil; CPFL Energia, Brazil

S68 AC-DC Multi-phase I

Room: 108
Chair: Radu Bojoi

3:30 pm • Current Source Rectifiers in Discontinuous Conduction Modes of Operation
Robert Cuzner and Giri Venkataramanan, DRS Power and Control Technologies, United States; University of Wisconsin-Madison, United States

3:55 pm • Reduced Switch Multi-level Unidirectional Rectifiers
Parag Kshirsagar, Suman Dwari and Shashank Krishnamurthy, United Technologies Research Center, United States

4:20 pm • Analysis and Design of 3-phase Buck-Boost Quasi-Resonant Reduced Switch Rectifier
Dunisha Wijeratne, Gerry Moschopoulos and Mehdi Narimani, University of Western Ontario, Canada

4:45 pm • Volume Minimization of the Main DM/CM EMI Filter Stage of a Bidirectional 3-phase 3-level PWM Rectifier System
David Olivier Boillat, Johann Wlater Kolar and Jonas Muhlethaler, ETH Zurich, Switzerland

S69 Power Converters for Renewable Energy Applications II

Room: 110/112
Chair: Di Zhang

3:30 pm • A Dual-input Boost-buck Converter with Coupled Inductors for TEG Applications
Feng Cao, Junjun Zhang, Hongfei Wu, Haibing Hu, Yan Xing and Xudong Ma, Nanjing Univ. of Aeronautics and Astronautics, China; Southeast University, China

3:55 pm • A Simple Flyback Microinverter for Solar Energy Systems with Variable Frequency Controlled ZVS
Aniruddha Mukherjee, Majid Pahlevaninezhad and Gerry Moschopoulos, Western University, Canada, Canada; Queen's University, Canada

4:20 pm • An On-chip Hysteretic-Current-Controlled LED Driver with Synchronous Rectification and Lossless Peak and Valley Current Sensing for High-brightness Lighting Applications
WITHDRAWN
Zhidong Liu and Hoi Lee, University of Texas at Dallas, United States

4:45 pm • Bidirectional Modular Multilevel DC-DC Converter Control and Efficiency Improvements through Separate Module Control Method
Todor Todorcevic, Pavol Bauer, Jan Abraham Ferreira and Rick van Kessel, Delft University of Technology, Netherlands; SBM Offshore, Monaco

S70 Resonant DC-DC

Room: 111/113
Chair: Mor Mordechai Peretz

3:30 pm • Loss Reduction in a Medium Frequency Series Resonance Converter by Forced Evacuation
Lars Lindenmueller, Philipp Kleinichen, Chester Ditmanson, Rodrigo Alvarez and Steffen Bernet, Technische Universitaet Dresden, Germany

3:55 pm • VHF Series-Input Parallel-Output Interleaved Self-Oscillating Resonant SEPIC Converter
Milovan Kovacevic, Arnold Knott and Michael A. E. Andersen, Technical University of Denmark, Denmark

4:20 pm • New Optimal Design Methodology of Medium-Frequency Soft-Switching Converters
Asier Garcia-Bediaga, Irma Villar, Alejandro Rujas, Ion Etxeberria-Otadui and Alfred Rufer, IK4-IKERLAN Technological Research Center, Spain; STI-IEL-LEI, EPFL, Switzerland

4:45 pm • A Load/Line Adaptive Zero Voltage Switching DC-DC Converter used in Electric Vehicles
Majid Pahlevaninezhad, Hamid Danesh-Pajooh, Alireza Bakhshai and Praveen Jain, Queen's University, Canada

S71 Control Issues in Electric Drives

Room: 201
Chair: Uday Deshpande

3:30 pm • Unified Direct-Flux Vector Control of Induction Motor Self-Commissioning Drive with Analysis of Parameter Detuning Effects
Shafiq Ahmed Odhano, Aldo Boglietti, Iustin Radu Bojoi and Eric Armando, Politecnico di Torino, Italy

3:55 pm • Single External Source Control of Doubly-Fed Induction Machine Using Dual Inverter
Yongsu Han and Jung-Ik Ha, Seoul National University, Korea (South)

4:20 pm • Predictive direct flux vector control of Permanent Magnet Synchronous Motor Drives
Barbara Boazzo and Gianmario Pellegrino, Politecnico di Torino, Italy

4:45 pm • Fluctuating Current Control for a PMSM under Reduced DC Link Capacitance
Junwoo Kim, Ilsu Jeong, Kilho Lee and Kwanghee Nam, Pohang University of Science and Technology, Korea (South)

S72 Assorted Issues in Electric Drives

Room: 203
Chair: Luca Zarri

3:30 pm • Stability Analysis and Improvements for Combined Voltage and Current Mode Flux Observer of Induction Machine
Kai Wang, Wenxi Yao, Kevin Lee and Zhengyu Lu, Zhejiang University, China; Eaton Corporation, United States

3:55 pm • Modeling of Permanent Magnet Synchronous Machine Including Torque Ripple Effects
Abraham Gebregergis, Mazharul Chowdhury, Mohammad Islam and Tomy Sebastian, Nexteer Automotive, United States

4:20 pm • A DC-flux-injection Approach for Thermal Monitoring of Induction Machines with Direct Torque Control
Lijun He, Siwei Cheng, Yi Du, Ronald Harley and Thomas Habetler, Georgia Institute of Technology, United States; Ford Motor Company, United States

4:45 pm • Fault Tolerant Rotor Position and Velocity Estimation Using Binary Hall-effect Sensors for Low Cost Vector Control Drives
Giacomo Scelba, Giuseppe Scarcella, Giulio De Donato, Fabio, Giulii Capponi and Filippo Bonaccorso, University of Catania, Italy; Scuola Superiore Sant'Anna, Italy; University of Rome "La Sapienza", Italy

S73 Modeling and Control V

Room: 205
Chair: Hui Li

3:30 pm • Evaluation of Alternative Modulation Schemes For 3-level Neutral-Point-Clamped 3-phase Inverters
Xuning Zhang, Dushan Boroyevich, Rolando Burgos, Paolo Mattavelli and Fei Wang, Virginia Polytechnic Institute and State University, United States; University of Padova, Italy; University of Tennessee, United States

3:55 pm • Component Cost Models for Multi-Objective Optimizations of Switched-Mode Power Converters
Ralph Burkart and Johann Kolar, ETH Zurich, Switzerland

4:20 pm • A Comparison Between Dead-Beat And Predictive Control For A 7-level Back-To-Back Cascaded H-Bridge Under Fault Conditions
Luca Tarisciotti, Pericle Zanchetta, Alan Watson, Jon Clare and Stefano Bifaretti, University of Nottingham, United Kingdom; University of Rome "Tor Vergata", Italy

4:45 pm • An Innovative Current Sensor-less Continuous Conduction Mode PFC Control
Peng Fang and Yan-Fei Liu, Queen's University, Canada

S74 Magnetic Gears

Room: 207
Chair: Kan Akatsu

3:30 pm • Slip Recovery and Prevention in Pseudo Direct Drive Permanent Magnet Machines
Mohammed Bouheraoua, Jiabin Wang and Kais Atallah, Magnomatics Limited, United Kingdom, The University of Sheffield, United Kingdom

3:55 pm • Motor Integrated Permanent Magnet Gear in a Battery Electrical Vehicle
Tommy Vestergaaard Frandsen, Laszio Mathe, Nick Ilsoe Berg, Rasmus Koldber Holm, Torben N. Matzen, Peter Omand Rasmussen and Kasper Koetter Jensen, Aalborg University, Denmark; Grundfos Holding A/S, Denmark

4:20 pm • Construction of a Low Speed Flux Focusing Magnetic Gear
Krishna K. Uppalapati, Walter Bomela, Jonathan Bird, Matthew Calvin and Jason Wright, University of North Carolina at Charlotte, United States

4:45 pm • Theoretical and Experimental Loss and Efficiency Studies of a Magnetic Lead Screw
Nick Ilsoe Berg, Rasmus Koldborg Holm and Peter Omand Rasmussen, Aalborg University, Denmark

S75 Thermal Management

Room: 210/212
Chair: Bram Ferreira

3:30 pm • Weight Optimization of a Cooling System Composed of Fan and Extruded Fin Heat Sink
Christoph Gammeter, Florian Krismer and Johann W. Kolar, Swiss Institute of Technology, Switzerland

3:55 pm • Thermoelectric Cooling for Power Electronics Circuits: Small Signal Modeling and Controller Design
Cong Li, Da Jiao, Jizhou Jia, Feng Guo and Jin Wang, The Ohio State University, United States

4:20 pm • A Real-Time Thermal Model for Monitoring of Power Semiconductor Devices
Tanya Gachovska, Bo Tian, Jerry Hudgins, Wei Qiao and John Donlon, University of Nebraska-Lincoln, United States; Powerex. Inc., United States

4:45 pm • A Comparison of Thermal Vias Patterns used for Thermal Management in Power Converter
Deepak Gautam, Fariborz Musavi, Dale Wager and Murray Edington, Delta-Q Technologies Corp., Canada

Thursday, September 19 8:00 am – 9:40 am

S76 Wireless Power Transfer I

Room: 102
Chair: Omer C. Onar

8:00 am • Design and Implementation of Removable and Closed-shape Dual Ring Pickup for Contactless Linear Inductive Power Track System
Jia-You Lee, Hung-Yu Shen and Kai-Chuan Chan, National Cheng Kung University, Taiwan

8:25 am • Frequency Splitting Analysis of Magnetically-Coupled Resonant Wireless Power Transfer
Yiming Zhang, Zhengming Zhao and Kainan Chen, Tsinghua University, China

8:50 am • 8-Type Contactless Transformer Applied in Railway Inductive Power Transfer System
Mingshuo Li, Qianhong Chen, Jia Hou, Wenxian Chen and Xinbo Ruan, Nanjing University of Aeronautics and Astronautics, China

9:15 am • Impedance Transformers for Compact and Robust Coupled Magnetic Resonance Systems
Eunsoo Lee, XuanVan Thai, Suyong Choi, Chuntaek Rim and Jin Huh, KAIST, Korea, (South)

S77 Power Quality

Room: 103/105
Chair: Yunwei Li

8:00 am • Application of Matrix Pencil Method in Sub-cycle Voltage Dip Classification
Meng Hwee Chia and Ashwin Khambadkone, National University of Singapore, Singapore

8:25 am • Electric Arc Furnace (EAF) Compensation Using LaGrange Minimization
Leonard White and Subhashish Bhattacharya, North Carolina State University, United States

8:50 am • Improvement of Conservation Voltage Reduction Energy Savings via Local Voltage Regulation
Arthur Barnes and Jim Simonelli, Gridco Systems, United States

9:15 am • Adaptive Notch Filter Applied to Hybrid Active Var Compensator under Nonsinusoidal and Unbalanced Conditions
Silvia Costa Ferreira, Luiz Gonzaga Fernandez Silvia, Robson Bauwelz Gonzatti, Carlos Henrique da Silva, Luiz Eduardo Borges da Silva and Germano Lambert-Torres, Federal University of Itajuba, Brazil; CPFL Energy, Brazil

S78 Wind Energy: DFIG Control and Operation

Room: 104/106
Chair: Dan Ionel

8:00 am • Harmonic Analysis of Doubly Fed Induction Generator Based Utility Interactive Wind Turbine Systems During Fault Conditions
Yusuf Yasa, Yilmaz Sozer and Erkan Mese, Yildiz Technical University, Turkey; University of Akron, United States

8:25 am • Research on LVRT Capability of DFIG with Demagnetization Control
Linyuan Zhou, Jinjun Liu, Sizhan Zhou and Yangque Zhu, Xian Jiaotong University, China

8:50 am • Enhanced Operation for DFIG-based WECS using Resonant Feedback Compensators under Grid Unbalance
Peng Cheng and Heng Nian, Zhejiang University, China

9:15 am • A Class of Flux Observers for Doubly-Fed Induction Generators used in Small Power Wind Generation Systems
Cristian Lascu, Frede Blaabjerg, Ion Boldea and Wenjie Chen, University Politehnica of Timisoara, Romania; Aalborg University, Denmark; Zhejiang University, China

S79 Distributed Generation I

Room: 107/109
Chair: Yogesh Patel

8:00 am • Coordinated Operation of Parallel-Connected Inverters for Active Islanding Detection Using High Frequency Signal Injection
Fernando Briz, David Reigosa, Cristian Blanco and Juan Manuel Guerrero, University of Oviedo, Spain

8:25 am • Implementation and Control of a Residential Microgrid Based on Renewable Energy Sources, Hybrid Storage Systems and Thermal Controllable Loads
Julio Pascual, Idoia San Martin, Alfredo Ursua, Pablo Sanchis and Luis Marroyo, Public University of Navarre, Spain

8:50 am • Enhanced Power Quality Control Strategy for Paralleled Inverters in Distributed Generation
Zhixiang Zou, Zheng Wang and Ming Cheng, Southeast University, China

9:15 am • An Effective Smooth Transition Control Strategy using Droop Based Synchronization for Parallel Inverters
Nayeem Arafat, Ali Elrayyah and Yilmaz Sozer, University of Akron, United States

S80 DC-DC Isolated II

Room: 108
Chair: Hui Li

8:00 am • Rapid Push Pull Resonant Charger for High Power High Voltage Application Using Low Input Voltage
Eyal Rotman and Shmuel Ben-Yaakov, Rafael Advanced Defense Systems LTD, Israel; Ben-Gurion University of the Negev, Israel

8:25 am • Experimental Discussions on Operating Frequencies of a Bidirectional Isolated DC-DC Converter for a Battery Energy Storage System
Nadia Tan, Takahiro Abe and Hirofumi Akagi, Universiti Tenaga Nasional, Malaysia; JFE Steel Corporation, Japan; Tokyo Institute of Technology, Japan

8:50 am • A Modular DC-DC Converter with Collapsible Input Voltage of Series Connected Modules without Additional Bypass Switch
Yeh Ting, Sjoerd de Haan and Jan Abraham Ferreira, Delft University of Technology, Netherlands

9:15 am • A LCL-Resonant Isolated Multiport DC-DC Converter for Power Management of Multiple Renewable Energy Sources
Jianwu Zeng, Wei Qiao and Liyan Qu, University of Nebraska-Lincoln, United States

S81 AC-AC Converters

Room: 110/112
Chair: Luca Zarri

8:00 am • A Novel Single-phase PWM AC-AC Converters Without Commutation Problem
Hyunhak Shin, Honnyong Cha, Heung-Geun Kim and Dong-Wook Yoo, Kyungpook National Univ., Korea (South); Korea Electrotechnology Research Institute, Korea (South)

8:25 am • Design of 400V Class Inverter Drive Using SiC 6-in-1 Power Module
Kohei Shirabe, Mahesh Swamy, Jun-Koo Kang, Masaki Hisatsune, Mrinal Das, Robert Callanan and Henry Lin, Yaskawa America, Inc., United States; Cree, Inc., United States

8:50 am • A 3-phase Back-to-Back Converter for Reactive Power Compensation, Current Harmonic Filtering and Active Power Compensation
Janeth Alcala, Victor Cardenas, Homero Miranda, Javier Perez-Ramirez and Saida Charre, Universidad de Colima, Mexico; UASLP, Mexico; ITSON, Mexico

9:15 am • In-situ Reconfiguration for Flexible Distribution of Energy and Storage Resources
Ajit Anbiah Renjit and Mahesh Illindala, The Ohio State University, United States

S82 Power Converters for Photovoltaics

Room: 111/113
Chair: Toshihisa Shimizu

8:00 am • A Single-phase Grid-connected PV Converter with Minimal DC-link Capacitor and Low-frequency Ripple-free Maximum Power Point Tracking
Yuxiang Shi, Liming Liu, Hui Li and Yaosuo Xue, Florida State University, United States; Siemens Corporate Research, United States

8:25 am • Control Strategies for Utility-Scale Cascaded Photovoltaic System
Liming Liu, Hui Li and Yaosuo Xue, Florida State University, United States; Siemens Corporate Research, United States

8:50 am • Nonlinear Control Design for the Photovoltaic Isolated-Port Architecture with Submodule Integrated Converters
Yoash Levron, Daniel Clement, Dragan Maksimovic and Carlos Olalla, University of Colorado at Boulder, United States; Universitat Rovira i Virgili, Spain

9:15 am • A High Efficiency and Reliability Single-phase Photovoltaic Micro-Inverter with High Magnetics Utilization for Nonisolated AC-Module Applications
Baifeng Chen, Bin Gu, Jih-Sheng Lai and Wensong Yu, Virginia Tech, United States

S83 Maximum Power Point Tracking I

Room: 201
Chair: Eduard Muljadi

8:00 am • New Overall Control Strategy for Wind Energy Conversion Systems in MPPT and Stall Regions
Zakariya Dalala, Zaka Ullah Zahid and Jih-Sheng Lai, Virginia Tech, United States

8:25 am • Small Wind Turbines Sensorless MPPT: Robustness Analysis and Lossless Approach
Andoni Urtasun, Pablo Sanchis and Luis Marroyo, Public University of Navarre, Spain

8:50 am • Maximum-Voltage-Unit-Guided MPPT Algorithm for Improved Performance under Partial Shading
Tong Yao and Raja Ayyanar, Arizona State University, United States

9:15 am • High Efficient Variable step Size Incremental Resistance Maximum Power Point Tracker for PV Battery Charging Applications
Emad M. Ahmed, Mohamed Orabi and Masahito Shoyama, APEARC, Aswan University, Egypt; Kyushu University, Japan

S84 Power Converters for Electric Drives

Room: 203
Chair: Zhiguo Pan

8:00 am • A Novel Indirect Quasi-Z-Source Matrix Converter Applied to Induction Motor Drives
Shuo Liu, Baoming Ge, Xinjian Jiang, Haitham Abu-Rub and Fang Z. Peng, Beijing Jiaotong University, China; Michigan State University, United States; Tsinghua University, China; Texas A and M University at Qatar, Qatar

8:25 am • AC-AC 3-phase Drive System Based on Twelve-Leg DC-link Converter
Cursino Jacobina, Nady Rocha, Gregory Carlos and Euzeli Santos Jr, Federal University of Campina Grande, Brazil; Federal University of Paraiba, Brazil; Federal Institute of Alagoas, Brazil; Indiana University-Purdue University Indianapolis, United States

8:50 am • Stability Analysis and Dynamic Response of a DC-link Module with a Series Voltage Compensator
Huai Wang, Wenchao Liu, Henry Shu-hung Chung and Frede Blaabjerg, Aalborg University, Denmark; City University of Hong Kong, Hong Kong

9:15 am • Single-phase Active Power Filtering Method Using Diode-Rectifier-Fed Motor Drive
Wook-Jin Lee, Yeongrack Son and Jung-Ik Ha, Seoul National University, Korea (South)

S85 Magnetic Bearings and Bearlingless Machines

Room: 205
Chair: Elena Lomonova

8:00 am • Design and Test Result of Novel Single-Drive Bearingless Motor with Cylindrical Radial Gap
Hiroya Sugimoto, Seiyu Tanaka, Akira Chiba and Junichi Asama, Tokyo Institute of Technology, Japan; Shizuoka University, Japan

8:25 am • A Principle and A Test Result of A Novel Bearingless Motor With Motor Parallel Winding Structure
Akira Chiba, Satoshi Horima and Hiroya Sugimoto, Tokyo Institute of Technology, Japan

8:50 am • Suitability Investigation of a Bearingless Disk Drive for Micro Turbine Applications
Hubert Mitterhofer, Branimir Mrak and Wolfgang Amrhein, Linz Center of Mechatronics GmbH, Austria; Johannes Kepler University Linz, Austria

9:15 am • Compact and Low Cost Magnetic Bearing with Saturated Coil for Gas Turbine Generators
Van Xuan Thai, Bohwan Choi, Suyong Choi, Seungjin Yoo and Chuntaek Rim, KAIST, Korea, (South)

S86 Diagnostics and Fault Analysis of Electric Machines I

Room: 207
Chair: Marques Cardoso

8:00 am • A Novel High Sensitivity Differential Current Transformer for Online Health Monitoring of Industrial Motor Ground-wall Insulation
Prabhakar Neti, Karim Younsi and Manoj Shah, GE Global Research Center, United States

8:25 am • Interior Permanent Magnet Synchronous Machine Rotor Demagnetization Characteristics under Fault Conditions
Gilsu Choi and Thomas Jahns, University of Wisconsin - Madison, United States

8:50 am • Reliable Detection of Induction Motor Rotor Faults under the Rotor Axial Air Duct Influence
Chanseung Yang, Tae-June Kang, Doosoo Hyun, Sang Bin Lee, Jose Antonino-Daviu and Joan Pons-Llinares, Korea University, Korea, (South); Polytechnic University of Valencia, Spain

9:15 am • Fault Type Detection using Frequency Pattern of Stator Current in IPM-type BLDC Motor under Stator Inter-turn, Dynamic Eccentricity, and Coupled Faults
Jun-Kyu Park, Il-Man Seo and Jin Hur, University of Ulsan, Korea (South)

S87 Converter-level Power Electronic Device Integration

Room: 210/212
Chair: Jerry Hudgins

8:00 am • Evaluation of 15 kV SiC N-IGBT and P-IGBT for Complementary Inverter Topology with Zero dV/dT Stress on Gate Drivers
Arun Kadavelugu, Subhashish Bhattacharya, Sei-Hyung Ryu, Dave Grider, Anant Agarwal and Scott Leslie, North Carolina State University, United States; Cree, Inc, United States; U.S., Department of Energy, United States; Powerex, Inc, United States

8:25 am • Characterization of 15 kV SiC n-IGBT and its Application Considerations for High Power Converters
Arun Kadavelugu, Subhashish Bhattacharya, Sei-Hyung Ryu, Edward Van Brunt, Dave Grider, Anant Agarwal and Scott Leslie, North Carolina State University, United States; Cree, Inc, United States; Dept. of Energy, United States; Powerex, Inc, United States

8:50 am • A Gate Assist Circuit for Cross Talk Suppresion of SiC Devices in a Phase-leg Configuration
Zheyu Zhang, Fred Wang, Leon M. Tolbert and Benjamin J. Blalock, University of Tennessee, United States

9:15 am • Validation of the Plug-and-play AC-AC Power Electronics Building Block (AC-PEBB) for Medium Voltage Grid Control Applications
Amrit Iyer, Rohit Moghe, Rajendra Kandula, Jorge E. Hernandez and Deepak Divan, Georgia Institute of Technology, United States

Thursday, September 19 **10:00 am – 11:40 am**

S88 Wireless Power Transfer II

Room: 102
Chair: Fernando Briz

10:00 am • Analysis and Control of S/SP Compensation Contactless Resonant Converter with Constant Voltage Gain
Jia Hou, Qianhong Chen, Kaiqin Yan, Xiaoyong Ren, Siu-Chung Wong and Chi.K Tse, Nanjing University of Aeronautics and Astronautics, China; Hong Kong Polytechnic University, China

10:25 am • A Novel Fast-switching Control for Multiple Pickup IPT Systems
Liang Chen, John Boys and Grant Covic, University of Auckland, New Zealand

10:50 am • Contactless Slipring System based on Rotating Magnetic Field Principle for Rotary Applications
Ali Abdolkhani, Aiguo Patrick Hu, Grant Covic and Mahsa Moridnejad, University of Auckland, New Zealand

11:15 am • Experimental Verifications and Design Procedure of an AC-DC Converter with Input Impedance Matching for Wireless Power Transfer Systems
Keisuke Kusaka and Jun-ichi Itoh, Nagaoka University of Technology, Japan

S89 HVDC and FACTS

Room: 103/105
Chair: Leila Parsa

10:00 am • Multi-module Bidirectional Buck-boost Inverter-based HVDC Back-to-back Transmission System
Ahmed Elserougi, Ayman Abdel-Khalik, Ahmed Massoud and Shehab Ahmed, Alexandria University, Egypt; Qatar University, Qatar; Texas A and M University at Qatar, Qatar

10:25 am • Power Flow Router Sensitivities for Post-contingency Corrective Control
James Jamal Thomas, Jorge Hernandez and Santiago Grijalva, Georgia Institute of Technology, United States

10:50 am • Experimental Validation of Modular Transformer Converter Based Convertible Static Transmission Controller for Transmission Grid Management
Nima Yousefpoor, Babak Parkhideh, Ali Azidehak and Subhashish Bhattacharya, North Carolina State University, United States; University of North Carolina - Charlotte, United States

11:15 am • A Control Structure for Line-frequency-switched STATCOMs under System Faults
Saman Babaei and Subhashish Bhattacharya, North Carolina State University, United States

S90 Wind Farm Connection

Room: 104/106
Chair: Yao Duan

10:00 am • A Boost Conversion System Consisting of Multiple DC-DC Converter Modules for Interfacing Wind Farms and HVDC Transmission
Kenichiro Sano and Masahiro Takasaki, Central Research Inst. of Electric Power Ind., Japan; Tokyo University of Science, Japan

10:25 am • An Adaptive Phase-Locked Loop Algorithm for Faster Fault Ride Through Performance of Interconnected Renewable Energy Sources
Lenos Hadjidemetriou, Elias Kyriakides and Frede Blaabjerg, University of Cyprus, Cyprus; Aalborg University, Denmark

10:50 am • Comprehensive Modeling of Turbine Systems from Wind to Electric Grid
Bora Novakovic, Yao Duan, Mark Solveson, Adel Nasiri and Dan Ionel, University of Wisconsin, Milwaukee, United States; ANSYS, United States

11:15 am • Multi-megawatt Wind Turbine Converter Configurations Suitable for Off-shore Applications, Combining 3-L NPC PEBBs
Javier Chivite Zabalza, Igor Larrazabal, Ignacio Zubimendi, Sergio Aurtenetxea and Mikel Zabaleta, Ingeteam Power Technology, Spain

S91 Distributed Generation II

Room: 107/109
Chair: Peter Liu

10:00 am • Synchronization in Highly Distorted 3-phase Grids using Selective Notch Filters
Cristian Blanco, David Reigosa, Fernando Briz and Juan Manuel Guerrero, University of Oviedo, Spain

10:25 am • Islanding Detection in Grid-connected Power Converters using Harmonics due to the Non-ideal Behavior of the Inverter
David Reigosa, Fernando Briz, Cristian Blanco and Juan Manuel Guerrero, University of Oviedo, Spain

10:50 am • Decentralized Control of MTDC Networks with Energy Storage and Distributed Generation
Catalin Gavriluta, Ignacio Candela, Costantino Citro, Alvaro Luna and Pedro Rodriguez, Technical University of Catalonia, Spain; Abengoa Research, Spain

11:15 am • Control System Tuning and Stability Analysis of Virtual Synchronous Machines
Salvatore D'Arco, Jon Are Suul and Olav B. Fosso, SINTEF Energy Research, Norway; Norwegian University of Science and Technology, Norway

S92 Converter Applications

Room: 108
Chair: Zach Pan

10:00 am • Miniature Self-powered Stick-on Wireless Sensor Node for Monitoring of Overhead Power Lines
Qiliang Xu, Rafael Send, Igor Paprotny, Richard White and Paul Wright, University of California, Berkeley, United States

10:25 am • A Low-cost Electric-field Energy Harvester for an MV/HV Asset-monitoring Smart-sensor
Rohit Moghe, Amrit Iyer, Frank Lambert and Deepak Divan, Georgia Institute of Technology, United States

10:50 am • Design and Analysis of Integrated Driver for Piezoelectric Actuators
Mario Lok, David Brooks, Rob Wood and Gu-Yeon Wei, Harvard University, United States

11:15 am • A Low Power Consumption Driver with Low Acoustics for Piezoelectric Synthetic Jets
Ramanujam Ramabhadran, John Glaser and H. Peter de Bock, General Electric Global Research Center, United States

S93 Matrix Converters

Room: 110/112
Chair: Lee Empringham

10:00 am • Comparison of 3-phase AC-AC Matrix Converter and Voltage DC-link Back-to-back Converter Topologies Based on EMI Filter
Bo Wen, Xuning Zhang, Qiong Wang, Rolando Burgos, Paolo Mattavelli and Dushan Boroyevich, Virginia Tech, United States; DTG-University of Padova, Italy

10:25 am • Efficiency and Damping Control Evaluation of a Matrix Converter with a Boost-up AC Chopper in Adjustable Speed Drive System
Kazuhiro Koiwa and Jun-ichi Itoh, Nagaoka University of Technology, Japan

10:50 am • New Control Strategy for Indirect Matrix Converters Operating in Boost Mode
Andres Escobar-Mejia, Jonathan Hayes, Juan Carlos Balda and Claudio Busada, University of Arkansas, United States; Universidad Nacional del Sur, Argentina

11:15 am • A Modulation Strategy for Matrix Converter with Extended Control Range and Reduced Switching Power Losses
Michele Mengoni, Luca Zarri, Angelo Tani, Giancarlo Rini, Giovanni Serra and Domenice Casadei, University of Bologna, Italy

S94 Single Phase DC to AC Inverters I

Room: 111/113
Chair: Pierluigi Tenca

10:00 am • Novel Soft-switching Snubberless Naturally Clamped Current-fed Full-bridge Front-end Converter Based Bidirectional Inverter for Renewable, Microgrid, and UPS Applications
Pan Xuewei, Akshay Rathore and Udupi R. Prasanna, National University of Singapore, Singapore; University of Texas at Dallas, United States

10:25 am • A Soft-switching Full-bridge Inverter with High Efficiency
Yenan Chen, Guangcheng Hu, Chengrui Du, Min Chen and Dehong Xu, Zhejiang University, China

10:50 am • Impedance Design of Quasi-Z Source Network to Limit Double Fundamental Frequency Voltage and Current Ripples in Single-phase Quasi-Z Source Inverter
Dongsen Sun, Baoming Ge, Xingyu Yan, Daqiang Bi, Haitham Abu-Rub and Fang Z. Peng, Beijing Jiaotong University, China; Michigan State University, United States; Tsinghua University, China; Texas A and M University at Qatar, Qatar

11:15 am • Current-fed DC-DC Topology Based Inverter
Soumya Shubhra Nag and Santanu Mishra, Indian Institute of Technology, Kanpur, India

S95 Maximum Power Point Tracking II

Room: 201
Chair: Pedro Rodriguez

10:00 am • Current-sensorless Power-angle-based MPPT for Single-stage Grid-connected Photovoltaic Voltage-source Inverters
Gamal M. Dousoky and Masahito Shoyama, Minia University, Egypt; Kyushu University, Japan

10:25 am • Maximum Power Point Tracking Algorithm with Advanced State Detection and Regression Method for Small Wind Energy Systems
Joanne Hui, Alireza Bakhshai and Praveen K. Jain, Queen's University, Canada

10:50 am • A Maximum Power Point Tracking Method for PV Systems Supplying a Periodic Nonlinear Load
Chung-Ti Hsu, Peng Li, Su Sheng and Brad Lehman, Northeastern University, United States

11:15 am • A Distributed Approach to MPPT for PV Sub-module Differential Power Processing
Shibin Qin, Stanton Cady, Alejandro Dominguez-Garcia and Robert C.N. Pilawa-Podgurski, University of Illinois at Urbana-Champaign, United States

S96 Drive Topologies and Packaging for Hybrid and Electric Vehicles

Room: 203
Chair: Chandra Namuduri

10:00 am • A High Temperature Traction Inverter with Reduced Cooling and Improved Efficiency for HEV Applications
Zhuxian Xu, Fan Xu, Dong Jiang, Wenchao Cao and Fred Wang, University of Tennessee, United States; United Technologies Research Center, United States

10:25 am • A Variable Voltage Converter with Direct Bypass for Traction Drive Inverters
Lihua Chen, Ford Motor Company, United States

10:50 am • An Inverter Packaging Scheme for an Integrated Segmented Traction Drive System
Gui-Jia Su, Lixin Tang, Curt Ayers and Randy Wiles, Oak Ridge National Laboratory, United States

11:15 am • Low Voltage and High Power DC-AC Inverter Topologies for Electric Vehicles
Rashidreza Karimi, Thies Koeneke, Dennis Kaczorowski, Timur Werner and Axel Mertens, Leibniz University of Hannover, Germany

S97 Noise and Vibration in Electric Machines

Room: 205
Chair: Long Wu

10:00 am • Analytical Expression of Pulsating Torque harmonics due to PWM Drives
Joseph Song-Manguelle, Gabriel Ekemb, Stefan Schroeder, Tobias Geyer, Jean Maurice Nyobe-Yome and Rene Wamkeue, ExxonMobil, United States; University of Quebec in Chicoutimu, Canada; GE Global Research, Germany; ABB, Switzerland; University of Douala, Cameroon; University of Quebec in Abiti-Temiscamingue, Canada

10:25 am • Suppression Control of Radial Force Vibration due to Fundamental Permanent-magnet Flux in IPMSM
Masato Kanematsu, Takayuki Miyajima, Hiroshi Fujimoto, Yoichi Hori, Toshio Enomoto, Masahiko Kondou, Hiroshi Komiya, Kantaro Yoshimoto and Takayuki Miyakawa, University of Tokyo, Japan; Nissan Motor Co., LTD., Japan

10:50 am • Multi-physics Analysis of Double Stator Switched Reluctance Machines
Arash Hassanpour Isfahani and Babak Fahimi, University of Texas at Dallas, United States

11:15 am • Influence of Pole and Slot Number Combinations on Cogging Torque in Permanent Magnet Machines with Static and Rotating Eccentricities
Zi-Qiang Zhu, L.J. Wu and M.L. Mohd Jamil, University of Sheffield, United Kingdom

S98 IPM Machines II

Room: 207
Chair: Patel Reddy

10:00 am • Multi-objective Tradeoffs in the Design Optimization of a Brushless Permanent Magnet Machine with Fractional-slot Concentrated Windings
Peng Zhang, Gennadi Sizov, Muyang Li, Dan Ionel, Nabeel Demerdash, Steven Stretz and Alan Yeadon, Marquette University, United States; Regal Beloit Corporation, United States

10:25 am • Circulating Current in Parallel Connected Stator Windings due to Rotor Eccentricity in Permanent Magnet Motors
Eri Maruyama, Akeshi Takahashi, Akihito Nakahara and Kenji Miyata, Hitachi, Ltd., Japan

10:50 am • Impact of Interior Permanent Magnet Rotor Design on Signal Injection Based Sensorless Control and Power Conversion
Ian P. Brown, Gennadi Y. Sizov and Laura E. Brown, Illinois Institute of Technology, United States; Marquette University, United States; Michigan Technological University, United States

11:15 am • Design and Control of IPMSM Sensorless Drive for Mechanical Rotor Position Detection Capability
Yong-Cheol Kwon, Seung-Ki Sul, Noor Aamir Baloch, Sohji Murakami and Shinya Morimoto, Seoul National University, Korea (South); Yaskawa Electric Corporation, Japan

S99 Power Electronic Modules III

Room: 210/212
Chair: Yehui Han

10:00 am • Gate Drive Investigations of IGBT Modules with SiC-Schottky Freewheeling Diodes
Na Ren, Kuang Sheng, Junming Zhang and Fangzheng Peng, Zhejiang University, China; Michigan State University, United States

10:25 am • A High Temperature, Double-sided Cooling SiC Power Electronics Module
Hao Zhang, Simon Ang, Alan Mantooth and Shashank Krishnamurthy, UARK, United States; United Technologies Research Center, United States

10:50 am • Advanced Packaging of SiC Power Module for Automotive Applications
Zhenxian Liang, Puqi Ning and Fred (Fei) Wang, Oak Ridge National Laboratory, United States; University of Tennessee, United States

11:15 am • Anti-series Normally-on SiC JFETs Operating as Bidirectional Switches
Mahmood Saadeh, Madu Chinthavali, Burak Ozpineci and Alan Mantooth, Oak Ridge National Laboratory, United States; University of Arkansas, United States

Thursday, September 19 1:30 pm – 3:10 pm

S100 Wireless Power Transfer III

Room: 102
Chair: Thomas Jahns

1:30 pm • Analysis and Comparison of Secondary Series- and Parallel-Compensated IPT Systems
Wei Zhang, Siu-Chung Wong, Chi K. Tse and Qianhong Chen, Hong Kong Polytechnic University, Hong Kong; Nanjing University of Aeronautics and Astronautics, China

1:55 pm • Wireless Fleet Charging System for Electric Bicycles
Hui Zhi (Zak) Beh, Grant Covic and John Boys, University of Auckland, New Zealand

2:20 pm • Inductive Power Transfer by Means of Multiple Frequencies in the Magnetic Link
Zeljko Pantic, Kibok Lee and Srdjan Lukic, North Carolina State University, United States

2:45 pm • Self-oscillating Contactless Resonant Converter with Phase Detection Contactless Current Transformer
Kaiqin Yan, Qianhong Chen, Jia Hou, Wenxian Chen, Xiaoyong Ren and Xinbo Ruan, Nanjing University of Aero. and Astro., China

S101 Grid Connected Converters I

Room: 103/105
Chair: Pedro Rodriguez

1:30 pm • Analysis on Capability of Harmonic Damping Using Active Filter Acting as Resistive Harmonic Impedance
Khairul Nisak Md Hasan, Alvaro Luna, J. Ignacio Candela and Pedro Rodriguez, Technical University of Catalonia, Spain, Universiti Teknologi PETRONAS, Malaysia

1:55 pm • Anti-islanding Detector based on a Robust PLL
Stefano Bifaretti, University of Rome Tor Vergata, Italy

2:20 pm • Auto-tuning based Resonance Damping of Gridconnected Voltage Source Inverters with Long Transmission Cable
Shao Zhang, Shuai Jiang, Xi Lu, Baoming Ge and Fang Zheng Peng, Michigan State University, United States

2:45 pm • Test Bed Implementation of 380V DC Distribution System Using Isolated Bidirectional Power Converters
Myung-Hyo Ryu, Hosung Kim, Jonghyun Kim, Juwon Baek and Jee-Hoon Jung, Korea Electrotechnology Research Institute, Korea (South); Ulsan National Institute of Science Technology, Korea (South)

S102 Wind Energy Converters

Room: 104/106
Chair: Frede Blaabjerg

1:30 pm • Nonlinear Control of Wind Energy Conversion System Based on Control-Lyapunov Function
Jonathan Mash, Majid Pahlevaninezhad and Praveen Jain, Queen's University, Canada

1:55 pm • Lifetime Estimation for the Power Semiconductors Considering Mission Profiles in Wind Power Converter
Ke Ma, Marco Liserre and Frede Blaabjerg, Aalborg University, Denmark

2:20 pm • Current-based Eccentricity Detection for Direct-drive Wind Turbines via Synchronous Sampling
Xiang Gong and Wei Qiao, General Motors Technical Center, United States; University of Nebraska-Lincoln, United States

2:45 pm • Permanent-magnet Synchronous-generator Wind-energy Systems with Boost Matrix Converters
Ekrem Karaman, Mehdi Farasat and Andrzej Trzynadlowski, University of Nevada, Reno, United States

S103 Distributed Generation III

Room: 107/109
Chair: Behrooz Mirafzal

1:30 pm • On the Use of Real-time Simulation Technology in Smart Grid Research and Development
Christian Dufour and Jean Belanger, Opal-RT Technologies, Canada

1:55 pm • Parameter Design and Impacts on Power Quality of a Q-f Droop Curve Based Islanding Detection Method
Ling Jiang, Wen Cai, Bangyin Liu, Shanxu Duan and Changyue Zou, Huazhong University of Science and Technology, China

2:20 pm • Reactive Power Scheduler for Voltage Regulation of Distributed Energy Systems
Ali Safayet, Iqbal Husain and Yilmaz Sozer, North Carolina State University, United States; University of Akron, United States

2:45 pm • Broadband Methods for Online Grid Impedance Measurement
Tomi Roinila, Matti Vilkko and Jian Sun, Rensselaer Polytechnic Institute, United States; Tampere University of Technology, Finland

S104 AC-DC Multi-phase II

Room: 108
Chair: Qiang Li

1:30 pm • Discrete-time One Cycle Control of VIENNA Rectifiers Considering the DC-link Neutral-point Voltage Balance
Yumei Li, Xiaoming Zha, Fei Liu and Leping Bu, Wuhan University, China; Naval University of Engineering, China

1:55 pm • Evaluation of LCL Filter Inductor and Active Front End Rectifier Losses Under Different PWM Method
Lixiang Wei, Yogesh Patel and C.S.N. Murthy, Rockwell Automation, United States, L&T Technology, United States

2:20 pm • Optimization and Comparison of Two Soft Switched High Voltage Converter Modulator Topologies
Chao Ji, Alan Watson, Pericle Zanchetta, Michael Bland, Jon Clare, Patrick Wheeler and William Reass, University of Nottingham, United Kingdom; Los Alamos National Laboratory, United States

2:45 pm • Comparative Evaluation of SiC Devices for PWM Buck Rectifier Based Active Front End Converter for MV Grid Interface
Sachin Madhusoodhanan, Yonghwan Cho, Arun Kadavelugu, Subhashish Bhattacharya, Dave Grider, Sei-Hyung Ryu, Anant Agarwal and Scott Leslie, North Carolina State University, United States; Cree, Inc, United States; US Department of Energy, United States; Powerex Inc, United States

S105 Multilevel Converters II

Room: 110/112
Chair: Tobias Geyer

1:30 pm • A Concept of Multi-level Converter Building Modules to Realize Higher Number of Output Levels
Hidemine Obara and Yukihiko Sato, Chiba University, Japan

1:55 pm • Scaling the Controllable Network Transformer (CNT) to Utility-level Voltages with Direct-AC-AC Power Electronic Building Blocks (PEBBs)
Amrit Iyer, Rajendra Kandula, Rohit Moghe, Frank Lambert and Deepak Divan, Georgia Institute of Technology, United States

2:20 pm • Bidirectional Three Port, 3-phase Multilevel Inverter Based on Switched Capacitor Cells
Mark Scott, Ernest Davison, Cong Li, Rachid Darbali-Zamora, Ramiro Duarte, Xintong Lu, Titus Chen, Feng Guo and Jin Wang, The Ohio State University, United States; The University of Puerto Rico, United States

2:45 pm • Low-voltage-ride-through (LVRT) Capability of a Phase-shifted-PWM STATCOM Using the Modular Multilevel Cascade Converter Based on Single-star Bridge-cells (MMCC-SSBC)
Joao Inacio Yutaka Ota, Yuji Shibano and Hirofumi Akagi, Tokyo Institute of Technology, Japan

S106 Single Phase DC to AC Inverters II

Room: 111/113
Chair: Stefano Bifaretti

1:30 pm • A Multilevel Energy Buffer and Voltage Modulator for Grid-interfaced Micro-inverters
Minjie Chen, Khurram Afridi and David Perreault, Massachusetts Institute of Technology, United States

1:55 pm • Quasi Variable Capacitor Applied to Soft Switching Inverter for Induction Heating
Sachio Kubota, Fumio Ito and Yoshihiro Shimaoka, Toba National College of Maritime Technology, Japan

2:20 pm • Common-mode Voltage Reduction Method of PWM Current Source Inverter Modifying the Distribution of Zero Current
Yushi Takatsuka, Katsutoshi Yamanaka and Hidenori Hara, Yaskawa Electric Corporation, Japan

2:45 pm • A Single-phase Current Source PV Inverter with Power Decoupling Capability using an Active Buffer
Yoshiya Ohnuma, Koji Orikawa and Jun-ichi Itoh, Nagaoka University of Technology, Japan

S107 Lighting Technologies I

Room: 201
Chair: Henry Chung

1:30 pm • A Review and Classification of LED Ballasts
Sinan Li, Siew Chong Tan, S.Y.(Ron) Hui and Chi K. Tse, The University of Hong Kong, Hong Kong; Hong Kong Polytechnic University, Hong Kong

1:55 pm • A High-Frequency Digitally Controlled LED Driver for Automotive Applications with Fast Dimming Capabilities
Luca Corradini and Giorgio Spiazzi, University of Padova, Italy

2:20 pm • Daisy-Chain Transformer Structure for Current-Balancing Multiple LED Strings
Ruihong Zhang and Henry Shu-hung Chung, City University of Hong Kong, Hong Kong

2:45 pm • A Dimmable LED Driver Using Resistive DAC Feedback Control for Adaptive Voltage Regulation
Lukas Lohaus, Arne Rossius, Stefan Dietrich, Ralf Wunderlich and Stefan Heinen, RWTH Aachen University, Germany

S108 Energy Efficient Motor Drives

Room: 203
Chair: Brij N Singh

1:30 pm • Energy Saving Start-up Method by Combined Use of Two Position Sensorless Controls
Takahiro Suzuki, Yuichi Shimizu, Yoshitaka Iwaji, Shigehisa Aoyagi and Ryoichi Takahata, Hitachi, Ltd., Japan; Hitachi Appliances, Inc., Japan

1:55 pm • Maximum Efficiency Drives of Synchronous Reluctance Motors with On-Line Stator Resistance Estimator
Shu Yamamoto, Hideaki Hirahara, Akira Tanaka, Takahiro Ara and Kouki Matsuse, Polytechnic University, Japan; Tokyo Metropolitan University, Japan; Meiji University, Japan

2:20 pm • Multi-mode Control Strategy in Small-scale Wind Turbine Generators for Wider Operating Speed Range and Higher Efficiency Operation
Lujie Chen, Wen Soong and Nesimi Ertugrul, University of Adelaide, Australia

2:45 pm • Numerical Design Methodology of Optimal Trajectories for Efficient Induction Motor Drive based on a Loss Map
Kaoru Inoue, Naoya Okada, Hiroki Kiyose and Toshiji Kato, Doshisha University, Japan

S109 *Norio Takahashi Memorial Session:* Losses in Electrical Machines

Room: 205
Chair: David Dorrell

1:30 pm • Analysis of the Temperature Dependence of Losses in Electrical Machines
Joerg Schuetzhold and Wilfried Hofmann, Technical University Dresden, Germany

1:55 pm • Impact of Dead-time on Iron Losses in Inverter-fed Magnetic Materials
Seyed Mohammad Dehghan and Keisuke Fujisaki, Toyota Technological Institute, Japan

2:20 pm • The Minor Hysteresis Loop under Rotating Magnetic Fields in Machine Laminations
Natheer Alatawneh and Pragasen Pillay, Concordia University, Canada

2:45 pm • A Combined Hysteresis and Eddy-current Model Developed for a Wide Frequency Range in Electric Machine Applications
Reinhard Woehrnschimmel, Christian Kral, Florian Muellner, Stefan Wild, Harald Neudorfer and Friedrich Dangl, Austrian Institute of Technology GmbH, Austria; Traktionssysteme Austria GmbH, Austria

S110 Axial Flux Machines

Room: 207
Chair: Jessica Colton

1:30 pm • Operation Characteristics of Ferrite Permanent Magnet In-wheel Axial-gap Motor with Coreless Rotor Structure for Electric City Commuters
Kodai Sone, Masatsugu Takemoto, Satoshi Ogasawara, Kenichi Takezaki and Wataru Hino, Hokkaido University, Japan; Dynax Corporation, Japan

1:55 pm • Omega Shaped Axial-flux Permanent-magnet Machine for Direct-drive Applications with Constrained Shaft Height
Giulio De Donato, Fabio Giulii Capponi, Gabriele Borocci, Federico Caricchi, Luigi Beneduce, Luigi Fratelli and Antonio Tarantino, University of Roma "La Sapienza", Italy; AnsaldoBreda S.p.A., Italy

2:20 pm • FEA Estimation and Experimental Validation of Solid Rotor and Magnet Eddy Current Loss in Single-sided Axial Flux Permanent Magnet Machines
Xu Yang, Dean Patterson, Jerry Hudgins and Jessica Colton, University of Nebraska Lincoln, United States; Boulder Wind Power, United States

2:45 pm • Line-start Axial-flux Permanent-magnet Synchronous Motor
Amin Mahmoudi, Solmaz Kahourzade, Mohammad Nasir Uddin, Nasrudin Abd Rahim and Wooi Ping Hew, University of Malaya, Malaysia; Lakehead University, Canada

S111 Wide Bandgap Semiconductors III

Room: 210/212
Chair: Robert Pilawa

1:30 pm • A 3600V 80A Single External-driver Series Connected Circuit with Three Silicon Carbide MOSFETs
Shidong Cheng, Yizhe Huang, Xinke Wu and Kuang Sheng, Zhengjiang University, China; Zhejiang University, China

1:55 pm • Performance Consideration of an AC Coupled Gate Drive Circuit With Forward Bias for Normally-on SiC JFETs
Georgios Kampitsis, Stavros Papathanassiou and Stefanos Manias, National Technical University of Athens, Greece

2:20 pm • Performance Comparison of 1200V 100A SiC MOSFET and 1200V 100A Silicon IGBT
Gangyao Wang, Fei Wang, Gari Magai, Yang Lei, Alex Huang and Mrinal Das, North Carolina State University, United States; Cree, Inc., United States

2:45 pm • High-temperature Characterization and Comparison of 1.2 kV SiC Power MOSFETs
Christina DiMarino, Zheng Chen, Milisav Danilovic, Dushan Boroyevich, Rolando Burgos and Paolo Mattavelli, Virginia Polytechnic Institute and State University, United States

Thursday, September 19 **3:30 pm – 5:10 pm**

S112 Wireless Power Transfer IV

Room: 102
Chair: Robert Lorenz

3:30 pm • High Efficiency Contactless Power Transfer System for Electric Vehicle Battery Charging Application
Cong Zheng, Rui Chen, William Eric Faraci, Zaka Ullah Zahid, Matthew Senesky, Dave Anderson, Jih-Sheng Lai, Wensong Yu and Chien-Yu Lin, Virginia Tech, United States; Texas Instruments Incorporated, United States; National Taiwan University of Science and Tech, Taiwan

3:55 pm • Vehicle-to-Grid Scheme Based on Inductive Power Transfer for Advanced Distribution Automation
Pirooz Javanbakht, Salman Mohagheghi, Babak Parkhideh, Sumit Dutta, Ritwik Chattopadhyay and Subhashish Bhattacharya, Colorado School of Mines, United States; University of North Carolina - Charlotte, United States; North Carolina State University, United States

4:20 pm • Single-phase Active Boost Rectifier with Power Factor Correction for Wireless Power Transfer Applications
Madhu Sudhan Chinthavali, Omer Onar, John Miller and Lixin Tang, Oak Ridge National Laboratory, United States

4:45 pm • Optimal Design Method to Achieve Both Good Robustness and Efficiency in Loosely-coupled Wireless Charging System Employing Series-Parallel Resonant Tank with Asymmetrical Magnetic Coupler
Isaac Nam, Roger Dougal and Enrico Santi, University of South Carolina, United States

S113 Grid Connected Converters II

Room: 103/105
Chair: Sheldon Williamson

3:30 pm • Forward-type Micro-inverter with Current Decoupling
Chien-Yao Liao, Wen-Shiun Lin, Kai-Shin Chen, Yaow-Ming Chen and Cheng-Yen Chou, National Taiwan University, Taiwan; Darfon Electronic Corporation, Taiwan

3:55 pm • Inverter Control Strategy for DG Systems based on the Conservative Power Theory
Danilo Brandao, Fernando Marafao, Helmo Paredes and Alessandro Costabeber, State University of Campinas, Brazil; Unesp - Univ Estadual Paulista, Brazil; University of Padova, Italy

4:20 pm • 15 kV SiC IGBT based 3-phase, 3-level, Modular-leg Power Converter
Dhaval Patel, Arun Kadavelugu, Sachin Madhusoodhanan, Subhashish Bhattacharya, Kamalesh Hatua, Scott Leslie, Sei-Hyung Ryu, Dave Grider and Anant Agarwal, North Carolina State University, United States; Indian Institute of Technology Madras, India; Powerex, Inc, United States; Cree, Inc, United States; DOE, United States

4:45 pm • Grid Harmonics and Voltage Unbalance Effect Elimination for 3-phase PLL Grid Synchronization Algorithm
Ali Safayet, Iqbal Husain, Ali Elrayyah and Yilmaz Sozer, North Carolina State University, United States; University of Akron, United States

S114 Wind Energy Technologies

Room: 104/106
Chair: David Dorrell

3:30 pm • Variable Speed Wind Power Plant Operating with Reserve Power Capability
Mohit Singh, Vahan Gevorgian, Eduard Muljadi and Erik Ela, National Renewable Energy Laboratory, United States

3:55 pm • Modeling of a Hydraulic Wind Power Energy Transfer System Utilizing a Proportional Valve
Majid Deldar, Afshin Izadian and Sohel Anwar, Purdue School of Engineering Indianapolis, United States

4:20 pm • Estimation of Wake Effect in Wind Farms Using Design of Experiment Methodology
Amir Tahavorgar and John E. Quaicoe, Memorial University of Newfoundland, Canada

4:45 pm • Analysis of Grid Current Control in Consideration of Voltage Feedforward and Cable Capacitance Demonstrated on a Fully Sized Wind Turbine Installed in a Wind Park
Felix Fuchs, Viet Pham and Axel Mertens, Leibniz Universitaet Hannover, Germany

S115 AC-DC Multi-phase III

Room: 107/109
Chair: Akshay Kumar Rathore

3:30 pm • Control Algorithm of High Power Rectifier System in DC Arc Furnace for Improved Arc Stability
Kyungsub Jung, Yongsug Suh, Taewon Kim, Taejun Park and Yongjoong Lee, Chonbuk National University, Korea (South); RIST, POSCO, Korea (South); Paul Scherrer Institute, Switzerland

3:55 pm • A Generalized DQ Impedance Model of 3-phase Diode Rectifier
Qin Lei, Sisheng Liang, Fang Zheng Peng, Miaosen Shen and Vladimir Blasko, Michigan State University, United States; United Technologies Research Center, United States

4:20 pm • DC-link Current Control Scheme for Paralleled 3-phase Current Source Rectifiers in High Efficiency Power Supply System
Fan Xu, Ben Guo, Zhuxian Xu, Leon Tolbert, Fred Wang and Benjamin Blalock, University of Tennessee, United States

4:45 pm • Analysis of Nonlinear Sideband Effects in Small-signal Input dq Admittance of Twelve-pulse Diode Rectifiers
Marko Jaksic, Zhiyu Shen, Igor Cvetkovic, Dushan Boroyevich, Rolando Burgos and Paolo Mattavelli, Virginia Tech, United States; University of Padova, Italy

S116 Modular Multilevel Converters

Room: 108
Chair: Pierluigi Tenca

3:30 pm • Modular Multilevel Converter based on Current Source H-bridge cells implemented with low cost Reversing Conducting IGCT
Ricardo Lizana, Marcelo Perez, Jose Rodriguez and Bin Wu, Universidad Tecnica Federico Santa Maria, Chile; Ryerson University, Canada

3:55 pm • Optimal Selection of the Average Capacitor Voltage for Modular Multilevel Converters
Antonios Antonopoulos, Lennart Angquist, Lennart Harnefors and Hans-Peter Nee, KTH Royal Institute of Technology, Sweden

4:20 pm • Development of a 500-kW Modular Multilevel Cascade Converter for Battery Energy Storage Systems
Noriko Kawakami, Satoru Ota, Hironobu Kon, Shuji Konno, Hirofumi Akagi, Hirom Kobayashi and Naotaka Okada, Toshiba Mitsubishi Electric Industrial Systems, Japan; Tokyo Institute of Technology, Japan; Central Research Institute of Electric Power Ind, Japan

4:45 pm • A Parallel-redundant BTB (Back-to-back) System Using Modular Multilevel Cascade Converters for Power Transmission Grids
Kei Sekiguchi, Pracha Khamphakdi, Makoto Hagiwara and Hirofumi Akagi, Tokyo Institute of Technology, Japan

S117 Single Phase AC-DC

Room: 110/112
Chair: Sudipta Chakraborty

3:30 pm • PFC Converter with Novel Integration of both EMI Filter and Boost Inductors
Cheng Deng, Dehong Xu, Changsheng Hu and Zhiwei Wen, Zhejiang University, China

3:55 pm • A Power Supply Reaching Titanium Level Efficiency for a Wide Range of Input Voltages
Werner Konrad, Christian Rainer, Gerald Deboy and Annette Muetze, Graz University of Technology, Austria; Infineon Technologies Austria AG, Austria

4:20 pm • A Primary-side-control Quasi-resonant Flyback Converter with Tight Output Voltage Regulation and Self-calibrated Valley Switching
Ping-Chun Hsieh, Chia-Jung Chang and Chern-Lin Chen, National Taiwan University, Taiwan; Noveltek Semiconductor Corp., Taiwan

4:45 pm • Full-bridge Single-stage PFC with Reduced DC Bus Capacitor and Improved Light Load Operation as a Solution for Modern SMPS
Hugo Ribeiro, Beatriz Borges and Carlos Ferreira, Instituto de Telecomunicacoes/ IPT, Portugal; Universidade Tecnica de Lisboa, Portugal

S118 Single Phase DC to AC Inverters III

Room: 111/113
Chair: Luca Solero

3:30 pm • Modulation Scheme of a Differential-mode Cuk Inverter for Loss Mitigation
Siamak Mehrnami and Sudip Mazumder, University of Illinois, Chicago, United States

3:55 pm • DSPIC Microcontroller Based Implementation of a Flyback PV Microinverter Using Direct Digital Synthesis
Serkan Ozturk and Isik Cadirci, Hacettepe University, Turkey

4:20 pm • Load Impedance Estimation and Iterative-learning Control for a Single-phase Three-wire Inverter
Tsai Fu Wu, Chia-Ling Kuo, Li-Chiun Lin and Hui-Chung Hsieh, National Tsing Hua University, Taiwan; National Chung Cheng University, Taiwan

4:45 pm • Parallel Operation of Digital Controlled Modified Sine Wave Inverters
Su Sheng, Peng Li and Brad Lehman, Northeastern University, United States

S119 Lighting Technologies II

Room: 201
Chair: Ron Hui

3:30 pm • A Single-inductor, Multiple-channel Current-balancing LED Driver for Display Backlight Applications
Hyun-Chang Kim, Chang Soo Yoon, Deog-Kyoon Jeong and Jaeha Kim, Seoul National University, Korea (South)

3:55 pm • Zero Ripple Single Stage AC-DC LED Driver with Unity Power Factor
Peng Fang, Brian White, Chris Fiorentino and Yan-Fei Liu, Queen's University, Canada

4:20 pm • A Novel Pulse Current Driving; High Power Factor LED Driver Without Electrolytic Capacitors
John Lam and Praveen K. Jain, Queen's University, Canada

4:45 pm • Digital Implementation of the Feedforward Loop of the Asymmetrical Half-bridge Converter for LED Lighting Applications
Manuel Arias, Marcos Fernandez, Jose Evelio Rodriguez, Diego Gonzalez and Javier Sebastian, Universidad de Oviedo, Spain

S120 Model-based Sensorless Control

Room: 203
Chair: David Diaz-Reigosa

3:30 pm • Stability and Dynamic Performance Improvement of a Sensorless IPMSM Drive via Adaptive Estimated-speed-assisted Position Prediction and Current Quality Evaluation
Yue Zhao, Wei Qiao and Long Wu, University of Nebraska-Lincoln, United States; John Deere Electronic Solutions, United States

3:55 pm • Comparative Analysis of Feedback Gains for Adaptive Full-order Observers in Sensorless Induction Motor Drives
Bin Chen, Wenxi Yao, Kai Wang, Kevin Lee and Zhengyu Lu, Zhejiang University, China; Eaton Corporation, United States

4:20 pm • Signal-injection Assisted Full-order Observer with Parameter Adaptation for Synchronous Reluctance Motor Drives
Toni Tuovinen and Marko Hinkkanen, Aalto University School of Electrical Eng., Finland

4:45 pm • A Novel Approach to the Design of Back-EMF Observer Based Sensorless Control of Non-salient PMSM: Theoretical Analysis and Experimental Investigations
Nicola Bedetti, Sandro Calligaro and Roberto Petrella, Gefran s.p.a., Italy; University of Udine, Italy

S121 High Frequency Effects in Electric Machines

Room: 205
Chair: Jagadeesh Tangudu

3:30 pm • Experimental and Analytical Determination of Proximity Losses in a High-speed PM Machine
Phil Mellor, Rafal Wrobel, Daniel Salt and Antonio Griffo, University of Bristol, United Kingdom

3:55 pm • Rotor Impedance of the High-frequency Circulating Bearing Current Path in Inverter-fed AC Machines
Oliver Magdun, Yves Gemeinder and Andreas Binder, Darmstadt University of Technology, Germany

4:20 pm • Skin effect and Proximity Losses in High Speed Brushless Permanent Magnet Motors
Mircea Popescu and David Dorrell, Motor Design Ltd, United Kingdom; University of Technology, Sydney, Australia

4:45 pm • A Stator Turn-fault Detection Method for Inverter-fed IPMSM with High-frequency Current Injection
Myoungho Kim, Seung-Ki Sul and Junggi Lee, Samsung Heavy Industries, Korea (South); Seoul National University, Korea (South); LG Electronics, Korea (South)

S122 Diagnostics and Fault Analysis of Electric Machines II

Room: 207
Chair: Sang Bin Lee

3:30 pm • Accurate and Simple Diagnosis Algorithm for Inter-turn Fault in the BLDC Motor
Kyung-Tae Kim and Jin Hur, University of Ulsan, Korea (South)

3:55 pm • A Novel Online Stator Groundwall Insulation Monitoring Scheme for Inverter-fed AC Motors
Pinjia Zhang, Karim Younsi and Prabhakar Neti, GE Global Research, United States

4:20 pm • A Detailed Transient Model of Interior Permanent Magnet Motor Accounting for Saturation under Stator Turn Fault
Bhaskar Sen, Jiabin Wang and Panagiotis Lazari, The University of Sheffield, United Kingdom

4:45 pm • Fault Diagnosis of Mechanical Unbalance for PMSM Drive System Under Nonstationary Condition
Jun Hang, Jianzhong Zhang, Ming Cheng and Zheng Wang, Southeast University, China

S123 Gallium Nitride Devices

Room: 210/212
Chair: Shashank Krishnamurthy

3:30 pm • Gallium Nitride Based High Power-density Automotive HID Electronic Ballast
Zirui Jia, Min Chen, Xiaofeng Zhaoming and Qian, Zhejiang University, China

3:55 pm • Evaluation of 600 V Cascode GaN HEMT in Device Characterization and All-GaN-based LLC Resonant Converter
Weimin Zhang, Zhuxian Xu, Zheyu Zhang, Fred Wang, Leon Tolbert and Benjamin Blalock, University of Tennessee, United States

4:20 pm • Simulation Model Development and Verification for High Voltage GaN HEMT in Cascode Structure
Zhengyang Liu, Xiucheng Huang, Fred C. Lee and Qiang Li, Virginia Tech, United States

4:45 pm • Analytical Loss Model of High Voltage GaN HEMT in Cascode Configuration
Xiucheng Huang, Qiang Li, Zhengyang Liu and Fred Lee, Virginia Tech, United States

Monday, September 16 **5:00 pm – 6:30 pm**

Poster Session: Charging Systems

N

Room: Exhibit Hall A - North
Chair: Pierluigi Tenca

P101 • A Quick Charger Station for EVs Using a Pulse Frequency Technique
Chetnaphat Praisuwanna and Surin Khomfoi, King Mongkut's Institute of Technology Ladkraban, Thailand

P102 • Modular Battery Charger for Electric Vehicles
Bryan Savage, Roger Shuttleworth and Nigel Schofield, University of Manchester, United Kingdom; McMaster University, Canada

P103 • Closed-loop control on DC Link Voltage Ripple of Plug-in Hybrid Electric Vehicle Charger with Sinusoidal Charging
Lingxiao Xue, Paolo Mattavelli, Dushan Boroyevich, Zhiyu Shen and Rolando Burgos, Virginia Tech, United States; DTG-University of Padova, Italy

Poster Session: Fuel Cell Vehicles

N

Room: Exhibit Hall A - North
Chair: Pierluigi Tenca

P301 • Novel Interleaved Bidirectional Snubberless Naturally Clamped Zero Current Commutated Soft-switching Current-fed Full-bridge Voltage Doubler for Fuel Cell Vehicles
Pan Xuewei and Akshay Rathore, National University of Singapore, Singapore

Poster Session: Wireless Power Transfer

N

Room: Exhibit Hall A - North
Chair: Pierluigi Tenca

P501 • A Time-efficient Methodology For Visualizing Time-varying Magnetic Flux Patterns of Mid-range Wireless Power Transfer Systems
Cheng Zhang, Wenxing Zhong, S.Y.(Ron) Hui and Xun Liu, The University of Hong Kong, Hong Kong; Convenientpower HK Ltd., Hong Kong

P502 • A Compact Wireless Charging System for Electric Vehicles
Ning Puqi, Onar Omer, Miller John and Whitte Clifford, Oak Ridge National Lab, United States

P503 • Finite-element-simulation-assisted Optimized Design of an Asymmetrical High-power Inductive Coupler with a Large Air-gap for EV Charging
Raffael Haldi, Isaac Nam, Kurt Schenk and Enrico Santi, NTB Interstate University of Applied Sciences, Switzerland; University of South Carolina, United States

P504 • A 10kW Transformer with a Novel Cooling Structure of a Contactless Power Transfer System for Electric Vehicles
Itaru Fujita, Tomohiro Yamanaka, Yasuyoshi Kaneko, Shigeru Abe and Tomio Yasuda, Saitama University, Japan; Technova Inc, Japan

P505 • Bidirectional Contactless Power Transfer System for Electric Vehicles
Soichiro Nakadachi, Shigeru Mochizuki, Sho Sakaino, Yasuyoshi Kaneko, Shigeru Abe and Tomio Yasuda, Saitama University, Japan; Technova Inc, Japan

P506 • Field Containment in Dynamic Wireless Charging Systems Through Source-receiver Interaction
Kibok Lee, Zeljko Pantic and Srdjan Lukic, North Carolina State University, United States

Poster Session: Passives and Magnetics

N

Room: Exhibit Hall A - North
Chair: Craig Winterhalter

P701 • Scaling the Serialization of Mosfets by Magnetically Coupling their Gate Electrodes
Emmanouil Dimopoulos and Stig Munk-Nielsen, Aalborg University, Denmark

P702 • Turn-on Loss Reduction of 6.5kV/500A Trench/Field-stop IGBTs Using a Simple GDU
Philipp Kleinichen, Rodrigo Alvarez, Martin Buschendorf and Steffen Bernet, Technische Universitaet Dresden, Germany; Technical University of Dresden, Germany; Dresden University of Technology, Germany

P703 • EMI Reduction with Near Field Coupling Suppression Techniques for Planar Transformers and CM Chokes in Switching-mode Power Converters
Yongbin Chu, Shuo Wang, Dianbo Fu and Jun Xu, University of Texas at San Antonio, United States; Huawei Technologies Co., Ltd, United States

P704 • Genetic Algorithm Based High Inductance Density Low-profile Inductor Optimization
Tao Fan, Xuhui Wen and Puqi Ning, IEE Chinese Academy of Sciences, China

P705 • Inductor Design for Low Loss with Dual Foil Windings and Quasi-distributed Gap
Charles Sullivan, Hamza Bouayad and Yue Song, Thayer School of Engineering at Dartmouth, United States

P706 • High Frequency Analysis of an Integrated Planar Transformer with Common Mode EMI Suppression Capability
Majid Pahlevaninezhad, Djilali Hamza and Praveen Jain, Queen's University, Canada

P707 • Planar Inductor with Quasi-distributed Gap Core and Busbar Based Planar Windings
Nomura Tsuyoshi, Wang Chi-Ming, Seto Kayoko and Yoon Sang Won, Toyota Research Institute of North America, United States; Toyota Motor Corporation, Japan

P708 • Characteristics Analysis and Performance Evaluation for Interleaved Boost Converter with Integrated Winding Coupled Inductor
Jun Imaoka, Masayoshi Yamamoto, Kazuhiro Umetani, Seikoh Arimura and Tetsuo Hirano, Shimane University, Japan; DENSO Corporation, Japan; DENSO CORPORATION, Japan

P709 • A Transient Core Loss Calculation Algorithm for Soft Magnetic Composite Material
Masaki Wasekura, Chi-Ming Wang, Yoshitaka Maeda and Robert Lorenz, Toyota Motor Corporation, Japan; University of Wisconsin-Madison, United States; Toyota Central R and D Labs., Inc, Japan; University of Wisconsin - Madison, United States

P710 • Galvanic Isolation for High Frequency Applications Using an Integrated Dielectric Structure
Adrian Zsombor Amanci, Harry Ruda and Francis Dawson, University of Toronto, Canada

P711 • Practical Inductance Calculation for Planar Magnetics With Track-width-ratio
Samuel R. Cove and Martin Ordonez, University of British Columbia, Canada

P712 • Determination of the Optimal Thickness for a Multi-layer Transformer Winding
Kartik Iyer, Kaushik Basu, William Robbins and Ned Mohan, University of Minnesota,Twin Cities, United States

Poster Session: Control Issues in Electric Drives

E

Room: Exhibit Hall A - East
Chair: David Diaz-Reigosa

P901 • A New Oscillation Controller Design and Induction Machine Stability Analysis of Volts/Hz-based Industrial Adjustable Speed Drives in a Wide Speed and Power Range
Kevin Lee, Wenxi Yao, Bin Chen, Zhengyu Lu, Anbo Yu and Li David, Eaton Corporation, United States; Zhejiang University, China; Eaton, China

P902 • Characteristics of Speed Control of Two Induction Motors Fed by a Five-leg Inverter with Space Vector Modulation
Masaya Iwashita, Yosuke Suzuki, Kouki Matsuse and Kaushik Rajashekara, Meiji University, Japan; The University of Texas at Dallas, United States

P903 • Detection of Resonance Frequency in Motion Control Systems
Sheng-Ming Yang and Shih-Chuan Wang, National Taipei University of Technology, Taiwan

P904 • State-space Speed Control of Two-mass Mechanical Systems: Analytical Tuning and Experimental Evaluation
Seppo Saarakkala and Marko Hinkkanen, Aalto University, Finland

P905 • Control of Pseudo-sinusoidal Switched Reluctance Motor With Zero Torque Ripple and Reduced Input Current Ripple
Le Du, Swint Ethan, Bin Gu and Jih-Sheng Lai, Virginia Tech, United States; Applimotion,Inc, United States; Virginia Tech, United States

P906 • Advanced Control Techniques for Switched Reluctance Machine Drives in Emerging Applications
Yilmaz Sozer, Iqbal Husain and David Torrey, University of Akron, United States; North Carolina State University, United States; GE Global Research, United States

P907 • Wide Speed Range Operation of Surface Permanent Magnet Synchronous Machine using an Open Winding and a Dual Inverter Drive
Reaz ul Haque, Mohammad Sedigh Toulabi, Andrew Knight and John Salmon, University of Alberta, Canada

Poster Session: Sensorless Control of AC drives

E

Room: Exhibit Hall A - East
Chair: Giacomo Scelba

P1101 • Sensorless Control of Low-cost Single-phase Hybrid Switched Reluctance Motor Drive
Uffe Jakobsen, Kaiyuan Lu, Peter Omand Rasmussen, Dong-Hee Lee and Jin Woo Ahn, Smedegaard A/S, Denmark; Aalborg University, Denmark; Kyungsung University, Korea (South)

P1102 • An Extended Flux Model-based Rotor Position Estimator for Sensorless Control of Interior Permanent Magnet Synchronous Machines
Yue Zhao, Zhe Zhang, Wei Qiao and Long Wu, University of Nebraska-Lincoln, United States; John Deere Electronic Solutions, United States

P1103 • Sensorless Control Method for PMSM Based on Frequency-adaptive Disturbance Observer
Yongsoon Park and Seung-Ki Sul, Seoul National University, Korea (South)

P1104 • Sensorless Vector Control Suitable for Position-dependent Load Torque Applications
Takahiro Suzuki, Yuichi Shimizu, Yasuo Notohara and Yoshitaka Iwaji, Hitachi, Ltd., Japan; Hitachi Appliances, Inc., Japan

P1105 • Closed-loop MRAS Speed Observer for Linear Induction Motor Drives
Angelo Accetta, Maurizio Cirrincione, Marcello Pucci and Gianpaolo Vitale, ISSIA-CNR, Italy; UTBM, France; CNR - ISSIA, Italy

P1106 • Sensorless Control Scheme for Ultra High Speed Switched Reluctance Machine
Jie Dang and Ronald G. Harley, Georgia Institute of Technology, United States

Poster Session: Assorted Issues in Electric Drives I

E

Room: Exhibit Hall A - East
Chair: Fernando Briz

P1301 • Dielectric Electro Active Polymer Incremental Actuator Driven by Multiple High-voltage Bidirectional DC-DC Converters
Prasanth Thummala, Zhe Zhang, Michael A. E Andersen and Sarban Rahimullah, Technical University of Denmark, Denmark; Danfoss PolyPower, Denmark

P1302 • Thermal Cycling Evaluation for DFIG Wind Turbine Power Converter Based on Joint Modelling
Ting Lei, Mike Barnes and A.C. Smith, University of Manchester, United Kingdom

P1303 • Self-commissioning of Interior Permanent Magnet Synchronous Motor Drives with High-frequency Current Injection
Shafiq Ahmed Odhano, Paolo Giangrande, Chris Gerada and Iustin Radu Bojoi, Politecnico di Torino, Italy; University of Nottingham, United Kingdom

P1304 • On-line Rotor Time Constant Estimation for Indirect Field Oriented Induction Machine
Anno Yoo, Chanook Hong and Jung-Ik Ha, LSIS, Korea (South); Seoul National University, Korea (South)

P1305 • Using Loss Location and Loss Magnitude Manipulation for Tuning of Field Oriented Induction Machine Drives
Mark Kringle and Robert Lorenz, WEMPEC, UW Madison, United States; University of Wisconsin - Madison, United States

P1306 • Six Step Phase Modulation of Dual Inverter for Open-end Permanent Magnet Synchronous Motor
Yongjae Lee and Jung-Ik Ha, Seoul National University, Korea (South)

P1307 • Torque Ripple Suppression of Permanent Magnet Synchronous Motors Considering Total Loss Reduction
Noriya Nakao and Kan Akatsu, Shibaura Institute of Technology, Japan

P1308 • Unified Direct-Flux Vector Control of Induction Motor Drives with Maximum Torque per Ampere Operation
Iustin Radu Bojoi, Zijian Li, Shafiq Ahmed Odhano, Giovanni Griva and Alberto Tenconi, Politecnico di Torino, Italy

P1309 • Six-phase Machine Conversion System with 3-phase and Single-phase Series Converters
Cursino Jacobina, Victor Melo, Nady Rocha and Edison da Silva, DEE - Federal University of Campina Grande, Brazil; DEE - Federal University of Paraiba, Brazil

Poster Session: Renewable Energy Technologies I: Wind and Wave

S

Room: Exhibit Hall A - South
Chair: Dan Ionel

P1501 • Novel Variable Step-size Maximum Power Point Tracking Control Strategy for PV Systems Based on Contingence Angles
Tang Lei, Xu Wei, Zhang Yongchang and Zeng Cengbi, Sichuan University, China; RMIT University, Australia; North China University of Technology, China

P1502 • Investigation on Open Winding PMSG System with the Integration of Full Controlled and Uncontrolled Converter
Yijie Zhou and Heng Nian, College of Electrical Engineering, Zhejiang Uni, China; Zhejiang University, China

P1503 • Optimal Control for an HVDC System with Series Connected Offshore Wind Turbines
Alejandro Garces, Rene Alexander Barrera-Cardenas and Marta Molinas, Universidad Tecnologica de Pereira, Colombia; Norwegian University of Science and Technology, Norway

P1504 • A New Scheme of Full-power Converter used for Grid Integration of Variable-speed Wind Turbines
Katsumi Nishida, Tarek Ahmed and Mutsuo Nakaoka, Ube National College of Technology, Japan; Assiut University, Egypt; Kyungnam University, Korea (South)

P1505 • Adaptive Feature Extraction and SVM Classification for Real-time Fault Diagnosis of Drivetrain Gearboxes
Dingguo Lu and Wei Qiao, University of Nebraska-Lincoln, United States

Poster Session: Multilevel Converters

S

Room: Exhibit Hall A - South
Chair: Edison Da Silva

P1701 • A Regenerative Cascaded Multilevel Converter with Reduced Active Front Ends
Lan Xiong, Xiaoming Zha, Fei Liu and Jinwu Gong, Wuhan University, China

P1702 • Switching Performance Optimization for High Switching Frequency High Power 3-level Neutral Point Clamped Phase Leg
Yang Jiao, Sizhao Lu and Fred Lee, Virginia Tech, United States

P1703 • A High Switching-Frequency MOSFET-based Three-level Voltage Source Converter
Ken Kobravi and Reza Iravani, Industry, United States; Academy, Canada

P1704 • Modeling and Control of Multi Modular Converters using Optimal LQR Controller with Integral Action
Elyas Rakhshani, Antoni M. Cantarellas, Daniel Remon, Pedro Rodriguez and Ignacio Candela, ABENGOA Research, Spain; Abengoa Research, Spain; Technical University of Catalonia (UPC), Spain

P1705 • A Comparative Study of Three-level DC-DC Converters
Mehdi Narimani, Gerry Moschopoulos and Dunisha Wijeratne, The University of Western Ontario, Canada

P1706 • A Fast and Generalized Space Vector PWM Scheme and Its Application in Optimal Performance Investigation for Multilevel Inverters
Yi Deng, Koon Hoo Teo and Ronald G. Harley, Georgia Institute of Technology, United States; Mitsubishi Electric Research Laboratories, Inc., United States

P1707 • A Survey on the Modular Multilevel Converters — Modeling, Modulation and Controls
Jun Wang, Rolando Burgos and Dushan Boroyevich, Virginia Polytechnic Institute and State Univers, United States; Virginia Polytechnic Institute and State University, United States

P1708 • Discontinuous Hybrid Modulation Technique for 3-phase Three-level Neutral Point Clamped Inverters
Alessandro Pevere and Roberto Petrella, DIEGM - University of Udine, Italy

P1709 • An Improved Control System for Modular Multilevel Converters Featuring New Modulation Strategy and Voltage Balancing Control
Shengfang Fan, Kai Zhang, Jian Xiong and Yaosuo Xue, Huazhong University of Science and Technology, China; Corporate Technology, Siemens Corporation, United States

P1710 • A Multilevel AC-AC Conversion System and Control Method using Y Connected H Bridge Circuit and Bidirectional Switches
Masakazu Muneshima and Yasuyuki Nishida, Meidensha Corporation, Japan; Chiba Institute of Technology, Japan

P1711 • A Broad Range of Frequency Control for the Modular Multilevel Cascade Converter Based on Triple-star Bridge-cells (MMCC-TSBC)
Wataru Kawamura, Makoto Hagiwara and Hirofumi Akagi, Tokyo Institute of Technology, Japan

P1712 • Method to Minimize the Low-frequency Neutral-point Voltage Oscillations with Time-offset Injection for Neutral-point-clamped Inverters
Ui-Min Choi, Kyo-Beum Lee and Frede Blaabjerg, Aalborg University, Denmark; Ajou University, Korea (South)

P1713 • Capacitor Voltage Balancing of a New Five-level Hybrid-clamped Inverter
Yingyu Zeng, Kui Wang, Yongdong Li and Zedong Zheng, Tsinghua University, China

P1714 • Capacitor Voltage Balancing of Five-level ANPC Converter based on Zero-sequence Voltage Injection Using PS-PWM
Kui Wang, Zedong Zheng, Yongdong Li, Jianghua Feng, Jing Shang and Yingyu Zeng, Tsinghua University, China; CSR Zhuzhou Institude CO., LTD., China

P1715 • Closed Form Line to Line Voltage THD of the Cascade Multilevel Inverter Including Device Voltage Drops
Naeem Farokhnia, Muneer Mohammad and Mehrdad Ehsani, Texas A and M University, United States

P1716 • On Reliability of Medium Voltage Multilevel Converters
Roman Grinberg, Gernot Riedel, Eiril Bjornstad, Arthur Korn and Peter Steimer, ABB Switzerland, Corporate Research, Switzerland; ABB Norway, Norway; ABB Switzerland, Switzerland

P1717 • Natural Balancing of the 2-Cell Modular Multilevel Converter
Wim van der Merwe, ABB Corporate Research, Switzerland

P1718 • Analysis and Space-vector-modulation of a 4L-3B6-VSC
Marvin Tannhaeuser, Steffen Bernet and Jens Weber, Dresden University of Technology, Germany

P1719 • Experimental Investigation of Short-circuit Failures in a Three Level Neutral-point-clamped Voltage-source Converter Phase-leg with IGBTs
Michael Sprenger, Rodrigo Alvarez, Marvin Tannhaeuser and Steffen Bernet, Dresden University of Technology, Germany

P1720 • Small-signal Modeling and Control of 3-phase Grid-connected Three-level Neutral-point-clamped Inverter with a LCL Filter
Ja-Hwi Cho, Nam-Joon Ku, Rae-Young Kim and Dong-Seok Hyun, Hanyang University, Korea (South)

P1721 • The Polyphase Cascaded-cell DC-DC Converter
Staffan Norrga, Lennart Angquist and Antonios Antonopoulos, KTH Royal Institute of Technology, Sweden

P1722 • A Comparison of Phase Disposition and Phase Shift PWM Strategies for Modular Multilevel Converters
Xiaojie Shi, Zhiqiang Wang, Leon Tolbert and Fred Wang, University of Tennessee, United States; The University of Tennessee, United States

Poster Session: Converter Modeling and Control

W

Room: Exhibit Hall A - West
Chair: Paolo Mattavelli

P1901 • Benchmarking of PWM Techniques Effects on Efficiency, Power Quality and EMI in DC-supplied Induction Motor Drives
Maria Carmela Di Piazza, Marcello Pucci and Gianpaolo Vitale, CNR - ISSIA, Italy

P1902 • Assessment of Synchronous-frame PI Current Control Dynamics by Means of Multivariable Analysis with Time-delays Consideration
Francisco D. Freijedo, Ana Vidal, Alejandro Gomez-Yepes, Jano Malvar, Oscar Lopez and Jesus Doval-Gandoy, Gamesa Innovation and Technology, Spain; University of Vigo, Spain; University of Vigo., Spain

P1903 • Analysis and Control of DC Voltage Ripple for Modular Multilevel Converters under Single Line to Ground Fault
Xiaojie Shi, Zhiqiang Wang, Leon Tolbert and Fred Wang, University of Tennessee, United States; The University of Tennessee, United States

P1904 • Cascaded Model Predictive Control of Voltage Source Inverter with Active Damped LCL Filter
Bjarte Hoff, Waldemar Sulkowski and Pawan Sharma, Narvik University College, Norway

P1905 • A Newly Normalized Deadbeat Control for Grid Connected Distributed Generation System
Mohamed Trabelsi and Lazhar Ben-Brahim, Qatar University, Qatar

P1906 • A Method to Identify the Equivalent Loss Resistance of Voltage Source Converters for Current Control Design
Ana Vidal, Alejandro G. Yepes, Francisco D. Freijedo, Oscar Lopez, Jano Malvar and Jesus Doval-Gandoy, University of Vigo, Spain; Gamesa Innovation and Technology, Spain

P1907 • Series Z-source Converter Modeling and Controller Design Method
Joanne Kitson, David Drury and Phil Mellor, University of Bristol, United Kingdom

P1908 • Transformer Shielding Technique for Common Mode Noise Reduction in Isolated Converters
Yuchen Yang, Daocheng Huang, Fred Lee and Qiang Li, Virginia Tech, CPES, United States

P1909 • Terminal Characterization of Conducted EMI in 3-phase Power Converters
Junsheng Wei, Dieter Gerling and Marek Galek, Universitaet der Bundeswehr Muenchen, Germany; University of Federal Defence Munich, Germany; Siemens AG Corporate Technology, Germany

P1910 • Common Mode EMI Noise Characterization and Improvement for GaN Switched-Capacitor Converter
Kaichien Tsai, Feng Qi, Ernest Davidson and Longya Xu, The Ohio State University, United States

P1911 • Novel Digital Control Schemes of Dynamic Current Sharing for Multiphase Buck Converter with Fast Dynamic Response
Kejiu Zhang, Shiguo Luo, Thomas Wu and Issa Batarseh, Dell Inc., United States; University of Central Florida, United States

P1912 • Design of an AC-DC and DC-DC Interleaved PWM Controller for Switching Power Supply
Tsung-Han Yu, Tsorng-Juu Liang, Kai-Hui Chen, Ji-Shiuan Li and Ji-Shiang Lee, National Cheng Kung University, Taiwan

P1913 • New Hybrid Control Technique to Improve Light Load Efficiency while Meeting the Hold-up Time Requirement for Two-stage Server Power
Yen-Shin Lai, Zih-Jie Su and Wen-Shyue Chen, National Taipei University of Technology, Taiwan

P1914 • Research on Feedforward Control of Superbuck Converter to Null Audio-susceptibility
Yan Li, Pengyu Jia, Beibei Wang and Trillion Q. Zheng, Beijing Jiaotong University, China

P1915 • Automatic Resonant Frequency Tracking in Unregulated LLC Resonant Converters Based on Total Resonant Current Harmonic Calculation
Siyao Jiang, Weimin Zhang, Bo Liu and Fred Wang, Shandong University, China; University of Tennessee, United States; The University of Tennessee, United States

P1916 • Two Loop Average Current Control Implementation using Cypress PSoC with Closed Loop Experimental Results
Udupi Rajagopal Prasanna and Akshay Rathore, University of Texas, Dallas, United States; National University of Singapore, Singapore

P1917 • Input Impedance of Voltage Source Converter with Stationary Frame Linear Current Regulators and Phase-locked Loop
Bo Wen, Dushan Boroyevich, Rolando Burgos and Paolo Mattavelli, Virginia Tech, United States; DTG-University of Padova, Italy

P1918 • A Simple Deadbeat Current Control for Single-phase Transformerless Inverters with LCL Filter
Giampaolo Buticchi, Davide Barater, Luca Tarisciotti and Pericle Zanchetta, University of Parma, Italy; University of Nottingham, United Kingdom

P1919 • An Optimal PWM Strategy of Z-source Inverters
Yu Tang, Ding Jiudong and Xie Shaojun, Jiangsu Key laboratory of New Energy Generation, China

P1920 • Study of Five-phase Space Vector PWM Considering Third Order Harmonics
Dong Jiang and Wei Qian, United Technologies Research Center, United States; Magna Electronics, United States

P1921 • Noise Shaping Modulation and Dynamic Current Control of NPC Inverters for Low Switching Frequency Applications
Galina Mirzaeva, Graham Goodwin, Cesar Silva and Manuel Diaz, University of Newcastle, Australia; Universidad Technica Federico Santa Maria, Chile

P1922 • Improved Common-mode Voltage Elimination Modulation with Dead-Time Compensation for Neutral-point-Clamped 3-phase Inverters
Xuning Zhang, Rolando Burgos, Dushan Boroyevich, Paolo Mattavelli and Fei Wang, Virginia Tech, United States; Virginia Polytechnic Institute and State University, United States; University of Tennessee, United States

P1923 • EMC Models for Power Electronics: from Converter Design to System Level
Genevieve Frantz, David Frey, Jean-Luc Schanen, Hemant Bishnoi, Paolo Mattavelli and Bertrand Revol, G2ELab, France; CPES, United States; Virginia Tech, United States; SATIE, France

P1924 • A Novel Strategy for Vienna-type Rectifier With Light Unbalanced Grid
Sensen Liu, Lijun Hang and Leon Tolbert, Zhejiang Hangzhou Municipal Electric Power bure, China; The College of Electrical Engineering, Zhejiang, China; The University of Tennessee at Knoxville, China

Tuesday, September 17 10:00 am – 11:30 am

Poster Session: Devices, Modules and Converters

N

Room: Exhibit Hall A - North
Chair: Filippo Chimento

P2101 • High Temperature Gate Drive Circuits for Silicon Carbide Switching Devices
Yang Wang and Shashank Krishnamurthy, United Technologies Research Center, United States

P2102 • Dynamic Characterization of Parallel-connected High-power IGBT Modules
Filippo Chimento, Liwei Wang, Muhammad Nawaz and Nan Chen, ABB Coprorate Research, Sweden; ABB Corporate Research, Sweden

P2103 • Sensing Power MOSFET Junction Temperature Using Circuit Output Current Ringing Decay
He Niu and Robert Lorenz, Student, United States; University of Wisconsin - Madison, United States

P2104 • Design Considerations and Performance Evaluation of 1200 V, 100 A SiC MOSFET Based Converter for High Power Density Application
Samir Hazra, Sachin Madhusoodhanan, Giti Karimi Moghaddam, Kamalesh Hatua and Subhashish Bhattacharya, North Carolina State University, United States; Indian Institute of Technology Madras, India

Poster Session: Fuel Cells

N

Room: Exhibit Hall A - North
Chair: Giorgio Spiazzi

P4101 • A New 3-phase High-power Soft-switched DC-DC Converter Based Fuel Cell Power Conditioning System with Minimized DC Capacitor
Xiaohu Liu and Hui Li, Florida State University, United States

P4102 • Electrical Circuit Analysis of CO Poisoning in High Temperature PEM Fuel Cells for Rapid Fault Diagnostics
Chris De Beer, Paul Barendse, Pragasen Pillay, Brian Bullecks and Raghunathan Rengaswamy, University of Cape Town, South Africa; Texas Tech University, United States

Poster Session: Lighting Technologies

N

Room: Exhibit Hall A - North
Chair: Giorgio Spiazzi

P4301 • Input Filter Design for TRIAC Dimmable LED Lamps
Montu Doshi and James Patterson, Texas Instruments, Inc., United States

P4302 • Sliding Mode Control of a Cuk Converter with Variable Hysteresis Width for HBLEDs Applications
WITHDRAWN
Mirko Bodetto, Abdelali [illegible] Pastor, Francisco Javier Calvente Calvo and Luis Martinez-Salamero, Universidad Rovira i Virgili, Spain

P4303 • Hybrid Passive Current Sharing Method for Multi-channel SRC LED Driver
Ting Jiang, Jianfeng Wang, Junming Zhang and Xinke Wu, Zhejiang University, China

P4304 • DC Level Dimmable LED Driver Using DC Distribution
Gab-Su Seo, Kyu-Chan Lee and Bo-Hyung Cho, Seoul National University, Korea, Republic of; INTERPOWER, Korea, Republic of

P4305 • A Novel Double Frequency Dimmer for Lighting Device
Wu Chen, Zhu Xu, Guangjiang Wang and Gangyao Wang, Southeast University, China; North Carolina State University, United States

P4306 • Hybrid Centralized-distributed Power Conditioning System for Thermoelectric Generator with High Energy Efficiency
Hongfei Wu, Kai Sun, Min Chen, Zhe Chen and Yan Xing, Nanjing University of Aeronautics and Astronautics, China; Tsinghua University, China; Aalborg University, Denmark; Nanjing University of Aeronautics and Astronautics, China

P4307 • Load Characterisation of Electric Spring
Chi Kwan Lee, Kai Lok Cheng and Wai Man Ng, The University of Hong Kong, Hong Kong

P4308 • Efficient Single Phase Harmonics Elimination Method for Microgrids Operating in Grid Connected or Standalone Mode
Saeed Anwar, Ali Elrayyah and Yilmaz Sozer, University of Akron, United States

Poster Session: Power Converters for Transportation and Utility Applications

N

Room: Exhibit Hall A - North
Chair: Axel Mertens

P4501 • A Power Decoupling Method based on Four-switch Three-port DC-DC/AC Converter in DC Microgrid
Wen Cai, Ling Jiang, Bangyin Liu, Shanxu Duan and Changyue Zou, Huazhong University of Science and Technology, China

P4502 • Sinusoidal Compensator with Active Damping Effects in Grid-Connected Inverter with an LCL Filter
Toshiji Kato, Kaoru Inoue, Haruzumi Kawabata and Yusuke Akiyama, Doshisha University, Japan

P4503 • 1.5MVA Grid-Connected Interleaved Inverters Using Coupled Inductors for Wind Power Generation System
Dongsul Shin, Jong-Pil Lee, Kyung-Jun Lee, Tae-Jin Kim, Dong-Wook Yoo, Fang Zheng Peng, Baoming Ge and Honnyong Cha, Pusan National University, Korea (South); Korea Electrotechnology Research Institute, Korea (South); Michigan State University, United States; Kyungpook National University, Korea (South)

P4504 • Control Technique for 15 kV SiC IGBT-based Active Front End Converter of a 13.8 kV Grid Tied 100 kVA Transformerless Intelligent Power Substation
Sachin Madhusoodhanan, Kamalesh Hatua and Subhashish Bhattacharya, North Carolina State University, United States; Indian Institute of Technology Madras, India

P4505 • Reactive Power Compensation Bridge with Minimized Equipped Capacitor and its Application to Static Var Compensator
Takanori Isobe, Kyohei Kato, Yoel Rosales, Daisuke Shiojima and Ryuichi Shimada, Tokyo Institute of Technology, Japan; MERSTech Co., Ltd., Japan

P4506 • Analysis and Design of a Multi-port Converter Using a Magnetic Coupling Inductor Technique
Kenichi Itoh, Masanori Ishigaki, Naoki Yanagizawa, Shuji Tomura and Takaji Umeno, Toyota Central Research and Development Labs., Japan

P4507 • A Compact Integrated Switched Reluctance Motor Drive with Bridgeless PFC Converter
Jianing Liang, Linni Jian, Guoqing Xu and Ming Chang, Shenzhen Institutes of Advanced Technology, China; The Chinese University of Hong Kong, Hong Kong

P4508 • Rapid Charging Strategy in the Constant Voltage Mode for a High Power Lithium-ion Battery
Yong-Duk Lee and Sung-Yeul Park, University of Connecticut, United States

Poster Session: Assorted Issues in Electric Drives II

E

Room: Exhibit Hall A - East
Chair: Brian Welchko

P2301 • Reducing Switching Losses in BLDC Motor Drives by Reducing Body Diode Conduction of MOSFETs
Cameron Brown and Bulent Sarlioglu, The Boeing Company, United States; University of Wisconsin - Madison, United States

P2302 • A Fault Diagnosis and Tolerant Method for Switched Reluctance Motor Drives
Hak-Seung Ro, Dong-Hee Kim, Hae-Gwang Jeong and Kyo-Beum Lee, Ajou University, Korea (South)

P2303 • Design Constraints of Small Single-phase Permanent Magnet Brushless DC Drives for a Cooling Application
Stephan Dunkl, Annette Muetze and Gerhard Schoener, Graz University of Technology, Austria; MSG Mechatronic Systems GmbH, Austria

P2304 • Investigation of Permanent Magnet Magnetization for a Bearingless Servomotor
Junichi Asama, Kazuyuki Samejima, Takaaki Oiwa and Akira Chiba, Shizuoka University, Japan; Tokyo Institute of Technology, Japan

P2305 • Mixed-mode EMI Noise in 3-phase DC-fed PWM Motor Drive System
Jing Xue and Fred Wang, University of Tennessee, United States

Poster Session: Electrical Machines General

E

Room: Exhibit Hall A - East
Chair: Karim Younsi

P2501 • Evaluation and Design for an Integrated Modular Motor Drive (IMMD) with GaN devices
Jiyao Wang, Ye Li and Yehui Han, University of Wisconsin-Madison, United States

P2502 • Torque, Power, Losses and Heat Calculation of a Transverse Flux Reluctance Machine with Soft Magnetic Composite Materials and Disc-shaped Rotor
Jan Doering, Gunar Steinborn and Wilfried Hofmann, TU Dresden, Germany; Technical University Dresden, Germany

Poster Session: Reluctance Machines

E

Room: Exhibit Hall A - East
Chair: Karim Younsi

P2701 • Comparative Study of Electromagnetic Performance of Switched Reluctance Machines under Different Excitation Techniques
Ziad Azar and Zi-Qiang Zhu, University of Sheffield, United Kingdom

P2702 • A Novel Permanent Magnet Biased Bearingless Switched Reluctance Motor
Jianfeng Liu, Huijun Wang, Junfang Bao, Guangxu Zhou and Fengge Zhang, BeiHang University, China; Shandong Academy of Sciences, China; Shenyang University of Technology, China

Poster Session: Losses & Thermal Analaysis in Electrical Machines

E

Room: Exhibit Hall A - East
Chair: Karim Younsi

P2901 • A Hybrid Model for Improved Hysteresis Loss Prediction in Electrical Machines
Maged Ibrahim and Pragasen Pillay, Concordia University, Canada

P2902 • Coupled Electromagnetic-thermal Analysis of Electric Machines Including Transient Operation Based on Finite Element Techniques
Wenying Jiang and Thomas Jahns, University of Wisconsin - Madison, United States

P2903 • Modelling, Improvement and Experimental Validation of a 50 kHz-5 kVA Litz-wired Transformer for PV Inverters
Ernesto L. Barrios, Alfredo Ursua, Luis Marroyo and Pablo Sanchis, Public University of Navarre, Spain; Public University of Navarra, Spain

P2904 • Investigation of Mechanical Loss and Heat Transfer in an Axial-flux PM Machine
Rafal Wrobel, Gyula Vaniel, Colin Copeland, Tomasz Duda, Dave Staton and Phil Mellor, University of Bristol, United Kingdom; Motor Design Ltd., United Kingdom; Unversity of Bath, United Kingdom

Poster Session: Diagnostics and Fault Detection in Electrical Machines

E

Room: Exhibit Hall A - East
Chair: Karim Younsi

P3101 • Influence of d- and q-axis Currents on Demagnetization in PM Synchronous Machines
James McFarland and Thomas Jahns, University of Wisconsin - Madison, United States

P3102 • Inter Turn Short Fault Model of PMSMs with Series and Parallel Winding Connection
Bon-Gwan Gu, Jun-Hyuk Choi and In-Soung Jung, Korea Electronics Technology Institute, Korea (South)

P3103 • Transient Analysis of Irreversible Demagnetization of Permanent Magnet Brushless DC Motor with Stator Turn Fault under the Operating State
Yoon-Seok Lee, Kyung-Tae Kim and Jin Hur, University of Ulsan, Korea (South)

P3104 • The Use of the Signature Analysis of the Stator Instantaneous Complex Apparent Impedance for Discriminating Stator Winding Faults and Supply Voltage Unbalance in 3-phase Induction Motors
M'hamed Drif, Malika Drif, Jorge O. Estima and Antonio J. Marques Cardoso, University of Science and Technolog of Oran M. B, Algeria; University of Beira Interior, Portugal

P3105 • Fault-tolerant Operation Strategy for Claw-pole Generators with Stator Turn-to-turn Short Circuits
Siwei Cheng, Thomas Habetler and Ronald G. Harley, Ford Motor Company, United States; Georgia Institute of Technology, United States

P3106 • Detecting Faults in Doubly Fed Induction Generator by Rotor Side Transient Current Measurement
Goran Stojcic, Kenan Pasanbegovic and Thomas M. Wolbank, Vienna University of Technology, Austria

P3107 • On-line Detection of High Resistance Connections with Inverse-sequence Regulators in Three Phase Induction Motor Drives
Luca Zarri, Michele Mengoni, Yasser Gritli, Fiorenzo Filippetti, Angelo Tani and Sang Bin Lee, University of Bologna, Italy; Korea University, Korea (South)

P3108 • Generalized Bearing Roughness Fault Detection in Claw-pole Generators
Siwei Cheng, Thomas Habetler, J. Rhett Mayor and Ronald G. Harley, Ford Motor Company, United States; Georgia Institute of Technology, United States

P3109 • Detection of Gearbox Bearing Defects using Electrical Signature Analysis for Doubly-fed Wind Generators
Pinjia Zhang and Prabhakar Neti, GE Global Research, United States

P3110 • Analytical Modelling of Stator Turn Fault in Surface Mounted Permanent Magnet Machines
Bhaskar Sen and Jiabin Wang, The University of Sheffield, United Kingdom

P3111 • Early Detection Technique for Stator Winding Inter-turn Fault in BLDC Motor Using Input Impedance
Chae-Lim Jeong, Seung-Tae Lee and Jin Hur, University of Ulsan, Korea (South)

P3112 • Study on Bearing Impedance Properties at Several Hundred Kilohertz for Different Electric Machine Operating Parameters
Ville Niskanen, Annette Muetze and Jero Ahola, Lappeenranta University of Technology, Finland; Graz University of Technology, Austria

Poster Session: Renewable Energy Technologies II: PV

S

Room: Exhibit Hall A - South
Chair: Hamid A. Toliyat

P3301 • Firefighter Safety for PV Systems: Overview of Future Requirements and Protection Systems
Sergiu Spataru, Dezso Sera, Frede Blaabjerg, Laszlo Mathe and Tamas Kerekes, Aalborg University, Denmark

P3302 • A Feedfoward Scheme to Improve System Stability in Grid-connected Inverter with LCL Filter
Changyue Zou, Bangyin Liu, Shanxu Duan and Rui Li, Huazhong Univ of Sci and Tech, China; Huazhong University of Science and Technology, China

P3303 • Experimental Verification of Energy Harvest from Non-planar Photovoltaic Surfaces
Haiyu Zhang and Robert Balog, Texas A and M University, United States

P3304 • Predicting Shading of Photovoltaic Systems with Cell-level Resolution
Stephanie Crocker and Charles Sullivan, Thayer School of Engineering at Dartmouth, United States

P3305 • Dual-stage Microinverter Design with a GaN-based Interleaved Flyback Converter Stage
Luciano Andres Garcia-Rodriguez, Ethan Williams, Juan Carlos Balda, Jesus David Gonzalez-Llorente, Esteban Lindstrom and Alejandro Oliva, University of Arkansas, United States; Universidad Sergio Arboleda, Colombia; Universidad Nacional del Sur - CONICET, Argentina

P3306 • Phase-Staggered Multiple ZVS Inverters for Grid-connected PV Systems
Vidisha Gupta, Ali Khajehoddin and Praveen Jain, Queen's University, Canada

P3307 • A Comparative Study of Degradation and Performance of Thin Film Photovoltaic Generators Versus a Multi-crystalline Generator
Inigo de la Parra, Miguel Garcia, Javier Marcos and Luis Marroyo, Public University of Navarre, Spain

Poster Session: Solar PV

S

Room: Exhibit Hall A - South
Chair: Yilmaz Sozer

P3501 • Two-stage PV Inverter System Emulator in Converter Based Power Grid Emulation System
Wenchao Cao, Yiwei Ma, Jingxin Wang, Liu Yang, Jing Wang, Fred Wang and Leon M. Tolbert, The University of Tennessee, Knoxville, United States

P3502 • A Reliable Photovoltaic Integrated UPS System with Modified Maximum Power Point Tracking (MPPT) Algorithm
Swanand Juvekar, Jonathan Brandmeyer, Bobby Compton, Yu Liu and Subhashish Bhattacharya, Eaton, United States; North Carolina State University, United States

P3503 • Transient Performance Analysis of a Small-scale PV-PHS Power Plant Fed by a SVPWM Drive Applied for a Distribution System
Pirooz Javanbakht, Salman Mohagheghi and Marcelo Godoy Simoes, Colorado School of Mines, United States

P3504 • Short-term Photovoltaic Output Forecasting Model for Economic Dispatch of Power System Incorporating Large-scale Photovoltaic Plant
Meiqin Mao, Wenjian Gong, Yu Cao and Liuchen Chang, Research Center for Photovoltaic System Engineer, China; University of New brunswick, Fredericton, Canada

Poster Session: Distributed Generation

S

Room: Exhibit Hall A - South
Chair: Rolando Burgos

P3701 • Distributed Generation Grid Integration Using Virtual Synchronous Generator with Adoptive Virtual Inertia
Jaber Alipoor, Yushi Miura and Toshifumi Ise, Osaka University, Japan

P3702 • Optimal Location of Battery Energy Storage Systems in Power Distribution Network for Integrating Renewable Energy Sources
Srinivas Bhaskar Karanki, David Xu, Bala Venkatesh and Bob Singh, Ryerson University, Canada; Hydro One Inc, Canada

P3703 • A Generalized Approach for Intelligent Fault Detection and Recovery in Power Electronic Systems
Weiqiang Chen and Ali Bazzi, University of Connecticut, United States

P3704 • Voltage Sag and Unbalance Generator for Power Quality Testing of Adjustable Speed Drives
Rangarajan Tallam and Richard Lukaszewski, Rockwell Automation, United States

P3705 • Voltage and Frequency Control of an Islanded Electronically-coupled DG Unit
Afsoon Nejati Aghdam, Amin Nobakhti and Houshang Karimi, Sharif University of Technology, Iran; Ecole Polytechnique de Montreal, Canada

Poster Session: Microgrid

S

Room: Exhibit Hall A - South
Chair: Jin Wang

P3901 • Small-signal Analysis and Modeling of Parallel Inverters Based on the Droop Control Method in Microgrid
Xuan Zhang, Jinjun Liu, Zhiyuan You and Linyuan Zhou, Xi'an Jiaotong University, China

P3902 • A Robust Synchronization Method for Centralized Microgrids
Armando Bellini, Stefano Bifaretti and Franco Giannini, University of Rome Tor Vergata, Italy

P3903 • Optimal Allocation and Economic Evaluation for Industrial PV Microgrid
Meiqin Mao, Peng Jin, Yongchao Zhao, Liuchen Chang and Fu Chen, Research Center for Photovoltaic System Engineering, China; Research Center for Photovoltaic System Engineer, China; University of New Brunswick, Canada

P3904 • H-infinity and Gain Scheduled H-infinity Control for Islanded Microgrids
Joel Steenis, Lloyd Breazeale, Kostas Tsakalis and Raja Ayyanar, Arizona State University, United States

P3905 • A Novel Robust Communication Algorithm for Distributed Secondary Control of Islanded MicroGrids
Qobad Shafiee, Tomislav Dragicevic, Cedomir Stefanovic, Petar Popovski, Juan Carlos Vasquez and Josep Maria Guerrero, Aalborg University, Denmark

Poster Session: Power Converters for Renewable Energy Applications

S

Room: Exhibit Hall A - South
Chair: Eduard Muljadi

P4701 • Optimization of SiC-based H5 and Conergy-NPC Transformerless PV Inverters
Stefanos Saridakis, Eftichios Koutroulis and Frede Blaabjerg, Technical University of Crete, Greece; Aalborg University, Denmark

P4702 • Study on a Control Method of a Single-phase Utility Interactive Inverter with a Power Decoupling Function
Keisuke Toyama and Toshihisa Shimizu, Tokyo Metropolitan University, Japan

P4703 • Dual Active Bridge Converter with PWM Control for Solid State Transformer Application
Chenhao Nan and Raja Ayyanar, Arizona State University, United States

P4704 • Comparison of Power Converters Considering the Determining Factors in Multi-MW Wind Turbines
Ke Ma, Marco Liserre and Frede Blaabjerg, Aalborg University, Denmark

P4705 • Low Voltage Ride-through of Single-phase Transformerless Photovoltaic Inverters
Yongheng Yang, Frede Blaabjerg and Huai Wang, Dept. of Energy Technology, Aalborg University, Denmark

P4706 • A Bidirectional Current-fed Resonant Push-pull Converter for Low Voltage, High Current Applications
Jani Hiltunen, Vesa Vaisanen and Pertti Silventoinen, Lappeenranta University of Technology, Finland

P4707 • Saturation Effects in Digital Extremum Seeking Control for Photovoltaic Applications
Ramon Leyva and Hector Zazo, Universitat Rovira i Virgili, Spain

P4708 • A Compact nX DC-DC Converter for Photovoltaic Power Systems
Fang Zheng Peng, Matthew Gebben and Baoming Ge, Michigan State University, United States

P4709 • A Digital Charge-mode Control Algorithm for Power Decoupling in a Flyback Microinverter
Shiladri Chakraborty, Niharika Gupta and Souvik Chattopadhyay, Indian Institute of Technology, Kharagpur, India

P4710 • Integration of Multi-terminal DC to DC Hub Architecture with Solid State Transformer for Renewable Energy Integration
Sumit Dutta, Sudhin Roy and Subhashish Bhattacharya, North Carolina State University, United States

P4711 • Use Conditions and Efficiency Measurements of DC Power Optimizers for Photovoltaic Systems
Chris Deline and Sara MacAlpine, NREL, United States; University of Colorado, United States

Poster Session: AC to DC Converters

W

Room: Exhibit Hall A - West
Chair: Gerry Moschopoulos

P4901 • Analysis and Design of a New Three-level PFC AC-DC Converter
Mehdi Narimani and Gerry Moschopoulos, The University of Western Ontario, Canada; University of Western Ontario, Canada

P4902 • Improving the Dynamic Response of Power Factor Correctors Using Simple Digital Filters: Moving Average Filter Comparative Evaluation
Jason Forbes, Matias Anun and Martin Ordonez, University of British Columbia, Canada

P4903 • Charge-Based ZVS Soft Switching Analysis of a Single-stage Dual Active Bridge AC-DC Converter
Jordi Everts, Florian Krismer, Jeroen Van den Keybus, Johan Driesen and Johann Kolar, Katholieke Universiteit Leuven (KU Leuven), Belgium; ETH Zurich, Switzerland; Triphase, Belgium

P4904 • Single-phase Voltage-doubler with Mismatched Capacitors for Balanced Output Voltages and Reduced DC-bus Voltage Ripples
Wen-Long Ming and Qing-Chang Zhong, The University of Sheffield, United Kingdom

P4905 • A Single-stage Single-switch Transformerless Buck-buck Converter with Constant Input Power Factor in the Entire Operational Range
Yu Chen, Zhihao Zhong, Shengfang Fan and Yong Kang, Huazhong Univ. of Sci and Tech, China

P4906 • A Nonlinear Control Approach for a Bidirectional Full-bridge AC-DC Converter
Nabil Akel, Majid Pahlevaninezhad and Praveen Jain, Queen's University, Canada

P4907 • Observer Based Active Damping of LCL Resonance in Grid Connected Voltage Source Converters
Vlatko Miskovic, Anton H.C. Smith, Charles Romenesko, Vladimir Blasko and Thomas Jahns, Danfoss, United States; Danfoss Power Electronics, United States; United Technologies Research Center, United States; University of Wisconsin - Madison, United States

P4908 • Modeling and Control of Average Input Current to Enhance Power Density for 3-phase Interleaved Boost Converters
YoungSun Lee, SeYoung Park and Jul-Ki Seok, YeungNam University, Korea, Republic of; Yeungnam University, Korea, Republic of

P4909 • Control of 3-phase Buck-type Rectifier in Discontinuous Current Mode
Ben Guo, Fred Wang, Rolando Burgos and Eddy Aeloiza, The University of Tennessee, United States; University of Tennessee, United States; Virginia Polytechnic Institute and State University, United States; ABB Corporate Research, United States

P4910 • Low-cost High-power-factor 3-phase Rectifier with Turn-on Current Suppression Circuit
Dongsheng Li, Yasuo Notohara, Masahiro Sano and Tatsuo Ando, Hitachi, Ltd., Japan; Hitachi Industrial Equipment Systems Co., Ltd., Japan; Hitachi Appliances, Inc., Japan

Poster Session: DC to DC Converters I

W

Room: Exhibit Hall A - West
Chair: Bill Peterson

P5101 • A Family of Bidirectional DC-DC Converters Suitable for Asymmetrical Power Flow Requirement
Wu Chen, Guangjiang Wang and Xu Zhu, Southeast University, China

P5102 • A Center-Tapped Forward-flyback DC-DC Converter for Low Power Applications
SeungWoon Lee, Kyusik Choi, ByungChul Hyun and Bo-Hyung Cho, Seoul National Univ., Korea (South); Samsung Electronics, Korea (South)

P5103 • Single-switch ZVZCS Quasi-resonant CLL Isolated DC-DC Converter for Low-power 32" LCD TV
Seung-Hee Ryu, Jung-Hoon Ahn, Byoung-Kuk Lee and Kwang-Seung Cho, Sungkyunkwan University, Korea (South); Samsung electro-mechanics co., ltd, Korea (South)

P5104 • A DC-DC Converter with Stacked Flyback Converters
Navid Golbon, Farnaz Ghodousipour and Gerry Moschopoulos, Western University, Canada

P5105 • Interleaved Series Input Parallel Output Zero-voltage-switching converter
Haixian Liu, Jinbin Zhao and Keqing Qu, Shanghai University of electric power, China; Shanghai University of Electric Power, China

P5106 • Increasing the Voltage and the Switching Frequency in a Dual Active Bridge Using a Normally-on SiC JFET in a Cascode Configuration
Alberto Rodriguez, Aitor Vazquez, Marcos Fernandez, Diego G. Lamar and Marta M. Hernando, University of Oviedo, Spain

P5107 • A Dual Pulse Modulated Five-element Multi-resonant DC-DC Converter and Its Performance Evaluations
Hiroto Mizutani, Tomokazu Mishima and Mutsuo Nakaoka, Kobe University, Japan; Kyungnam University, Korea, Republic of

P5108 • Adaptive Hybrid Primary/Secondary-side Digital Control for Series Resonant DC-DC Converters in 48V VR applications
Shangzhi Pan, Majid Pahlevaninezhad and Praveen Jain, Queen's University, Canada

P5109 • High-reliability Long-backup-time Super UPS with Multiple Energy Sources
Haijin Li, Wenping Zhang and Dehong Xu, Zhejiang University, China

P5110 • Load Monitoring and Output Power Control in a Wireless Power Transfer System Without Any Wireless Communication Feedback
Jian Yin, Deyan Lin, Chi Kwan Lee and S.Y.(Ron) Hui, The University of Hong Kong, Hong Kong

P5111 • Inductive Magnetic Harvester with Resonant Capacitive Rectifier Based on Synchronized Switch Harvesting Technique
Qian Sun, Sumeet Patil, Nian-Xiang Sun and Brad Lehman, Northeastern University, United States

P5112 • Magnetically Coupled Buck Converters
Tobias Schmid and Alexandr Ikriannikov, Volterra Semiconductor Corporation, United States

P5113 • Study of an Active Network DC-DC Boost Converter Based on Switched-inductor
Ting Wang, Yu Tang and Yaohua He, NanJing University of Aeronautics and Astronautics, China; NanJing University of Aeronautics and Astronauti, China

P5114 • Adaptive Voltage Positioning with Average Current Mode Control
Ruqi Li, Tony O'Brien, John Lee, John Beecroft and Kenny Hwang, Cisco, Inc., United States; Cisoc, Inc., United States

P5115 • A High Efficiency Resonant Switched Capacitor Converter with Continuous Conversion Ratio
Alon Cervera, Michael Evzelman, Peretz Mor and Shmuel Ben-Yaakov, Ben Gurion University of the Negev, Israel; Ben-Gurion University of the Negev, Israel

P5116 • Inductor Optimization for Multiphase Interleaved Synchronous Bidirectional Boost Converter Working in Discontinuous Conduction Mode with Zero Voltage Switching
Aitor Vazquez, Alberto Rodriguez, Kevin Martin, Manuel Arias and Marta M. Hernando, University of Oviedo, Spain

P5117 • Elimination of Reactive Power in Dual Active Bridge By Hybrid of Phase Shift and PWM Control
Xiaolei Hu, Kingjet Tseng, Shan Yin, Rudy Tjandra and Tao Wang, Nanyang Technological University, Singapore

Tuesday, September 17 3:30 pm – 5:00 pm

Poster Session: Converters for AC Grid Connection of DC Distribution Systems

N

Room: Exhibit Hall A - North
Chair: Jon Are Suul

P5701 • Power Management Strategy for DC Microgrid Interfaced to Distribution System based on Solid State Transformer
Xunwei Yu, Xu She, Xijun Ni, Gangyao Wang and Alex Huang, NC State University, United States; North Carolina State University, United States

P5702 • Bidirectional 3-phase PFC Concept Based on an Integrated Inverting-link Current Source Converter
Thiago Soeiro and Marcelo Lobo Heldwein, Federal University of Santa Catarina (UFSC), Brazil

P5703 • A High-efficiency Single-phase Bidirectional AC-DC Converter with Miniminized Common Mode Voltages for Battery Energy Storage Systems
Bin Gu, Baifeng Chen, Jih-Sheng Lai and Jason Dominic, Virginia Tech, United States

Poster Session: Grid Integration of Electric Vehicles

N

Room: Exhibit Hall A - North
Chair: Seddik Bacha

P5901 • Combining Models to Assess the Impact of Electric Vehicles on an Evolving Grid
Norma Anglani, Fabrizio Fattori and Muliere Giuseppe, University of pavia, Italy; Provincial Administration of Pavia, Italy

P5902 • Reduced-capacity Smart Charger for Electric Vehicles on Single-phase Three-wire Distribution Feeders with Reactive Power Control
Hidenori Tanaka, Toshihiko Tanaka, Takaaki Wakimoto, Eiji Hiraki and Masayuki Okamoto, Yamaguchi University, Japan; Ube National College of Technology, Japan

P5903 • V2G Integration and Experimental Demonstration on a Lab-scale Microgrid
Patricio Mendoza-Araya, Phillip Kollmeyer and Daniel Ludois, University of Wisconsin - Madison, United States

P5904 • Smart Charging of Plug-in Hybrid Electric Vehicles (PHEVs) on the Residential Electric Grid regarding the Voltage Plan
Harun Turker, Seddik Bacha and Ahmad Hably, Grenoble Electrical Engineering Laboratory, France; GIPSA-Lab, France

P5905 • Plug-in Vehicles Car Park Photovaltic Farm Construction for Cost and Emission Reductions
Tan Ma and Osama Mohammed, IEEE Student Member, United States; IEEE Fellow, United States

Poster Session: Static Compensators and Active Power Filters

N

Room: Exhibit Hall A - North
Chair: Fang Zheng Peng

P6101 • An Overview of Grid Fundamental and Harmonic Components Detection Methods
Yi Fei Wang and Yun Wei Li, Canadian Utilities Ltd, Canada; University of Alberta, Canada

P6102 • A Multi-loop Control System For Series DC Active Filter in a Medium-voltage DC Amplifier
Hesam Mirzaee, Subhashish Bhattacharya and Sandeep Bala, North Carolina State University, United States; ABB US Corporate Research Center, United States

P6103 • A 7.2 kV Experimental Setup of a Third Harmonic Hybrid Active Filter for Medium Voltage Utility Applications
Jorge E. Hernandez, Rajendra P. Kandula, Frank Lambert, Deepak Divan and Santiago Grijalva, Georgia Institute of Technology, United States

P6104 • DC-side Series Active Power Filter for STATCOM Performance under System Faults
Saman Babaei and Subhashish Bhattacharya, North Carolina State University, United States

P6105 • Shunt Active Power Filter With Open-end Winding Transformer and Series Connected Converters
Gregory Carlos, Cursino Jacobina, Euzeli Santos, Edgard Fabricio and Nady Rocha, Federal Institute of Alagoas, Brazil; Federal University of Campina Grande, Brazil; Purdue School of Engineering and Technology, IUP, United States; Federal University of Paraiba, Brazil

P6106 • Shunt Compensator Based on 3-phase Interconnected Converters
Cursino Jacobina, Fabricio Edgard, Menezes Alysson, Correa Mauricio and Carlos Gregory, Federal University of Campina Grande, Brazil

P6107 • Modeling and Analysis of Harmonic Resonance in Power Electronics Based AC Systems
Xiongfei Wang, Frede Blaabjerg, Zhe Chen and Weimin Wu, Aalborg University, Denmark; Shanghai Maritime University, China

Poster Session: Utility and Smart Grid Applications

N

Room: Exhibit Hall A - North
Chair: Yilmaz Sozer

P6301 • Virtual Netrual Point Selection for Three-leg Railway Power Quality Conditioner
Zhang Chunpeng, Jiang Qirong, Tian Xu and Wei Yingdong, Tsinghua University, China

P6302 • Modeling and Design of Multi-parallel-connected Static Synchronous Series Compensators with Daisy-chained Transformers
Sui Pung Cheung and Shu Hung Chung, City University of Hong Kong, Hong Kong

P6303 • An Improved Active Frequency Drift Anti-islanding Detection Method with Lower Total Harmonic Distortion
Wu Chen, Guangjiang Wang, Xu Zhu and Bo Zhao, Southeast University, China; Zhejiang Electric Power Test and Research Instit, China

P6304 • Use of Hooke's Law for Stabilizing Future Smart Grid — The Electric Spring Concept
Chi Kwan Lee, Siew Chong Tan, Felix Wu, S.Y.(Ron) Hui and Balarko Chaudhuri, The University of Hong Kong, Hong Kong; Imperial College London, United Kingdom

P6305 • Development of A New Bridge-type Chopper for Low-voltage SMES Applications
Jin Jianxun, Xu Wei, Chen Xiaoyuan, Zhang Yongchang, Zhou Xin and Xin Ying, University of Electronic Science and Technology, China; RMIT University, Australia; North China University of Technology, China; Innopower Superconductor Cable Co., Ltd., China

P6306 • Comparison on the Unbalanced-load Handling Capability of Two Power Electronic Transformer Topologies
Xinyu Wang, Shaodi Ouyang, Jinjun Liu, Taotao Xu, Xiaojian Wang and Linyuan Zhou, Xi'an Jiaotong Univeristy, China; Xi'an Jiaotong University, China

P6307 • New Control Technique for Sensor-less Grid Synchronization of Modular Multilevel Converters for HVDC Systems
Andres Escobar, David Guzman, Juan Carlos Balda and Claudio Busada, University of Arkansas, United States; Universidad Nacional del Sur, Argentina

Poster Session: PM & IPM Machines

E *Room: Exhibit Hall A - East*
Chair: Patel Reddy

P5301 • Design and Analysis of Neodymium Free Spoke Type Motor with Segmented Wing Shape Permanent-magnet for Concentrating Flux Density
Mohmmad Mizanoor Rahman, Kyung-Tae Kim and Jin Hur, University of Ulsan, Korea (South)

P5302 • Investigation of Radial Electromagnetic Force Density and Vibration in a Fractional-slot Interior Permanent Magnet Synchronous Machine
Weizhong Fei and Patrick Luk, Cranfield University, United Kingdom

P5303 • Robust Design Optimization of Permanent Magnet Synchronous Machine Utilizing Genetic and Taguchi's Algorithm
Mazharul Chowdhury, Mohammad Islam, Abraham Gebregergis and Tomy Sebastian, Nexteer Automotive, United States

P5304 • Methods for Studying the Pareto-fronts of Multi-objective Design Optimization Problems of Electrical Machines
Yao Duan, Qin Sun and Dan Ionel, University of Wisconsin, Milwaukee, United States; Georgia Institute of Technology, United States

P5305 • Optimal Design of a Special Permanent Magnet Synchronous Machine for Magnetocaloric Refrigeration
Christophe Espanet, Christophe Kieffer, Stefan Giurgea, Frederic Gustin and Amine Mira, University of Franche-Comte, France; University of Technology of Belfort-Montbeliard, France

P5306 • Measuring Magnetic Properties of Synchronous Machines by Applying Angle Estimation Techniques Known from Sensorless Control
Sascha Kuehl and Ralph Kennel, Technische Universitaet Muenchen, Germany; Technical University of Munich, Germany

P5307 • Operation and Design Principles of a PM Vernier Motor
Byungtaek Kim and Thomas A. Lipo, Kunsan national univ., Korea (South); University of Wisconsin-Madison, United States

P5308 • Design and Performance Improvement of a Line-start PMSM
Solmaz Kahourzade, Amin Mahmoudi, Wooi Ping Hew and Mohammad Nasir Uddin, UM Power Energy Dedicated Advanced Centre, Malaysia; Lakehead University, Canada

P5309 • Winding Factors and Magnetic Fields in Permanent Magnet Brushless Machines with Concentrated Windings and Modular Stator Cores
Greg Heins, Dan Ionel and Mark Thiele, Regal Beloit Corporation, Australia; Regal Beloit Corporation, United States; Charles Darwin University, Australia

P5310 • Morphing Parametric Modeling and Design Optimization of Spoke and V-type Permanent Magnet Machines by Combined Design of Experiments and Differential Evolution Algorithms
Peng Zhang, Dan Ionel and Nabeel Demerdash, Marquette University, United States; Regal Beloit Corporation, United States

P5311 • Permanent Magnet Motor Capable of Pole Changing for High Efficiency
Kazuto Sakai and Nariaki Yuzawa, Toyo University, Japan

P5312 • Explicit Criteria for Reluctance Torque Utility of Permanent Magnet Motors
Takahashi Akeshi, Maruyama Eri and Hatsuse Wataru, Hitachi, Ltd., Japan

P5313 • Modeling THE Electromagnetic Vibration of Interior Permanent Magnet Machines for Electric Propulsion
Isaac Du, Lei Hao and Hejie Lin, General Motors, United States

P5314 • Energy Efficiency Comparison of SR and IPM Generators for Hybrid Electric Vehicle
Katsuhiko Urase, Kyohei Kiyota, Hiroya Sugimoto and Akira Chiba, Tokyo Institute of Technology, Japan

P5315 • Assessment of 12-slot, 14-pole Permanent Magnet Flux Switching Machine with Hybrid Excitation for Electric Vehicle Application
Vipulkumar Patel and Jiabin Wang, The University of Sheffield, United Kingdom

P5316 • Novel Nonlinear Inductance Modeling of Permanent Magnet Motor
David Woodburn, Thomas Wu, Louis Chow and Quinn Leland, University of Central Florida, United States; Air Force Research Laboratory, United States

P5317 • Reduction of Permanent Magnets in Small-Scale Wind Turbines
Adam Shea and Daniel Ludois, University of Wisconsin -Madison, United States; C-Motive Technologies Inc., United States

Poster Session: Induction Machines

E *Room: Exhibit Hall A - East*
Chair: Patel Reddy

P5501 • A Sensorless Field Oriented Controller for A Five-phase Induction Machine Under Open-circuit Phase Faults
Ahmed Morsy, Ayman Abdel-Khalik, Ahmed Massoud and Shehab Ahmed, Faculty of Engineering, Alexandria University, United States; Faculty of Engineering, Alexandria University, Egypt; Qatar University, Qatar; Texas AM University at Qatar, Qatar

P5502 • Design of a Measuring System to Analyze the Power Transmission in the Slip Ring System in Double Fed Induction Generators (DFIG)
A. T. Hermann Houenouvo, Robert Jensch and Wilfried Hofmann, TU-Dresden, Germany; Technical University Dresden, Germany

P5503 • DC Biased Stimulation Method for Induction Motor Parameters Identification at Standstill without Inverter Nonlinearity Compensation
Guangtong Shen, Kai Wang, Wenxi Yao, Kevin Lee and Zhengyu Lu, Zhejiang University, China; Eaton Corporation, United States

Poster Session: DC to DC Converters II

S

Room: Exhibit Hall A - South
Chair: Brandon Pierquet

P6901 • Analysis and Design of a Three-level DC-DC Converter with Load Adaptive ZVS Auxiliary Circuit
Pritam Das, Majid Pahlevaninezhad, Aniruddha Mukherjee, Gerry Moschopoulos and Praveen Jain, National University of Singapore, Singapore; Queen's University, Canada; University of Western Ontario, Canada

P6902 • Soft Switching Full-bridge Converter with a Wide ZVS Range and Reduced Parasitic Oscillation
Zhong Chen, Shasha Liu, Yang Wang and Liangchen Shi, Nanjing University of Aero. and Astro., China

P6903 • Comparison of Multi-phase SAB Converters vs. Multi-phase SRC Converters
Asier Garcia-Bediaga, Irma Villar, Ion Etxeberria-Otadui, Philippe Barrade and Alfred Rufer, IK4-IKERLAN Technology Research Center, Spain; LEI - EPFL, Switzerland

P6904 • Modeling of A Fixed-frequency Resonant LLC DC-DC Converter with Capacitive Output Filter
Xiaodong Li, Hong-Yu Li and Gao-Yuan Hu, Macau University of Science and Technology, Macau

P6905 • Optimal Design of a Class-E Resonant Driver
Michael Evzelman and Mor Peretz, Ben Gurion University of the Negev, Israel; Ben-Gurion University of the Negev, Israel

P6906 • Design and Implementation of a Bidirectional Isolated Dual-active-bridge-based DC-DC Converter with Dual-phase-shift Control for Electric Vehicle Battery
Yen-Ching Wang, Yen-Chun Wu and Tzung-Lin Lee, National Sun Yat-sen University, Taiwan

P6907 • Modeling Isolation Transformer Capacitive Components in a Dual Active Bridge Power Conditioner
Babak Farhangi and Hamid A. Toliyat, Texas A and M University, United States

P6908 • Design and Control of a Single-stage Large Air-gapped Transformer Isolated Battery Charger for Wide-range Output Voltage for EV Applications
Zaka Ullah Zahid, Cong Zheng, Rui Chen, William Eric Faraci, Jih-Sheng Lai, Matthew Senesky and Dave Anderson, Virginia Tech, United States; Virginia Tech, United States; Texas Instruments Incorporated, United States

P6909 • Closed loop D-Q Control of High-voltage High-power 3-phase Dual Active Bridge Converter in Presence of Real Transformer Parasitic Parameters
Awneesh Tripathi, Kamalesh Hatua, Krishna Mainali, Dhaval Patel and Subhashish Bhattacharya, North Carolina State University, United States; Indian Institute of Technology Madras, India

P6910 • A Single-switch LCL-resonant Isolated DC-DC Converter
Jianwu Zeng, Wei Qiao and Liyan Qu, University of Nebraska-Lincoln, United States

P6911 • Multi-objective Optimization and Design of a 500kHz Isolated Bidirectional DC-DC Converter
Yu Du and Alex Huang, ABB US Corporate Research, United States; North Carolina State University, United States

P6912 • Improving Performance of a DC-DC Cascaded Converter System Using an Extra Feedback Loop
Reza Ahmadi and Ferdowsi Mehdi, Southern Illinois University Carbondale, United States; Missouri University of Science and Technology, United States

P6913 • Novel Bidirectional Snubberless Naturally Clamped ZCS Current-fed Full-bridge Voltage Doubler: Analysis, Design, and Experimental Results
Pan Xuewei and Akshay Rathore, National University of Singapore, Singapore

P6914 • Predictive Current Mode Control of Single Phase Dual Active Bridge DC to DC Converter
Sumit Dutta and Subhashish Bhattacharya, North Carolina State University, United States

P6915 • Digital Fast-P Slow-ID Control DC-DC Converter Using A-D Converters in Different Resolutions
Fujio Kurokawa, Ryuya Yoshida and Yudai Furukawa, Nagasaki University, Japan

P6916 • Non-isolated Bidirectional ZVT Converter with a Single Resonant Inductor for Energy Storage System
JiTai Han, Chang-Soon Lim, Rae-Young Kim and Dong-Seok Hyun, Hanyang University, Korea (South)

P6917 • A ZVS Single-inductor Multi-input Multi-output DC-DC Converter with the Step Up/Down Capability
Hamidreza Keyhani and Hamid A. Toliyat, Texas A-and-M University - College Station, United States; Texas A and M University - College Station, United States

P6918 • Zero Voltage Switched Chopper with SiC-MOSFETs
Yukinori Tsuruta and Atsuo Kawamura, Yokohama National University, Japan

P6919 • Light-load Efficiency Optimization for Module Integrated Converters in Photovoltaic Systems
Zhe Chen, Hongfei Wu, Longxian Ni, Kai Sun and Yan Xing, Nanjing Univ. of Aeronautics and Astronautics, China; Nanjing University of Aeronautics and Astronautics, China; Tsinghua University, China

P6920 • Efficiency Improvement of a Low-power Multiple-input Converter with Forward-conducting-bidirectional-blocking Switches
Ruichen Zhao and Alexis Kwasinski, Baker Hughes Incorporated, United States; The University of Texas at Austin, United States

P6921 • Loss Modeling and Optimization for Monolithic Implementation of the Three-level Buck Converter
Beomseok Choi and Dragan Maksimovic, University of Colorado at Boulder, United States; University of Colorado - Boulder, United States

P6922 • High Voltage Conversion Ratio, Switched C and L Cells, Step-down DC-DC Converter
Ovidiu Pelan, Nicolae Muntean, Octavian Cornea and Frede Blaabjerg, "Politehnica" University of Timisoara, Romania; Institute of Energy Technology Aalborg, Denmark

P6923 • High Efficiency Power Amplifier Applying the Envelope Elimination and Restoration Technique with a Single Stage Envelope Amplifier with Ripple Cancellation Network
Daniel Diaz, Oscar Garcia, Jesus A. Oliver, Pedro Alou, Miroslav Vasic, Jose A. Cobos, Moises Patino, David Tena and Francisco J. Ortega, Universidad Politecnica de Madrid, Spain

P6924 • Reliability Analysis and Performance Degradation of a Boost Converter
Mohammed Alam and Faisal Khan, University of Utah, United States

Poster Session: DC to AC and AC to AC Converters

W

Room: Exhibit Hall A - West
Chair: Mor Peretz

P6501 • Switched-coupled-inductor Inverter
Qin Lei, Fang Zheng Peng and Miaosen Shen, Michigan State University, United States; United Technology Research Center, United States

P6502 • Single-phase Power Compensation in a Current Source Converter
Montie Vitorino, Mauricio Correa and Cursino Jacobina, Federal University of Paraiba, Brazil; Federal University of Campina Grande, Brazil

P6503 • Improved Control Strategy for Modular 2 MVA AC-AC Power Converters
Carlo Concari, Paolo Cova, Giovanni Franceschini, Andrea Toscani and Fulvio Bertoluzza, University of Parma, Dep. Ing. dell'Infomazione, Italy; POSEICO S.p.A., Italy

P6504 • A Comparative study of FPGA Based Cycloinverter with two Modulation Techniques
Anshul Agarwal and Vineeta Agarwal, NIT Hamirpur, India, India; MNNIT Allahabad, India, India

P6505 • Predictive Current Control of a Four-leg Indirect Matrix Converter with Imposed Source Currents and Common-mode Voltage Reduction
Cristian Garcia, Marco Rivera, Miguel Lopez, Jose Rodriguez, Patrick Wheeler, Ruben Pena, Jose Espinoza and Javier Riedemann, Universidad Tecnica Federico Santa Maria, Chile; Universidad de Talca, Chile; University of Nottingham, United Kingdom; Universidad de Concepcion, Chile

P6506 • AC-DC-AC Multilevel Converters Based on Three-leg Converters
Cursino Jacobina, Antonio Queiroz, Ayslan Maia, Edison da Silva and Alexandre Oliveira, Federal University of Campina Grande, Brazil

P6507 • 3-phase to 3-phase AC-AC DC-link Converters Based on Three-level and Two-level Legs
Luciano de Macedo Barros, Cursino Jacobina, Alexandre Cunha Oliveira, Isaac Soares de Freitas and Edison da Silva, Federal University of Campina Grande, Brazil; Federal University of Paraiba, Brazil

P6508 • Bridgeless High Power Factor Buck-converter Operating in Discontinuous Capacitor Voltage Mode
Abbas Fardoun, Nasrullah Khraim, Esam Ismail, Ahmad Sabzali and Mustafa Al-Saffar, United Arab Emirates University, United Arab Emirates; Al Ain Distribution Company, United Arab Emirates; College of Technological Studies, Kuwait

P6509 • Novel Topology Derivation for Low-common Mode Noise H-bridge Converters with Additional Switches
Jong-Won Shin, Hojoon Shin, Jung-Ik Ha and Bo-Hyung Cho, Virginia Polytechnic Institute and State Univers, United States; Seoul National University, Korea (South)

P6510 • X-source Inverter-A Generic Z-source Inverter Structure
Xinping Ding, Chenghui Zhang and Zhaoming Qian, Shandong University, China; Zhejiang University, China

P6511 • Common-mode Voltage Reduction with Two-phase Modulation in Three-level PWM Inverter
Toshiji Kato, Kaoru Inoue, Kyu Takano and Ariyasu Aki, Doshisha University, Japan

P6512 • High-frequency Interleaved 3-phase Inverter with Novel Single Reference Six-pulse-modulation (SRSPM) Technique
Udupi Rajagopal Prasanna and Akshay Rathore, University of Texas, Dallas, United States; National University of Singapore, Singapore

P6513 • Analytical Modelling of Modulation of Soft-switched Partial-resonant Link Inverter Suitable for PV
Ilija Pecelj, Sjoerd de Haan and Braham Ferreira, Delft University of Technology, Netherlands

P6514 • Ultra-sparse AC-link Converters
Mahshid Amirabadi, Jeihoon Baek and Hamid Toliyat, University of Illinois at Chicago, United States; Samsung Advanced Institute of Technology, Korea (South); Texas A and M University, United States

P6515 • Bidirectional Soft-switched AC-AC High Frequency Link Converter
Ankan De, Sudhin Roy and Subhashish Bhattacharya, NCSU, United States; North Carlina State University, United States; North Carolina State University, United States

Poster Session: Stability and Power Quality

W

Room: Exhibit Hall A - West
Chair: Srdjan Lukic

P6701 • Stability Analysis of the Shunt Regulator in PCU with Describing Function Method
Shiheng Wang, Xiaojie You, Hong Li, Ruixiang Hao and Trillion Q. Zheng, Beijing Jiaotong University, China

P6702 • Low Frequency Ripple Propagation Analysis in LLC Resonant Converter Based on Signal Modulation-demodulation Theory and Ripple Reduction Based on PIR Control Strategy
Xi Chen, Mengyin Ma, Shanxu Duan, Wen Cai and Changsong Chen, College of Electrical and Electronic Engineering, China; Huazhong University of Science and Technology, China

P6703 • Stable Control Design of Average Current Mode Control for Multi-phase Transformer-linked Type Boost Chopper Circuit
Iwamoto Kenta, Katsura Kenshiro, Kato Taiki and Yamamoto Masayoshi, Shimane University, Japan

P6704 • Performance Metrics for Small-signal Stability Assessment of DC-distributed Power-system-architecture Comparisons
Sanna Vesti, Jesus A. Oliver, Roberto Prieto, Jose A. Cobos and Teuvo Suntio, Universidad Politecnica de Madrid, Spain; Tampere University of Technology, Finland

P6705 • Stability Analysis of Inverter Based Power Generation Emulator in Test-bed for Power Systems
Liu Yang, Xiaohu Zhang, Yiwei Ma, Jing Wang, Lijun Hang, Keman Lin, Leon Tolbert, Fred Wang and Kevin Tomsovic, University of Tennessee, United States; The University of Tennessee, United States

P6706 • Design and Performance Evaluation of Overcurrent Protection Schemes for Silicon Carbide (SiC) Power MOSFETs
Zhiqiang Wang, Xiaojie Shi, Yang Xue, Leon Tolbert, Benjamin Blalock and Fred Wang, The University of Tennessee, United States; University of Tennessee, United States

P6707 • Circulating Current Control and Reduction in a Paralleled Converter Test-bed System
Yiwei Ma, Liu Yang, Jing Wang, Xiaojie Shi, Fred Wang and Leon M. Tolbert, University of Tennessee, United States

Monday, September 16 4:00 pm – 6:30 pm | Tuesday, September 17 12:00 pm – 2:00 pm

Colorado Convention Center, Exhibit Hall A

In this event, 13 university student teams will demonstrate their hardware or video of hardware operations. The objective of this student demo program is to show the prototype built by the students to the industry participants and provide an opportunity for potential technology transfer from academic research to industry products. Student demonstrations will take place in Exhibit Hall A.

The demos are as follows:

3-phase Back-to-back Inverter for Rapid Prototyping and Verification of Grid-connected Converters

Demonstrator: Elaina Chai (student)
University: Massachusetts Institute of Technology
Advisor: Ivan Celanovic

High Frequency 3D Integrated Point of Load (POL) Module with PCB Embedded Inductor Substrate

Demonstrator: Yipeng Su
University: Virginia Tech
Advisor: Fred C. Lee

400 Watt 27.12 Mhz Induction Heating

Demonstrator: Luke Raymond
University: University of Michigan
Advisor: Juan M. Rivas

Daisy-chain Transformer Structure for Current-balancing Multiple LED Strings

Demonstrator: Ruihong ZHANG
University: City University of Hong Kong
Advisor: Henry Shu-hung CHUNG

Miniature Self-powered Stick-on Wireless Sensor Node for Monitoring of Overhead Power Lines

Demonstrator: Qiliang Xu
University: University of California, Berkeley
Advisor: Prof. Paul K. Wright and Prof. Richard M. White

A Soft-switching Isolated Multiport DC-DC Converter for Simulataneous Power Management off Multiple Renewable Sources

Demonstrator: Jianwu Zeng
University: University of Nebraska-Lincoln
Advisor: Wei Qiao

Single-phase Electrolytic-capacitor-free Quasi-Z-source PV Inverter with Enhanced Reliability

Demonstrator: Yan Zhou
University: Florida State University
Advisor: Dr. Hui Li

Implementation of a Distributed Control Algorithm for Maximum Power Point Tracking in Differential Power Processing Photovoltaic Energy System

Demonstrator: Shibin Qin
University: University of Illinois at Urbana-Champaign
Advisor: Robert Pilawa-Podgurski

Reduction of Permanent Magnets in Small-scale Wind Turbines

Demonstrator: Adam Shea
University: University of Wisconsin – Madison
Advisor: T.M. Jahns

Invited IFEC Project 1: Highly Efficient Microinverter for Photovoltaic Panels *(Grand Prize and Best Efficiency Award)*

Students: Chien-Yu Lin, John Li-Chung Chen
University: National Taiwan University of Science and Technology
Advisor: Prof. Chiu and Prof. Lo

Invited IFEC Project 2: Single Stage QR Flyback Non-electrolytic LED Driver *(Best Engineering Achievement Award and Best Innovative Design Award)*

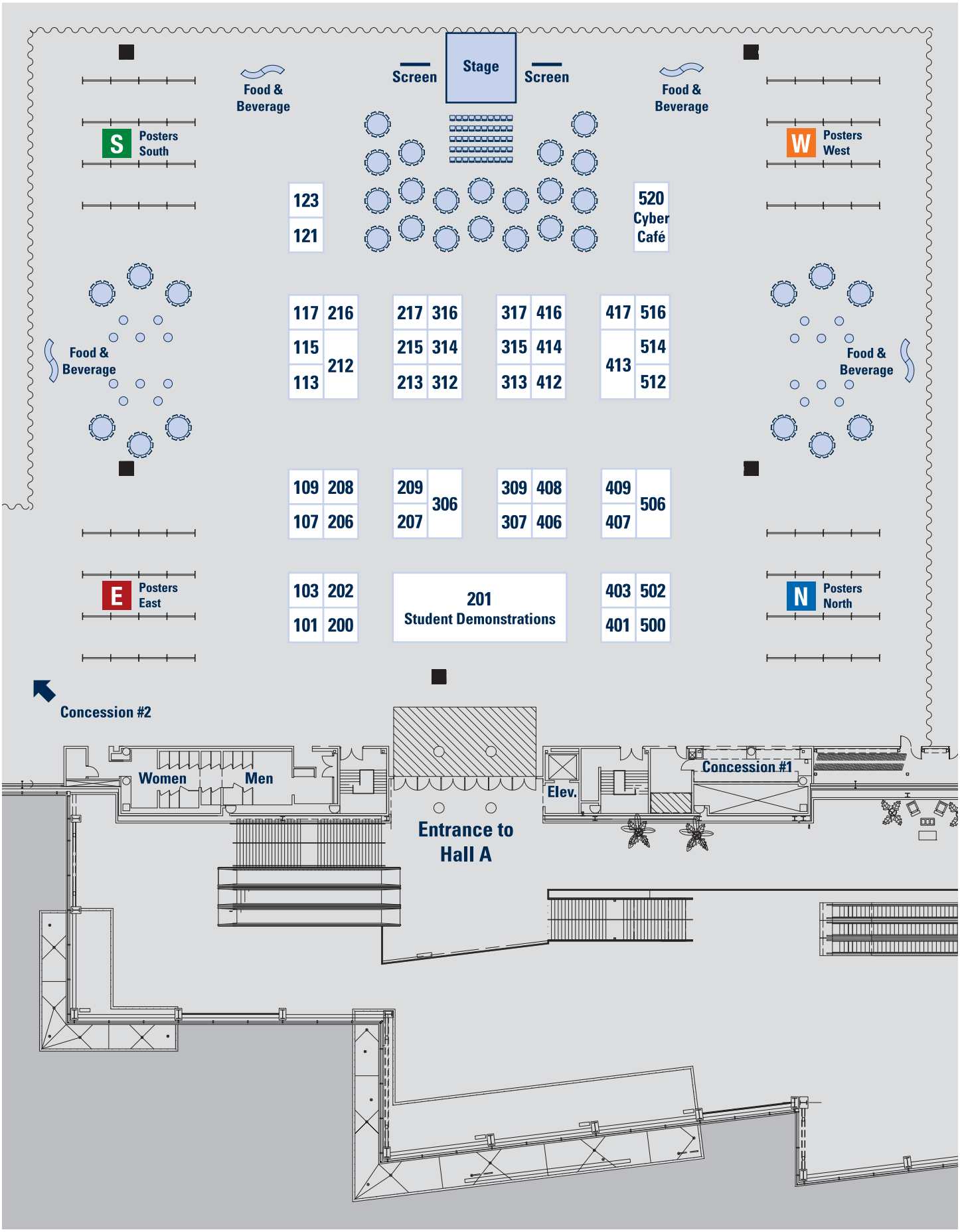
Students: Kuan-Wen Lee, Yi-Hsun Hsieh, Hui-Wen Rebecca Liang, Hsiang-Feng Yu, Shih-Wen Tsai, Ching-Hsiang Chung and Ji Shiuan Li
University: National Cheng-Kung University, Taiwan
Advisor: Prof. Liang and Prof. Chen

Invited IFEC Project 3: Low Power Off-line Light-emitting Diode (LED) Driver with Long Lifetime *(Grand Prize and Best Efficiency Award)*

Students: Xiawei Wang, Shengpeng Tang, Yue Ma, Zhao Li, Siyang Zhao
University: Zhejiang University, China
Advisor: Prof. Wu

Invited IFEC Project 4: Highly Efficient Grid-tied Microinverter for Photovoltaic Panels *(Best Engineering Achievement)*

Student: Bin Qian
University: Nanjing University of Aeronautics and Astronautics
Advisor: Prof. Hu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101 200
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403 502
401 500
N Posters North
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Entrance to Hall A
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Concession #1

Alphabetical Listing by Company Name:

Numerical Listing by Booth Number:

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The Industry Applications Society supports the advancement of the theory and practice of electrical and electronic engineering in the development, design, manufacture and application of electrical systems, apparatuses, devices and controls to the processes and equipment of industry and commerce; the promotion of safe, reliable and economical installations; industry leadership in energy conservation and environmental health and safety issues; the creation of voluntary engineering standards and recommended practices; and the professional development of its membership.

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Powerex turns ideas into cost-effective products and is a leading supplier of discrete devices, modules, and integrated high power semiconductor solutions.

Powersys (JMAG Division, JSOL Corporation)

Booth 417

2-5-4 Harumi, Chuo-ku
Tokyo, 104-0053
Japan
P +1 81-80-3250-9001
http://www.jmag-international.com

JMAG is a comprehensive FEA software solution for electromechanicla equipment design and development. To capture and reproduce the phenomenon in a product accurately in the analysis, accurate and precise modeling is essential. The higher the accuracy of a model, the higher the analysis resolution becomes to include the effects of slight differences in model geometry and properties.

Proto Laminations, Inc.

Booth 213

13666 East Bora Drive
Santa Fe Springs, CA 90670
USA
P +1 909-338-3744
ssprague@protolam.com
www.protolam.com

Proto Laminations specializes in the manufacture of laser cut and stamped short-run laminations for rotating machinery in support of the development, prototype evaluation and limited production needs of academic institutions and motor and generator manufacturers worldwide.

Shin-Etsu Magnetics, Inc.

Booth 206

909 Parkview Boulevard
Lombard, IL 60148
USA
P +1 630-424-3364
brad@smisj.com
http://www.shinetsu-rare-earth-magnet.jp/e

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Sidelinesoft, LLC

Booth 115

931 Mansfield Drive
Fort Collins, CO 80525
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P +1 970-414-0515
alexei.smirnov@sidelinesoft.com
www.sidelinesoft.com

Sidelinesoft presents NL5 Circuit Simulator: a unique simulation tool working with true ideal components. Its robust proprietary algorithm provides fast and reliable simulation, not distracted by convergence problems, which makes it especially efficient during the concept design stage of a project. NL5 is powerful and versatile, yet easy to use and user-friendly.

SMMA — The Motor and Motion Association — Booth 414

P.O. P182
South Dartmouth, MS 02748
USA
P +1 508-979-5935
bill.chambers@smma.org
www.smma.org

SMMA – The Motor & Motion Association is the North American trade association, with a global focus, representing fractional horsepower electric motor and drives manufacturers, and suppliers to the industry. Management and engineering topics are addressed at semi-annual conferences, SMMA Motor & Motion College courses and the Electric Motor Education & Research Foundation (EMERF).

TDK-Lambda Americas — Booth 202

405 Essex Road
Neptune, NJ 07753
USA
P +1 732-922-9300 x235
bonnie.west@us.tdk-lambda.com
www.us.tdk-lambda.com/hp

Genesys™ AC-DC power supplies provide high power density, low ripple and complete user-friendly interfaces, Highest power density 2400W in 1U. Identical family interfaces. Platforms 750W, 1500W, 2.4kW, 3.3/5kW, 0/15kW. Outputs available up to 600V and 1000A. Standard RS-232/RS-485 and Remote Analog Programming. Optional LAN, IEEE or Isolated Analog Control.

Tektronix, Inc. — Booth 406

14150 SW Karl Braun Drive
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P +1 503-627-2948
scottie.wyatt@tektronix.com
www.tekronix.com

For more than sixty-five years, engineers have turned to Tektronix for test, measurement and monitoring solutions to solve design challenges, improve productivity and dramatically reduce time to market. Tektronix is a leading supplier of test equipment for engineers focused on electronic design, manufacturing, and advanced technology development.

Tridus Magnetics and Assemblies — Booth 123

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P +1 310-884-3200
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Tridus provides customers with a low cost and high reliability path to China magnet manufacturing. Its technology and magnet solutions results in millions of magnets and magnet assemblies shipped globally. With a reliable and quality embedded supply-chain that spans from rare earth smelting and separation to complex value-added assembly products, Tridus demonstrates high standards for quality, exceptional levels of service, competitive pricing, and efficient supply chain management.

VAC Sales USA, LLC — Booth 412

2935 Dolphin Drive, Suite 102
Elizabethtown, KY 42701
USA
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brian.bell@vacuumschmelze.com

VACUUMSCHMELZE — a manufacturer of advanced magnetic materials — produces Rare Earth Permanent Magnets, Soft Magnetic Materials & Parts, and Cores & Inductive Components. A world leader in development, production and application know-how of magnetic materials, VAC supports customers selecting innovative materials and customizes unique materials for optimized solutions.

Webcom Communications — Booth 514

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P +1 720-528-3770 x113
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www.webcomcommunications.com

Webcom Communications Corp. is an integrated media company serving advanced technology industries and markets worldwide through its magazines, events, websites, eNewsletters, online media, directories, buyers guides, market reports, data products and marketing services. Webcom's products and services serve numerous markets and industries including electronics, IT, telecommunications, manufacturing, automation, infrastructure, lighting, materials, instrumentation, power, renewable energy, utilities, natural resources and healthcare.

Wiley — Booth 502

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> Call for Tutorials

The 6th Annual IEEE Energy Conversion Congress and Exposition (ECCE 2014) will be held in Pittsburgh, Pennsylvania, on September 14-18, 2014. The conference will bring together practicing engineers, researchers and other professionals for interactive discussions on the latest advances in various areas related to energy conversion. ECCE has grown to become the foremost technical conference and exposition for people looking for energy conversion solutions; solutions that are timely, practical, customer focused, market sensitive and cost effective. Engineers from throughout the energy conversion industry's broad spectrum come to ECCE specifically to take advantage of the concentrated brain trust assembled annually in one very special location to do business in a convivial and innovative atmosphere, a perfect blend of state of the art technical prowess and commercial opportunities under one roof.

Important Dates

February 14th, 2014
Submissions of one page abstract of proposed tutorial.

March 24th 2014
Notification of acceptance. Accepted tutorials will be advertised by the committee after this date.

July 1st, 2014
Full tutorial materials must be submitted for publication in the tutorials book.

Digest Submission Guidelines

Tutorial proposals should be submitted as a digest summarizing the content of the tutorial. Please follow the tutorial proposal form (on the next page) as the tutorial submission guideline. **Please submit the digest and any questions regarding this call directly to the Tutorials Chair, Khwaja Rahman, via email at khwaja.rahman@gm.com.** For more conference information, please visit http://2014.ecceconferences.org.

ECCE 2014 Tutorials Chair

Khwaja Rahman, *General Motors Global Electrification, USA*

The ECCE organizing committee invites proposals for half-day tutorials to be presented on Sunday September 14. The organizing committee is particularly interested in tutorials that are of value to the practicing engineer, with an emphasis on solutions to practical problems. Tutorials are solicited on any subject pertaining to the scope of the conference that includes, but is not limited to, the major topics listed below.

Energy Conversion Systems and their Technologies

- Electrical systems for the Oil & Gas, mineral and mining sectors
- Technologies and systems for energy storage
- Transmission / Distribution and smart grid applications
- HVDC, FACTS, renewable energy integration, distributed resources and micro-grids, V2G-G2V
- Renewable and alternative energy systems
- Low-loss energy conversion and energy saving systems, their energy management methodologies and algorithms
- Energy conversion and storage systems for Information Technologies (IT), e.g. computing, data centers, communication networks
- Technologies and systems for energy harvesting
- Transportation systems for people and goods, e.g. electric and hybrid vehicles, including marine and aerospace applications
- Quality indexes and standards for energy conversion systems

Components and Materials for Energy Conversion

- New materials of interest for energy conversion
- Design of electromechanical converters
- Drives and control of electromechanical converters
- Power conversion circuits, switching devices and control
- Passive components and their constitutive materials
- Design of packaging and integration, both at the component and system level
- Multiphysics modeling of components and systems
- Measurement techniques, sensors and EMC aspects
- Reliability, diagnostics and prognostics

Tutorials accepted for presentation will receive one conference registration together with an honorarium for $1,000. Note that publication of a technical paper at the conference will still require a full paid registration.

Conference > September 14-18, 2014 **Exposition > September 15-16, 2014**

2014.ecceconferences.org

Pittsburgh, Pennsylvania
September 14-18, 2014

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> Tutorial Proposal Form

Title of Tutorial

Abstract

(500 word limit. If the tutorial is accepted, this abstract will be published in the conference web page, program, and proceedings.)

Outline of Tutorial

(Outline would only define the topics and the subtopics that would be covered. No detail descriptions should be included in the proposal.)

Lead Instructor

Name

Affiliation

Email

Phone

Other Instructor

Name

Affiliation

Email

Phone

Instructor Bios

(~150 words each. Please provide a brief biography of each instructor, describing the qualifications for presenting the proposed tutorial, including the work and publications that are most relevant to the proposal.)

> Call for Papers

The 6th Annual IEEE Energy Conversion Congress and Exposition (ECCE 2014) will be held in Pittsburgh, Pennsylvania, USA on September 14-18, 2014. ECCE is the pivotal international conference and exposition event around electrical and electromechanical energy conversion. ECCE 2014 will feature both industry-driven and application-oriented technical sessions, as well as industry expositions and seminars. ECCE 2014 will bring together researchers from industry and academia, application engineers and other professionals for interactive and multidisciplinary discussions on the latest advances in various areas of industrial relevance related to classical electromagnetism and materials for energy conversion.

Technical papers are solicited on any subject pertaining to the scope of the conference that includes, but it is not limited to, the following major topics:

Energy Conversion Systems and their Technologies

- Electrical systems for the Oil & Gas, mineral and mining sectors
- Technologies and systems for energy storage
- Transmission / Distribution and smart grid applications
- HVDC, FACTS, renewable energy integration, distributed resources and micro-grids, V2G-G2V
- Renewable and alternative energy systems
- Low-loss energy conversion and energy saving systems, their energy management methodologies and algorithms
- Energy conversion and storage systems for Information Technologies (IT), e.g. computing, data centers, communication networks
- Technologies and systems for energy harvesting
- Transportation systems for people and goods, e.g. electric and hybrid vehicles, including marine and aerospace applications
- Quality indexes and standards for energy conversion systems

Components and Materials for Energy Conversion

- New materials of interest for energy conversion
- Design of electromechanical converters
- Drives and control of electromechanical converters
- Power conversion circuits, switching devices and control
- Passive components and their constitutive materials
- Design of packaging and integration, both at the component and system level
- Multiphysics modeling of components and systems
- Measurement techniques, sensors and EMC aspects
- Reliability, diagnostics and prognostics

Paper Submission Guidelines

Prospective authors must submit a digest — no longer than five (5) pages — summarizing the proposed paper. The text must be single column, single spaced. No indication of author names and affiliations is allowed in the digest. Deviations from these essential requirements will be grounds for immediate rejection. The digests must clearly state the objectives of the work, its significance in advancing engineering or science, as well as the methods and specific results in sufficient detail. The digest should include key equations, figures, tables and references as appropriate. The digests will be reviewed using a double-blind peer review process to ensure confidentiality and fair review. Please refer to the conference website for a detailed list of topics and the digest submission method.

Important Dates

January 15th, 2014
Digests submitted via the website.

May 1st, 2014
Notification of acceptance or rejection.

July 1st, 2014
Final papers with IEEE copyright forms.

Pittsburgh is "The City of Bridges" crossing its three rivers and located in the Appalachian mountains, renowned for their scenic beauty. The climate in September offers a pleasant mild balance between summer and winter conditions. Pittsburgh — known as "Steel City" too — has a remarkable industrial tradition in the metallurgy and electrical sectors. Such a heritage has evolved today towards a diversified blend of modern world-class academic institutions, national laboratories and multinational companies. Nowadays Pennsylvania is also a innovation center for the different technologies around the expanding Oil & Gas sector. The conference will be held at LEED gold certified David L. Lawrence Convention Center, which is located in the hub of Pittsburgh's cultural, business and entertainment district.

For more information, please visit http://2014.ecceconferences.org/ or contact the ECCE 2014 Technical Program Chairs via email at ecce2014tpc@gmail.com. For exhibiting at ECCE 2014, please contact conference exhibition Chair at ssprague@protolam.com and for participating in the products and services session please contact the technical program chairs. For more about Pittsburgh and its surrounding areas, please visit http://pittsburghpa.gov/.

ECCE 2014 Technical Program Chairs

Lixiang Wei, *Rockwell Automation, USA*
Pierluigi Tenca, *GE Global Research, Germany*
Nicola Bianchi, *University of Padova, Italy*
Wen Soong, *University of Adelaide, Australia*

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> Call for Special Session Organizers

The 6th Annual IEEE Energy Conversion Congress and Exposition (ECCE 2014) will be held in Pittsburgh, PA, on September 14-18, 2014. The conference will bring together researchers from industry and academia, application engineers and other professionals for interactive and multidisciplinary discussions on the latest advances in various areas of industrial relevance related to classical electromagnetism and materials for energy conversion. ECCE has grown to become the foremost technical conference and exposition around electrical and electromechanical energy conversion. It focuses on solutions that are industrially oriented. People from a broad spectrum of the energy conversion industry gather yearly at ECCE to interact in a convivial and innovative atmosphere, perfect blend of state the art, technical prowess and commercial opportunities in one attractive location.

Important Dates

March 31st, 2014
Proposal submissions of one page digest of proposed presentation.

May 1st, 2014
Notification of session acceptance.

The ECCE organizing committee invites persons interested in organizing Special Technical Sessions. Such sessions consist of oral presentations only, without written papers and are strongly oriented towards the interests of industry, as well as academia. Presentations might be of a somewhat more commercial nature than those related to the papers in the standard technical sessions.

Conference > September 14-18, 2014
Exposition > September 15-16, 2014

Presentations are solicited on any subject pertaining to the scope of the conference described in its Call for Papers (obtainable online from 2014.ecceconferences.org), but those that will address the following aspects of growing interest and innovation are preferred:

- Innovative materials for improved components and/or systems in electrical and electromechanical energy conversion.
- Components and systems for electrical applications in the oil & gas and mining sectors.
- Technologies and systems for large, cycle-efficient and cycle-intensive energy storage.
- Modelling of materials oriented to improve the estimation of the energy efficiency in the components and systems using them.
- Reliability, diagnostics and prognostics of components and modular systems.

Digest Submission Guidelines

Session organizers are requested to submit a digest (5 pages maximum) summarizing the proposed special session with 4 or 8 presentations. The digest should contain the session title, session organizer, title of each presentation, presenter for each presentation (with a short biography) and a summary of each presentation. Please submit the digest directly to ECCE 2014 Technical Program Committee Chairs via email at ecce2014tpc@gmail.com.

Please visit 2014.ecceconferences.org for additional conference information. For exhibiting at ECCE 2014, please contact conference Exhibition Chair at ssprague@protolam.com. For more about Pittsburgh and its surrounding areas, please visit http://pittsburghpa.gov. For submission and information regarding the ECCE 2014 Special Sessions, please contact the ECCE Technical Program Committee Chairs (ecce2014tpc@gmail.com).

ECCE 2014 Technical Program Chairs

Lixiang Wei, *Rockwell Automation, USA*
Pierluigi Tenca, *GE Global Research, Germany*
Nicola Bianchi, *University of Padova, Italy*
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> Save the date

Conference > September 14-18, 2014
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ECCE 2014

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