DETAILED PROGRAM

Monday, October 2, 10:50AM-12:30PM

Power Conversion for Solar Photovoltaic Systems I
Monday, October 2, 10:50AM-12:30PM, Room: 236, Chair: Ranjit Mahanty, Yongheng Yang

10:50AM Single-Stage Three-Phase Grid-Connected Photovoltaic System with Maximum Power Tracking and Active and Reactive Power Control based on Nonlinear Control [#259]
Pablo Rivera, Michael McIntyre, Mohammad Mohebbi and Joseph Latham, University of Louisville, United States; Universiti of Louisville, United States

11:15AM A Single Phase Doubly Grounded, PV Inverter using Coupled Inductor with Integrated Magnetics and Active Power Decoupling Technique [#645]
Yinglai Xia, Jinia Roy and Raja Ayyanar, Arizona State University, United States

Hybrid AC/DC Microgrids
Monday, October 2, 10:50AM-12:30PM, Room: 237/38, Chair: Jinjun Liu, Meiqin Mao

10:50AM Adaptive Active Power Sharing Techniques for DC and AC voltage control in a Hybrid DC/AC Microgrid [#1159]
Angel Navarro-Rodriguez, Pablo Garcia, Ramy Georgious and Jorge Garcia, University of Oviedo, Spain

11:15AM Modulation and Control Method for Bidirectional Isolated AC/DC Matrix Converter in Hybrid AC/DC Microgrid [#430]
Fanxiu Fang and Yunwei Li, University of Alberta, Canada

Dynamic Performance of Power Converters for Renewable Energy
Monday, October 2, 10:50AM-12:30PM, Room: 233, Chair: Hui Li, Adel Nasiri

10:50AM Robust $H_{\infty}$ DC Link Control Design for High-Power Density Converters with High-Order Filter in PV Systems [#604]
Nima Amouzegar Ashtiani, S. Mohsen Azizi and S. Ali Khajehoddin, University of Alberta, Canada; Michigan Technological University, United States

11:15AM Grid Voltage Harmonic Damping Method for SPC based Power Converters with Multiple Virtual Admittance Control [#1452]
Tarrasso Andres, Rocabet Joan, Candela Ignacio and Rodriguez Pedro, Technical University of Catalonia, Spain; Technical University of Catalonia - Loyola U., Spain
### Applications of MMC

**Monday, October 2, 10:50AM-12:30PM, Room: 203, Chair: Maryam Saeedifard, Vito Giuseppe Monopoli**

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<tr>
<th>Time</th>
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<tbody>
<tr>
<td>11:15AM</td>
<td><strong>Communication Network Latency Compensation in Modular Multilevel Converters</strong> [#52]</td>
<td>Tomas Perpetuo Correa, Emilio Jose Bueno and Francisco Javier Rodriguez, University of Alcala, Spain</td>
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### Inductive Power Transfer for EV Charging

**Monday, October 2, 10:50AM-12:30PM, Room: 232, Chair: Suman Debnath, Daniel Ludois**

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<th>Time</th>
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<tr>
<td>10:50AM</td>
<td><strong>An Analytical Method to Calculate Winding Resistance for Planar Coil with Ferrite Plate and Litz Wire in Inductive Power Transfer</strong> [#102]</td>
<td>Ming Lu and Khai Ngo, Monolithic Power Systems, United States; CPES, Virginia Tech, United States</td>
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<tr>
<td>11:15AM</td>
<td><strong>Comparative Evaluation of Front and Back End PFC IPT Systems for a Contactless Battery Charger</strong> [#1390]</td>
<td>Ander Avila, Asier Garcia-Bediaga, Ugaitz Iruretagoyena, Irma Villar and Alejandro Rujas, IK4-IKERLAN TECHNOLOGY RESEARCH CENTRE, Spain; IK4-Ikerlan Technology Research Centre, Spain; K4-IKERLAN TECHNOLOGY RESEARCH CENTRE, Spain</td>
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### Single-Phase DC/AC Converters I

**Monday, October 2, 10:50AM-12:30PM, Room: 230/31, Chair: Adam Skorek, Feng Gao**

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<tr>
<td>10:50AM</td>
<td><strong>Mode Selection Strategy for Multi-Mode Power Converters Minimizing its Differential Power</strong> [#1053]</td>
<td>Regina Ramos, Inigo Zubitur, Diego Serrano, Jesus A. Oliver, Pedro Alou and Jose A. Cobos, Universidad Politecnica de Madrid, Spain</td>
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</table>
**Investigation of Single-Phase Multilevel Inverter Based on Series/Parallel-Connected H-bridges [#1047]**
Antonio de Paula Dias Queiroz, Cursino Brandao Jacobina, Aysslan Caisson Noroes Maia, Victor Felipe Moura Bezerra Melo and Ivan da Silva, Federal Institute of Paraiba, Brazil; Federal University of Campina Grande, Brazil; Federal Institute of Alagoas, Brazil; Federal Institute of Pernambuco, Brazil

**Design and Implementation of a DC-AC Inverter with Zero-Voltage-Switching [#356]**
Hsin-Ju Liu, Tsorgn-Juu Liang, Kuan-Ho Liu and Kai-Hui Chen, National Cheng Kung University, Taiwan

**A Hybrid Two-four Leg H-bridge Inverter [#713]**
Abinadabe Andrade and Edison da Silva, UFCG/IFPB-Cajazeiras, Brazil; UFPB/UFPC, Brazil

**Multi-Phase DC/AC Converters I**
Monday, October 2, 10:50AM-12:30PM, Room: 204, Chair: David Diaz Reigosa, Marcello Pucci

**Critical-Mode-Based Soft-Switching Modulation for Three-Phase Inverters [#1253]**
Zhengrong Huang, Zhengyang Liu, Fred Lee, Qiang Li and Furong Xiao, CPES, Virginia Tech, United States; Beijing Institute of Technology, China

**Implementing Synchronous DC Link Voltage Control with Phase Skipping on a Three-Phase Microinverter Using Minimum DC Link Capacitance [#1311]**
Seyed Milad Tayebi, Siddhesh Shinde, Michael Pepper, Haibing Hu and Issa Batarseh, University of Central Florida, United States

**Differential-Mode and Zero Sequence Circulating Current Reduction for Paralleled Inverters With Modified Zero-CM PWM Algorithm [#17]**
Zewei Shen, Dong Jiang, Chen Jianan and Ronghai Qu, Huazhong University of Science and Technology, China

**MPC-SVM Method with Subdivision Strategy for Current Ripples Reduction and Neutral-Point Voltage Balance in Three-Level Inverter [#127]**
Hyun-Cheol Moon, June-Hee Lee, June-Seok Lee and Kyo-Beum Lee, Ajou University, Korea (South); Korea Railroad Research Institute, Korea (South)

**DC/DC Converters I**
Monday, October 2, 10:50AM-12:30PM, Room: 201, Chair: Philip Krein, Santanu Mishra

**Experimental Verification of a Bidirectional Chopper for Battery Energy Storage Systems Capable of Reduction in Size and Weight of an Inductor [#116]**
Haruna Ohnishi and Makoto Hagiwara, Tokyo Institute of Technology, Japan

**Magnetic Structure of Close-Coupled Inductors to Improve the Thermal Handling Capability in Interleaved DC-DC Converter [#693]**
Hoang Chuong Thai, Masataka Ishihara, Shota Kimura, Daigoro Ebisumoto, Mostafa Noah, Masayoshi Yamamoto, Jun Imaoka and Wilmar Martinez, Shimane University, Japan; Okayama University, Japan; Nagoya University, Japan; Kyushu University, Japan; Toyota Technological Institute, Japan

**Integrated Switched coupled-Inductor Boost-flyback converter [#773]**
Xinping Ding, Dailing Yu, Yingjie Song and Bicui Xue, Qingdao University of Technology, China; Jinan University, China

**Energy Efficient Visible Light Communication Transmitter Based on the Split of the Power [#449]**
Juan Rodriguez, Daniel G. Aller, Diego G. Lamar and Javier Sebastian, University of Oviedo, Spain

**Modeling and Control of Resonant Converters**
Monday, October 2, 10:50AM-12:30PM, Room: 200, Chair: Gerry Moschopoulos, Rivas-davila Juan

**Resonant LLC Bus Conversion Using Homopolarity Width Control [#1060]**
Mehdi Mohammadi and Martin Ordenez, University of British Columbia, Canada

**Dual-Loop Controller for LLC Resonant Converters Using an Average Equivalent Circuit [#1216]**
Franco Degioanni, Ignacio Galiano Zurbriggen and Martin Ordenez, University of British Columbia, Canada
11:40AM  Modeling Resonant Converters in a Rotating Coordinate [#509]
Yi-Hsun Hsieh and Fred C. Lee, CPES, Virginia Tech, United States

12:05PM  Closed-Loop Control of Impedance Control Network Resonant DC-DC Converter [#1156]
Jie Lu, Ashish Kumar and Khurram Afridi, University of Colorado Boulder, United States

Modeling and Control of Power Factor Correction Converters
Monday, October 2, 10:50AM-12:30PM, Room: 205, Chair: Aleksandar Prodic, Huai Wang

10:50AM  A Discontinuous Boost Power Factor Correction Conduction Loss Model [#1190]
Yanqi Yu, Fariborz Musavi and Wilson Eberle, The University of British Columbia, Canada; Washington State University, United States

11:15AM  Digital Control Of An Interleaved BCM Boost PFC Converter With Fast Transient Response At Low Input Voltage [#106]
Robert Ryan, John Hayes, Richard Morrison and Diarmuid Hogan, University College Cork, Ireland; University college Cork, Ireland; Excelsys Technologies, Ireland

11:40AM  New Modulated Carrier Control Method for Power Factor Correction Rectifier [#25]
Jintae Kim, Dong-Wook Yoo and Chung-Yuen Won, Sungkyunkwan University, Korea (South); Korea Electrotechnology Research Institute, Korea (South)

12:05PM  Efficiency Evaluation of Three-phase SiC Power Factor Correction Rectifier with Different Controllers [#447]
Alireza Kouchaki and Morten Nymand, University of Southern Denmark, Denmark

Induction Machines I
Monday, October 2, 10:50AM-12:30PM, Room: 264, Chair: Andrea Cavagnino, Renato Lyra

10:50AM  Induction Machine Design for Dynamic Loss Minimization along Driving Cycles for Traction Applications [#1313]
Yuying Shi and Robert Lorenz, University of Wisconsin-Madison, United States

11:15AM  Impact of Core Material Grades on Performance of Variable Speed Induction Motors Fed by Inverters [#132]
Katsumi Yamazaki, Koki Tanaka and Motomichi Ohno, Chiba Institute of Technology, Japan; Yaskawa Motor Corp., Japan

11:40AM  Electrical Monitoring of Mechanical Defects in Induction Motor Driven V-Belt-Pulley Speed Reduction Couplings [#81]
Tae-June Kang, Chanseung Yang, Yonghyun Park, Sang Bin Lee and Mike Teska, Korea University, Korea, Republic of; SKF Condition Monitoring Center, United States

12:05PM  A Simple Method for Determining Equivalent Circuit Parameters of Double-Cage Induction Motors from No-Load and Locked-Rotor Tests [#563]
Shu Yamamoto, Hideaki Hirahara, Akira Tanaka and Takahiro Ara, Polytechnic University, Japan

Axial Flux Machines
Monday, October 2, 10:50AM-12:30PM, Room: 263, Chair: Akira Chiba, Giulio De Donato

10:50AM  An Axial Flux-Focusing Magnetically Geared Motor [#1265]
Mojtaba Bahrami Koushahi, Jonathan Bird, Vedanadam Acharya, Kang Li, Matthew Calvin and Wesley Williams, Portland State University, United States; University of North Carolina at Charlotte, United States

11:15AM  Design of a Novel Interior Permanent Magnet Axial Flux Machine [#1468]
Burak Tekgun, Tausif Husain, Shuvajit Das, Yilmaz Sozer and Marv Hamdan, University of Akron, United States; Bendix CVS, United States

11:40AM  A Comparative Study of Coreless and Conventional Axial Flux Permanent Magnet Synchronous Machines Designed for Low and High Speed Operation [#1465]
Narges Taran, Vandana Rallabandi, Dan M. Ionel and Greg Heins, University of Kentucky, Lexington, KY, United States; Regal Beloit Corporation, Melbourne, VIC., Australia
Comparison of Dual Structure Axial Flux-Switching Permanent Magnet Machines [#1127]
Ju Hyung Kim, Mingda Liu, Hao Ding and Bulent Sarlioglu, University of Wisconsin-Madison, United States

Control of Electric Drives I
Monday, October 2, 10:50AM-12:30PM, Room: 262, Chair: Roberto Petrella, Hinkkanen Marko

Optimal Torque Control of Synchronous Motor Drives: Plug-and-Play Method [#719]
Hafiz Asad Ali Awan, Zhanfeng Song, Seppo Saarakkala and Marko Hinkkanen, Aalto University, Finland; Tianjin University, China

Self-Commissioning Technique for High Bandwidth Servo Motor Drives [#762]
Yen-Shin Lai and Min-Hsien Ho, Taipei Tech, Taiwan

Diagnostics and Fault Tolerant Systems in Drives
Monday, October 2, 10:50AM-12:30PM, Room: 260/61, Chair: Giacomo Scelba, Antonio J. Marques Cardoso

Ground Faulted Phase Location Identification for Adjustable Speed Drives in High Resistance Grounding System [#1325]
Jiangang Hu, Lixiang Wei, Jeff McGuire and Zhijun Liu, Rockwell Automation, United States

Fault Analysis in an Inverter-Fed Nine-Phase Induction Machine [#653]
Tamires Santos de Souza, Rodrigo Rodrigues Bastos and Braz de Jesus Cardoso Filho, Federal University of Minas Gerais, Brazil

GaN Switching Performance
Monday, October 2, 10:50AM-12:30PM, Room: 207/208, Chair: Enrico Santi, Muhammad Nawaz

Analysis of Oscillation in Bridge Structure Based on GaN Devices and Ferrite Bead Suppression Method [#348]
Fangwei Zhao, Yan Li, Qing Tang and Lu Wang, Beijing Jiaotong University, China

Switching Transient Analysis for Normally-Off GaN Transistors with p-GaN Gate in a Phase-Leg Circuit [#652]
Ruiliang Xie, Guangzhao Xu, Xu Yang, Hanxing Wang, Mofan Tian, Yidong Tian, Feng Zhang, Wenjie Chen, Laili Wang and Kevin J Chen, Xi’an Jiaotong University, China; Hong Kong University of Science and Technology, Hong Kong

12:05PM 
Comparison of Open-Phase Fault Detection for Permanent Magnet Machine Drives using Different Fault Signals [#839]
Shih-Chin Yang, Yu-Liang Hsu, Po-Huan Chou, Da-Ren Jian and Guan-Ren Chen, National Taiwan University, Taiwan; Feng Chia University, Taiwan; Industrial Technology Research Institute, Taiwan

12:05PM 
Algebraic Weighting Factor Selection for Predictive Torque and Flux Control [#250]
Tobias Geyer, ABB Corporate Research, Switzerland

GaN Switching Performance
Magnetics I
Monday, October 2, 10:50AM-12:30PM, Room: 206, Chair: David Perreault, Ruxi Wang

10:50AM Medium Frequency Transformer Leakage Inductance Modeling and Experimental Verification [#161]
Marko Mogorovic and Drazen Dujic, Power Electronics Laboratory, EPFL, Switzerland

11:15AM Continuum Modeling of Inductor Hysteresis and Eddy Current Loss Effects in Resonant Circuits [#694]
Jason Pries, Lixin Tang and Tim Burress, Oak Ridge National Laboratory, United States

Power Conversion for Solar Photovoltaic Systems II
Monday, October 2, 2:00PM-4:05PM, Room: 236, Chair: Pedro Rodriguez, Lixiang Wei

2:00PM Three-Phase DC-DC PWM Boost Converter for Renewable Energy Applications [#752]
Adel Abosnina and Gerry Moschopoulos, Western University, Canada

Yinglai Xia, Ziwei Yu and Raja Ayyanar, Arizona State University, United States

2:50PM A Novel Model Predictive Control for Single-Phase Grid-Connected Photovoltaic Inverters [#1089]
Esmaili Zangeneh Bighash, Seyed Mohammad Sadeghzadeh, Esmaeil Ebrahimzadeh, Yongheng Yang and Frede Blaabjerg, Electrical Engineering Faculty, Shahed University, Iran; Energy Department, Aalborg University, Denmark

Power Converter Topologies for Renewable Energy
Monday, October 2, 2:00PM-4:05PM, Room: 233, Chair: Tiefu Zhao, Mohammad B Shadmand

2:00PM Soft-Switching Isolated Tri-port Converter for Integration of PV, Storage and Single-Phase AC Grid [#1115]
Nishant Bilakanti, Liran Zheng, Rajendra Prasad Kandula, Karthik Kandasamy and Deepak Divan, GEORGIA INSTITUTE OF TECHNOLOGY, United States

2:25PM Power-Loss Analysis in 3-Level TNPC Inverters: Modulation Effects [#869]
Emanuel Serban, Cosmin Pondiche and Martin Ordonez, University of British Columbia, Canada; Schneider Electric, Canada
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<tr>
<td>2:50PM</td>
<td>Modeling and Design for Integrated Coupled Inductors in Interleaved Three-level DC/DC Converters [#1176]</td>
<td>Ruiyang Qin and Fred Lee, Delta Products Corporation, United States; Center for Power Electronics Systems, United States</td>
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<td>3:15PM</td>
<td>Design Considerations of a Full-Bridge Modular Multilevel Converter under Variable DC Link Voltage [#517]</td>
<td>Ahmed Allu, Milijana Odavic and Kais Atallah, University of Sheffield, United Kingdom</td>
</tr>
<tr>
<td>3:40PM</td>
<td>Geometry Optimization and Characterization of Three-phase Medium Frequency Transformer for 10kVA Isolated DC-DC Converter [#532]</td>
<td>Youngsil Lee, Gaurang Vakil, Alan Watson and Patrick Wheeler, University of Nottingham, United Kingdom</td>
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**Renewable Impacts in Industrial Microgrids**

Monday, October 2, 2:00PM-4:05PM, Room: 237/38, Chair: Marco Liserre, Giovanna Oriti

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<td>2:00PM</td>
<td>High-Speed Algorithm for Renewable Energy Based Microgrid Fault Detection and Protective Coordination [#78]</td>
<td>Hashim Al Hassan, Qiang Fu, Vijay Bhavaraju, Yi Yang and Brandon Grainger, University of Pittsburgh, United States; Eaton, United States</td>
</tr>
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<td>2:25PM</td>
<td>Increasing the Robustness of Islanded CERTS Microgrids with PV Microsources and Gensets during Dynamic Overload Conditions [#1360]</td>
<td>Zhe Chen, Mitch Marks and Thomas M. Jahns, University of Wisconsin - Madison, United States</td>
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<td>2:50PM</td>
<td>A Wind Energy Battery Charging System with Dynamic Current Limitation [#980]</td>
<td>Guilherme Farias, Joao Caracas, Jose Matos and Luiz Ribeiro, ENOVA ENERGIA/Brazil, Brazil; UFMA/Brazil, Brazil</td>
</tr>
<tr>
<td>3:15PM</td>
<td>A Fast Fault Protection Based on Direction of Bus-Side Capacitor Discharge Current for a High-Surety Power Supply [#918]</td>
<td>Haijin Li, Min Chen, Boping Yang, Frede Blaabjerg and Dehong Xu, Zhejiang University, Power Electronics Institute, China; Aalborg University, Energy Technology Department, Denmark</td>
</tr>
<tr>
<td>3:40PM</td>
<td>A First Approach For The Energy Management System in DC Micro-Grids with Integrated RES of Smart Ships [#51]</td>
<td>Angelo Accetta and Marcello Pucci, ISSIA-CNR, Italy</td>
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**Control Aspects of Electified Vehicles**

Monday, October 2, 2:00PM-4:05PM, Room: 232, Chair: Jin Ye, Ian Brown

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<td>2:00PM</td>
<td>Control Strategies for a High Frequency DC-DC Converter for Electrified Vehicles [#177]</td>
<td>Xin Jing, Brian Welchko, Constantin Stancu and Peter Savagian, General Motors Company, United States; NA, United States</td>
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<td>2:50PM</td>
<td>Optimal Performance of a Full Scale Li-ion Battery and Li-ion Capacitor Hybrid Energy Storage System for a Plug-in Hybrid Vehicle [#1398]</td>
<td>Phillip Kollmeyer, Wootton Mackenzie, Tyler Stiene, Megan Wood, John Reimers, Ephrem Chemali and Ali Emadi, McMaster University, Canada</td>
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<td>3:15PM</td>
<td>Hybrid Balancing in a Modular Battery Management System for Electric-Drive Vehicles [#722]</td>
<td>Fan Zhang, Muhammad Muneeb Ur Rehman, Regan Zane and Dragan Maksimovic, University of Colorado Boulder, United States; Utah State University, United States</td>
</tr>
<tr>
<td>3:40PM</td>
<td>Development of Compact Power Control Unit for HEVs [#793]</td>
<td>Shinya Yano, Yasushi Nakayama, Hiroshi Kobayashi, Seiki Hiramatsu, Motoru Yoshida, Kohei Onda, Komei Hayashi and Koji Yamazaki, Mitsubishi Electric Corp, Japan</td>
</tr>
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Multi-Phase DC/AC Converters II
Monday, October 2, 2:00PM-4:05PM, Room: 204, Chair: Parag Kshirsagar, Grahame Holmes

2:00PM A Three-Phase Grid-Connected Inverter Equipped With a Shunt Instantaneous Reactive Power Compensator [#1481]
Kazuto Takagi and Hideaki Fujita, Tokyo Institute of Technology, Japan

2:25PM A New Three-Level Three-Phase Boost PWM Inverter [#786]
Yam Siwakoti, Stephan Liese, Jian Guo Zhu and Frede Blaabjerg, University of Technology Sydney, Australia; Fraunhofer-Institute for Solar Energy Systems IS, Germany; Aalborg University Denmark, Denmark

2:50PM A Sine-Like Hysteresis Current Control Method in Application of Three-Phase Voltage Source Converter [#329]
Hongyan Zhao, Yan Li, Trillion Q. Zheng, Xianjin Huang, Fangwei Zhao, Zhenning Zi and Haobo Guo, Beijing Jiaotong University, China; State Grid Electric Power Research Institute, China

Single-Phase DC/AC Converters II
Monday, October 2, 2:00PM-4:05PM, Room: 230/31, Chair: Madhav Manjrekar, Vladimir Blasko

2:00PM Loss Reduction of 13.56 MHz Inverter Based on Frequency Multiplying Method [#1451]
Koji Orikawa, Satoshi Ogasawara and Jun-ichi Itoh, Hokkaido University, Japan; Nagaoka University of Technology, Japan

2:25PM A Bridge Modular Switched-Capacitor-Based Multilevel Inverter [#118]
Liangzong He, Chen Cheng, Nai Jixiao and Chen Wenxiang, Xiamen University, China

Shuang Xu, Liuchen Chang and Riming Shao, University of New Brunswick, Canada

Power Quality Control
Monday, October 2, 2:00PM-4:05PM, Room: 205, Chair: Zheng Wang, Tsorng-Juu Liang

2:00PM Single-Phase AC-DC-AC Topology for Grid Voltage Compensation [#1021]
Nayara Brandao de Freitas, Cursino Brandao Jacobina and Rodrigo Pereira de Lacerda, Federal University of Campina Grande, Brazil
2:25PM  Single-phase AC-DC-AC Multilevel Converter for Grid Overvoltage Based on an H-Bridge Connected in Series to the Five-Leg Converter [#1055]
Antonio de Paula Dias Queiroz, Cursino Brandao Jacobina, Ayslan Caisson Noroes Maia, Victor Felipe Moura Bezerra Melo, Nayara Brandao de Freitas and Gregory Arthur de Almeida Carlos, Federal Institute of Paraiba, Brazil; Federal University of Campina Grande, Brazil; Federal Institute of Alagoas, Brazil; Federal Institute of Pernambuco, Brazil

2:50PM  Effects of DC-link Filter on Harmonic and Interharmonic Generation in Three-phase Adjustable Speed Drive Systems [#1014]
Hamid Soltani, Pooya Davari, Dinesh Kumar, Firuz Zare and Frede Blaabjerg, Aalborg University, Denmark; Danfoss Drives A/S, Denmark; University of Queensland, Australia

Modeling and Control of Multilevel Converters
Monday, October 2, 2:00PM-4:05PM, Room: 200, Chair: Yongdong Li, Vito Giuseppe Monopoli

2:00PM  A Distributed Control Technique for the Multilevel Cascaded Converter [#640]
Ping-heng Wu, Yu-chen Su and Po-tai Cheng, National Tsing Hua University, Taiwan

2:25PM  A Capacitor Voltage Balancing Method for a Three Phase Modular Multilevel DC-DC Converter [#970]
Mingming Jiang, Shuai Shao, Kuang Sheng and Junming Zhang, Zhejiang University, China

2:50PM  Modeling and Suppression of Circulating Currents for Multi-Paralleled Three-Level T-Type Inverters [#325]
Zicheng Zhang, Ailian Chen, Xiangyang Xing, Ke Li, Chunshui Du and Chenghui Zhang, Shandong University, China

Switched Reluctance Machines
Monday, October 2, 2:00PM-4:05PM, Room: 263, Chair: Davide Barater, Iqbal Husain

2:00PM  A Fast Control-Integrated and Multiphysics-Based Multi-Objective Design Optimization of Switched Reluctance Machines [#658]
Sufei Li, Shen Zhang, Chen Jiang, J. Rhett Mayor, Thomas G. Habetler and Ronald G. Harley, Georgia Institute of Technology, United States

2:25PM  Acoustic Noise Mitigation for High Pole Count Switched Reluctance Machines through Skewing Method with Multiphysics FEA Simulations [#1487]
Yusuf Yasa, Mohammed Elamin, Yilmaz Sozer, John Kutz, Joshua Tylerenda and Ronnie Wright, University of Akron, United States; DCS Corporation, United States; TARDEC - US Army, United States

2:50PM  Investigation of Torque Ripple in Switched Reluctance Machines with Errors in Current and Position Sensing [#1231]
Cong Ma, Rakesh Mitra, Prerit Pramod and Rakib Islam, Nexteer Automotive, United States

3:15PM  Control System for Shunt Active Power Filters with Adaptive Voltage Saturation [#1408]
Albino Amerise, Michele Mengoni, Luca Zarri, Angelo Tani, Giovanni Serra and Domenico Casadei, University of Bologna, Italy

3:40PM  Research on Improved Hybrid Power Quality Conditioner for VV Co-phase Railway Power Supply System [#296]
Chenmeng Zhang, Xishan Wen, Jianming Li, Mangmang Chen, Baichao Chen, Jiaxin Yuan and Wenli Fei, Sichuan Electric Power Research Institute, China; Wuhan University, China; Southwest Electric Power Design Institute, China

3:15PM  GA Optimized SHE PWM Hybrid Cascaded H-bridge Multilevel Inverter with Capacitor Voltage Balancing [#1168]
Abhimandan Routray, Rajeev Kumar Singh and Ranjit Mahanty, Indian Institute of Technology (BHU) Varanasi, India

3:40PM  Resilient Two Dimensional Redundancy based Fault-tolerant Controller Array for Modular Multi-level Converters [#1298]
Ali Azidehak, Rajat Agarwal, Nima Yousefpoor, Alexander G Dean and Subhashish Bhattacharya, NORTH CAROLINA STATE UNIVERSITY, United States; North Carolina State University, United States

3:15PM  Investigation of Torque Ripple in Switched Reluctance Machines with Errors in Current and Position Sensing [#1231]
Cong Ma, Rakesh Mitra, Prerit Pramod and Rakib Islam, Nexteer Automotive, United States

3:40PM  Resilient Two Dimensional Redundancy based Fault-tolerant Controller Array for Modular Multi-level Converters [#1298]
Ali Azidehak, Rajat Agarwal, Nima Yousefpoor, Alexander G Dean and Subhashish Bhattacharya, NORTH CAROLINA STATE UNIVERSITY, United States; North Carolina State University, United States
3:40PM Simultaneous Optimization of Hub-Mounted Switched Reluctance Motor Geometry and Firing Angles [#1128]
Bahareh Anvari and Hamid A. Toliyat, Texas A and M university, United States; Texas A and M University, United States

Induction Machines II
Monday, October 2, 2:00PM-4:05PM, Room: 264, Chair: Renato Lyra, Nicola Bianchi

2:00PM Induction Machine Efficiency Measurement Using a Variable Frequency Drive Source [#1000]
Emmanuel Agamloh, Andrea Cavagnino and Silvio Vaschetto, Advanced Energy, United States; Politecnico di Torino, Italy

2:25PM Frequency, Load, and Flux Impacts on Induction Machine Copper and Core Losses in the qd0-Frame [#1314]
Liu Yiqi and Bazzi Ali, University of Connecticut, United States

2:50PM Induction Machine Rapid Performance Tests [#732]
Maher Al-Badri, Pragasen Pillay and Pierre Angers, Concordia University, Canada; Hydro-Quebec, Canada

Medium Voltage Drives and High Power Drives
Monday, October 2, 2:00PM-4:05PM, Room: 260/61, Chair: Navid Zargari, Shih-Chin Yang

2:00PM Assessment of Medium Voltage SiC MOSFET Advantages in Medium Voltage Drive Application [#1081]
Hanning Tang and Alex Huang, North Carolina State University, United States

2:25PM High-Speed Medium Voltage(MV) Drive Applications Enabled by Series Connection of 1.7 kV SiC MOSFET devices [#1351]
Kasunaidu Vechalapu, Samir Hazra, Utkarsh Raheja, Negi Abhay and Subhashish Bhattacharya, NORTH CAROLINA STATE UNIVERSITY, United States; North Carolina State University, United States

2:50PM Integrated Motor Drive Design for Weight Optimization [#1033]
Benjamin Cheong, Michael Galea, Paolo Giangrande, Pericle Zanchetta and Patrick Wheeler, University of Nottingham, United Kingdom

3:15PM Noninvasive Efficiency Estimation for Large Power and High Voltage Induction Motors [#576]
Zhao Haisen, Li Pengyu, Chen Geng, Wang Yilong, Zhan Yang, Xu Guorui and Liu Xiaofang, North China Electric Power University, China

3:40PM Separation of Slip- and High-Frequency Flux Densities and its Application in Rotor Iron Loss Fine Analysis of Induction Motors [#742]
Zhao Haisen, Li Bing, Wang Yilong, Zhan Yang, Xu Guorui and Zhang Dongdong, North China Electric Power University, China; Xian Jiaotong University, China

Sensorless Drives I
Monday, October 2, 2:00PM-4:05PM, Room: 262, Chair: Fernando Briz, Abraham Gebregergis

2:00PM Sensorless Speed Measurement for n-Phase Induction Machines Under Open-Phase Fault by Means of Rotor Slot Harmonics [#1228]
Alejandro G. Yepes, Jesus Doval-Gandoy, Fernando Baneira and Hamid Toliyat, University of Vigo, Spain; Texas A and M, United States

Chae-Eun Hwang, Younggi Lee and Seung-Ki Sul, Seoul National University, Korea (South)
2:50PM  
Enhanced Methodology for Injection-Based Real-Time Parameter Estimation to Improve Back-EMF Self-Sensing in Induction Machine Deadbeat-Direct Torque and Flux Control Drives [881]
Kang Wang, Noor Baloch and Robert Lorenz, University of Wisconsin - Madison, United States; Yaskawa Electric Corporation, Japan

3:15PM  
Compensation of Position Estimation Error for Precise Position-Sensorless Control of IPMSM Based on High-Frequency Pulsating Voltage Injection [542]
Younggi Lee, Yong-Cheol Kwon, Seung-Ki Sul, Noor Aamir Baloch and Shinya Morimoto, Seoul National University, Korea (South); Yaskawa Electric Corporation, Japan

Magnetics II
Monday, October 2, 2:00PM-4:05PM, Room: 206, Chair: Shashank Krishnamurthy, Shuo Wang

2:00PM  
A High-Reliable Magnetic Design Method for Three-Phase Coupled Inductor Used in Interleaved Multi-Phase Boost Converter [902]
Jun Imaoka, Kenkichiro Okamoto, Shota Kimura, Mostafa Noah, Masayoshi Yamamoto and Masahito Shoyama, Kyushu University, Japan; Shimane University, Japan

3:00PM  
Variable Inductor Modeling Revisited: The Analytical Approach [797]
J. Marcos Alonso, Marina Perdigao, Marco A. Dalla Costa, Shu Zhang and Yijie Wang, University of Oviedo, Spain; Inst. Telec./Inst. Sup. Eng., Coimbra, Portugal; Fed. Univ. of Santa Maria, GEDRE, Brazil; Harbin Institute of Technology, China

2:50PM  
Influence of switching frequency and saturation of the magnetic material on the volume of common-mode inductors used in power converter EMI filters [1161]
Bilel Zaidi, Arnaud Videt and Nadir Idir, L2EP, France

3:15PM  
Winding and Air Gap Configurations for Power Inductors to Reduce Near Magnetic Field Emission [903]
Huan Zhang, Shuo Wang and Qinghai Wang, University of Florida, United States; Huawei Technologies co., Ltd, China

SiC Converter Applications
Monday, October 2, 2:00PM-4:05PM, Room: 207/208, Chair: Jean-Luc Schanen, Yuxiang Shi

2:00PM  
Impact of next-generation 1700V SiC MOSFETs in a 125kW PV converter [159]
Jeffrey Casady, Fenton Rees, Brett Hull, Zhang Jon, John Palmour and Scott Allen, Wolfspeed, a Cree Company, United States; F.L. Rees and Associates, LLC, United States

3:00PM  
High Efficiency Power Converter with SiC Power MOSFETs for Pulsed Power Application [1284]
Ruxi Wang, Juan Sabate, Xiaohu Liu and Krishna Mainali, GE Global Research Center, United States

2:25PM  
Operation of Planar and Trench SiC MOSFETs in a 10kW DC/DC-Converter Analyzing the Impact of the Body Diode [945]
Abdullah Eial Awwad and Sibylle Dieckerhoff, Technical University of Berlin, Germany

3:15PM  
Influence of SiC technology in a Railway Traction DC-DC Converter Design Evolution [920]
Alejandro Rujas, Victor M. Lopez-Martin, Asier Garcia, Alona Berasategui and Txomin Nieva, IK4-Ikerlan. Power Electronics Area, Spain; CAF Power and Automation, Spain
Design of a 250 kW 1200 V SiC MOSFET Based Three Phase Inverter by Considering Subsystem Level design Optimization Approach [#524]
Ajith Wijenayake, Kraig Olejniczak, Brandon Passmore, Feurtado Matthew, Simco David, McNutt Ty, Alex Lostetter, Daniel Martin and Stephen Minden, Wolfspeed- A Cree Company, United States

Wireless Power Transfer I
Monday, October 2, 2:00PM-4:05PM, Room: 203, Chair: Huang-jen Chiu, Yaow-Ming Chen

Tunable Impedance Matching Network based on Phase-Switched Impedance Modulation [#824]
Alexander Jurkov, Aaron Radomski and David Perreault, Massachusetts Institute of Technology, United States; MKS Instruments Inc., United States

Design 13.56MHz 10 kW resonant inverter using GaN HEM for wireless power transfer systems [#751]
Kien Trung Nguyen and Kan Akatsu, Shibaura Institute of Technology, Japan

Yongbin Jiang, Junwen Liu, Xiufang Hu, Laili Wang, Yue Wang and Gaidi Ning, Xi an Jiaotong University, China

An Online LiFePO4 Battery Impedance Estimation Method for Grid-tied Residential Energy Storage Systems [#281]
Andres Salazar Llinas, Carlos Restrepo, Javad Mohammadpour, Antonio Ginart and Yabiao Gao, Sonnen Inc, United States; University of Georgia, United States; Smart Wires, Inc, United States; sonnen Inc, United States

An Improved Voltage Balance Strategy for Renewable Generation Energy Storage System [#613]
Muxin Han, Fu Jiang, Heng Li, Rong Zhou, Zhiwu Huang and Jun Peng, Central South University, China

A decentralized SOC balancing method in cascaded H-bridge based storage modules [#1199]
Guangze Shi, Yao Sun, Wenbin Yuan, Hua Han, Mei Su and Xiaochao Hou, Central South University, China

High-Power-Transfer-Density Capacitive Wireless Power Transfer System for Electric Vehicle Charging [#1204]
Sreyam Sinha, Brandon Regensburger, Kate Doubleday, Ashish Kumar, Saad Pervaiz and Khurram Afridi, University of Colorado Boulder, United States

Modeling and Analysis of Wireless Power Transfer System with Constant-Voltage Source and Constant-Current Load [#27]
Yiming Zhang, Zhengming Zhao and Ye Jiang, Missouri University of Science and Technology, United States; Tsinghua University, China; Tsinghua university, China

Cloudbased Battery Condition Monitoring Platform for Large-Scale Lithium-ion Battery Energy Storage Systems using Internet-of-Things (IoT) [#1341]
Amit Adhikaree, Taesic Kim, Jitendra Vagdoda, Ason Ochoa, Patrick Hernandez and Young Lee, Texas A and M University-Kingsville, United States

Environmental Tests and Evaluations of Variable 18650 Cylindrical Li-Ion Cells for Space Cells Qualification Establishment [#1488]
Jonghoon Kim, Pyeong-You Lee, Chang-O Youn, Woonki Na and Minho Jang, Chungnam National University, Korea, Republic of; California State University, Fresno, United States; Korea Aerospace Research Institute, Korea, Republic of

A Hybrid Vanadium Redox/Lithium-Ion Energy Storage System for Off-grid Renewable Power [#362]
Leong Kit Gan, Jorn Reniers and David Howey, University of Oxford, United Kingdom
P107  Electrical Circuit Modeling of Lithium Sulfur Batteries during Discharging State [#850]
Stroe Daniel-Ioan, Knap Vaclav, Swierzynski Maciej and Schaltz Erik, Aalborg University, Denmark

P108  Supercapacitor to Provide Ancillary Services to the Grid [#493]
Vahan Gevorgian, Eduard Muljadi, Yusheng Luo, Manish Mohanpurkar, Rob Hovsapian and Vladimir Koritarov, National Renewable Energy Laboratory, United States; Idaho National Laboratory, United States; Argonne National Laboratory, United States

P109  Cascaded Multilevel qZSI Powered Single Phase Induction Motor For Water Pump Application [#1412]
Syed Rahman, Mohammad Meraj, Atif Iqbal, Mohd Tariq, Ali Iftikhar Maswood, Lazhar Ben-Brahim and Rashid Alammar, Dept. of Electrical Engineering, Qatar University, Qatar; Nanyang Technological University, Singapore, Singapore

P110  Design Recommendations for Energy Systems: a UK Domestic Study [#175]
Konstantina Panagiotou, Christian Klumpner, Mark Sumner and Pat Wheeler, The University of Nottingham, United Kingdom; The University of Nottingham, United Kingdom

Plenary Poster Session: AC/AC Converters
Monday, October 2, 5:00PM-7:30PM, Room: Expo, Chair: Yam Siwakoti, Luca Zarri

P301  Single-Phase Trans-Z-Source AC-AC Converter with Safe Commutation Strategy [#147]
Jixiao Nai, Liangzong He and Yuzi Lin, Xiamen University, China

P302  A Post-Fault Strategy to Control the AC-AC Modular Multilevel Converter under Input-Side Line-to-Ground Fault [#585]
Qichen Yang and Maryam Saeedifard, Georgia Institute of Technology, United States

P303  Single-Phase Universal Active Power Filter with Five-Leg AC/DC/AC Converter [#1098]
Phelipe Leal Serafim Rodrigues, Cursino Brandao Jacobina, Nayara Brandao de Freitas and Mauricio Beltrao de Rossiter Correa, DEE UFCG, Brazil

P304  Modulation and Control Strategy for a Single-Phase to Three-Phase Indirect Matrix Converter Drives [#264]
Yeongsu Bak, June-Seok Lee and Kyo-Beum Lee, Ajou University, Korea (South); Korea Railroad Research Institute, Korea (South)

P305  Switched capacitor impedance matrix converter [#983]
M Raghu Ram, Avneet K Chauhan and Santosh K Singh, Indian Institute of Technology BHU, India

P306  A Modular Three-Phase AC-AC Converter with Small Number of Film Capacitors for High-Voltage High-Current Applications [#1262]
Ehsan Afshari and Mahshid Amirabadi, Northeastern University, United States

P307  Control Scheme of the Modular Multilevel Matrix Converter using Space Vector Modulation for Wide Frequency Range Operation [#1259]
Yushi Miura, Takuya Fujikawa, Tomoaki Yoshida and Toshifumi Ise, Osaka University, Japan

P308  Investigations on a family of Switched Mode Power Converters based on Center-Point-Clamped AC-AC Direct Power Converter [#1482]
Pankaj Kumar Bhowmik and Madhav Manjrekar, University of North Carolina, Charlotte, United States

Plenary Poster Session: Reliability, Diagnostics and Fault Analysis of Power Electronics
Monday, October 2, 5:00PM-7:30PM, Room: Expo, Chair: Wei Qiao, Huai Wang

P501  Diagnosis of Open-Circuit Faults for Six-Level Hybrid Inverters [#611]
Quoc Anh Le, Ngoc Dat Dao and Dong-Choon Lee, Yeungnam University, Korea, Republic of

P502  Design of Power Converter in DFIG Wind Turbine with Enhanced System-level Reliability [#928]
Dao Zhou, Guanguan Zhang and Frede Blaabjerg, Aalborg University, Denmark; Central South University, China

P503  Comparative Study on the Crowbar Protection Topologies for a DFIG Wind Turbine [#420]
Andreas Giannakis, Efthymios Koroniotis and Athanasios Karlis, Democritus University of Thrace, Greece

P504  Photovoltaic Condition Monitoring Using Real-Time Adaptive Parameter Identification [#360]
Jason Poon, Palak Jain, Costas Spanos, Sanjib Panda and Seth Sanders, UC Berkeley, United States; National University of Singapore, Singapore
**P505** A Fast Fault Diagnosis Method for Submodule Failures in Modular Multilevel Converters [#371]
Kunshan Xu, Shaojun Xie, Ye Yan, Zhao Zhang, Binfeng Zhang and Qiang Qian, Nanjing University of aeronautics.astronautics., China

**P506** On Self-Healing of Grid-tied PV Inverters Considering Current Sensor Inaccuracy and Aging Degradation [#1243]
Mehrdad Biglarbegian, Hamidreza Jafarian and Babak Parkhidel, University of North Carolina at Charlotte, United States

**P507** Fault Tolerant Control Method for Interleaved DC-DC Converters under Open and Short Circuit Switch Faults [#1462]
Elham Pazouki, Jose Alexis De Abreu-Garcia and Yilmaz Sozer, University of Akron, United States

**P508** A general fault diagnosis strategy for modular dc-dc converter system [#777]
Hanyu Wang, Xuejun Pei, Yuhuan Wu and Yong Kang, Huazhong University of Science and Technology, China

**P509** Monitoring Transistor Degradation in Power Electronic Converters Using Saturation-Region Resistance [#75]
Lei Ren, Chunying Gong and Xin Chen, Nanjing University of Aeronautics and Astronautics, China

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**Plenary Poster Session: AC Electrical Machines: Innovative Design Studies**
Monday, October 2, 5:00PM-7:30PM, Room: Expo, Chair: Phillip Kollmeyer, Zi-Qiang Zhu

**P701** Principle and Characteristics of an Ultralightweight Electromagnetic Resonance Coupling Machine with a Cage Rotor [#193]
Kazuto Sakai, Kenta Takishima and Kazuki Nihei, Toyo University, Japan

**P702** Investigation on the frequency effects on iron losses in laminations [#475]
Omar Bottesi, Luigi Alberti and Sandro Calligaro, Free University of Bozen-Bolzano, Italy; University of Padova, Italy

**P703** The Effect of Modulating Ring Design on Induction Machine with Integrated Magnetic Gear Torque [#1489]
Dalíà Zaky Abdelhamid and Andrew Knight, University of Calgary, Canada

**P704** Practical Considerations on the Off-Line Measurements of PMSM and SyRM Inductances [#862]
Andrea Cavagnino, Silvio Vaschetto and Emmanuel Agamloh, Politecnico di Torino, Italy; Advanced Energy, United States

**P705** Decoupled Current Control with Novel Anti-Windup for PMSM Drives [#160]
Kahyun Lee, Jung-Ik Ha and Dwarakanath Simili, Seoul National University, Korea (South); General Motors, United States

**P706** Foil Conductor Concentrated Coil Windings for Modular Permanent Magnet AC Machines [#1329]
Michael Rios, Giri Venkataramanan and Annette Muetze, University of Wisconsin-Madison, United States; Graz University of Technology, Austria

**P707** Synchronous Machine Field Excitation Utilizing a Single Phase Matrix Converter Excited Rotary Transformer [#242]
Jianyang Liu and Thomas Lipo, University of Wisconsin Madison, United States

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**Plenary Poster Session: Axial and Transversal Flux Machines**
Monday, October 2, 5:00PM-7:30PM, Room: Expo, Chair: Akira Chiba, Ayman El-Refaie

**P901** Mechanical and Thermal Performance of Transverse Flux Machines [#1467]
Iftekhar Hasan, Tausif Husain, Yilmaz Sozer, Iqbal Husain and Eduard Muljadi, University of Akron, United States; North Carolina State University, United States; National Renewable Energy Laboratory, United States

**P902** Maximum torque output Control of Hybrid Permanent Magnet Axial Field Flux-switching Memory Machine [#277]
GongDe Yang, Mingyao Lin, Nian Li, Xinghe Fu, Kai Liu and Guangfu Ning, Southeast university, China; Southeast University, China
P903  Design Considerations and Performance Improvement of a Dual-Stator PM Vernier Motor with Axial-Flux Loop [#972]
Fei Zhao, Liyi Li, Chunhua Liu and Byung-il Kwon, Harbin Institute of Technology, Shenzhen, China; Harbin Institute of Technology, China; City University of Hong Kong, Hong Kong; Hanyang University, Korea (South)

P904  Design, Analysis and Prototyping of a Flux Switching Transverse Flux Machine with Ferrite Magnets [#1224]
Zhao Wan and Iqbal Husain, North Carolina State University, United States

P905  MAGNUS - An Ultra-high Specific Torque PM Axial-Flux YASA Type Motor with Flux Focusing and Modulation [#1461]
Vandana Rallabandi, Narges Taran, Dan Ionel and Ion Boldea, University of Kentucky, Lexington, KY, United States; Universitatea Politehnica Timisoara, Romania

Plenary Poster Session: Utility Converters and Power Electronics Transformers
Monday, October 2, 5:00PM-7:30PM, Room: Expo, Chair: Fred Wang, Jinwei He

P1101  A Novel Current Control Strategy for a Back-to-Back HVDC Applications under Unbalanced Operation Conditions [#906]
Mohammed Alharbi, Faris Alfaris and Subhashish Bhattacharya, North Carolina State University, United States

P1102  Voltage Balancing of Modular Smart Transformers Based on Dual Active Bridges [#860]
Sante Pugliese, Markus Andresen, Rosa Mastromauro, Giampaolo Buticchi, Silvio Stasi and Marco Liserre, Polytechnic of Bari, Italy; Kiel University, Germany; University of Florence, Italy

P1103  Three-Port Energy Router for Universal and Flexible Power Management in Future Smart Distribution Grids [#996]
Luca Tarisciotti, Sabino Pipolo, Stefano Bifaretti and Pericle Zanchetta, University of Nottingham, United Kingdom; University of Rome Tor Vergata, Italy

P1104  Design and Implementation of a Series Resonant Solid State Transformer [#699]
Mohammad Rashidi, Mohammad Sabbah, Abedalsalam Bani-Ahmed, Adel Nasiri and Mohammad Hasan Balali, UWMilwaukee, United States

P1105  Design and Implementation of a 7.2kV Single Stage AC-AC Solid State Transformer Based on Current Source Series Resonant Converter and 15 kV SiC MOSFET [#991]
Qianlai Zhu, Li Wang, Dong Chen, Liqi Zhang and Alex Q. Huang, North Carolina State University, United States

P1106  Research on an Improved Hybrid Unified Power Flow Controller [#327]
Baichao Chen, Wenli Fei, Jiaxin Yuan and Cuihua Tian, Wuhan University, China

Plenary Poster Session: Motor Drives I
Monday, October 2, 5:00PM-7:30PM, Room: Expo, Chair: Fabio Giulii Capponi, Radu Bojoi

P1301  Two-Phase Open-End Winding Induction Motor Drive Using Improved Current Source Inverter [#1420]
Louelsson Costa, Montie Vitorino, Mauricio Correa, Edgar Braga and Darlan Fernandes, Federal University of Campina Grande, Brazil; Federal University of Paraiba, Brazil

P1302  An Extended Analytical Approach for Obtaining the Steady-state Periodic Solutions of SPWM Single-Phase Inverters [#859]
Xu Cheng, Yanfeng Chen, Xi Chen, Bo Zhang and Dongyuan Qiu, South China University of Technology, China
**P1303**  *Reliability Analysis and Life Testing of Semiconductor Devices for In-wheel Motor Drive System* [65]
Chao Ji, Geoffrey Owen, Simon T. M. Brockway and Chris Hilton, Protean Electric, United Kingdom

**P1304**  *Comparison of Operating Modes for a Brushless Doubly Fed Reluctance Motor Drive* [116]
Ronald S. Rebeiro and Andrew M. Knight, University of Calgary, Canada

**P1305**  *Sensorless Direct Torque Control of Induction Motors with Fault Tolerant Extended Kalman Filtering* [1258]
Xin Wang, Southern Illinois University Edwardsville, United States

**P1306**  *A Modulated Model Predictive Control Scheme for the Brushless Doubly-Fed Induction Machine* [290]
Xuan Li, Tao Peng, Hanbing Dan, Guanguan Zhang, Weiyi Tang and Pat Wheeler, Central South University, China; The University of Nottingham, United Kingdom

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**Plenary Poster Session: Switching Devices I**
Monday, October 2, 5:00PM-7:30PM, Room: Expo, Chair: Tanya Gachovska, Jun Wang

**P1501**  *Comparative Assessment of 3.3kV/400A SiC MOSFET and Si IGBT Power Modules* [7]
Nawaz Muhammad, Ionita Claudiu, Ilves Kalle and Iannuzzo Francesco, ABB Corporate Research, Sweden; Aalborg University, Department of Energy, Denmark

**P1502**  *Characterization and Performance Evaluation of State-of-the-Art 3.3 kV 30 A Full-SiC MOSFETs* [72]
Alinaghi Marzoughi, Rolando Burgos and Dushan Boroyevich, Virginia Tech, United States

**P1503**  *Research on an improved DC-side snubber for suppressing the turn-off overvoltage and oscillation in high speed SiC MOSFET application* [332]
Mei Liang, Yan Li, Qian Chen, Yi Lu, Haihong Yu, Trillion Q. Zheng, Haobo Guo and Fangwei Zhao, Beijing Jiaotong University, China; Beijing Jiaotong University, China; State Grid Zhejiang Electric Power Corporation, China

**P1504**  *A Modified Equivalent Circuit Based Electro-Thermal Model for Integrated POL Power Modules* [422]
Wenbo Liu, Laili Wang, Sam Webb, Yan-Fei Liu and Doug Malcolm, Queen’s University, Canada; Xi’an Jiaotong University, China; Sumida Technologies Inc., Canada

**P1505**  *Investigation of Cascode Structure GaN devices in ZCS Region of LLC Resonant Converter* [883]
Junlin Xiang, Xiaoyong Ren, Yakun Wang and Yue Zhang, Nanjing University of AeronauticsAndAstronautics, China; State Grid Nanjing Power Supply Company, China

**P1506**  *Design of High-Speed H-bridge Converter Using Discrete SiC MOSFETs for Solid-State Transformer Applications* [1025]
Dong Dong, Mohammed Agamy, Gary Mandrusiak and Qin Chen, GE Global Research, United States; GE global research, United States

**P1507**  *Role of Parasitic Capacitances in Power MOSFET Turn-on Switching Speed Limits: a SiC Case Study* [1059]
Davide Cittanti, Francesco Iannuzzo, Eckart Hoene and Kirill Klein, Politecnico di Torino, Italy; Aalborg University, Denmark; Fraunhofer IZM, Germany

**P1508**  *Analysis of False Turn-On Phenomenon of GaN HEMT with Parasitic Inductances for Propose Novel Design Method Focusing on Peak Gate Voltage* [1207]
Ishiwaki Seiya, Iwaki Toshihiro, Sugihara Yusuke, Nanamori Kimihiro and Yamamoto Masayoshi, Shimane University, Japan; Nagoya University, Japan

**P1509**  *Gate Driver Design Considerations for Silicon Carbide MOSFETs Including Series Connected Devices* [1500]
Samir Hazra, Kasunaidu Vechalapu, Sachin Madhusoodhanan, Subhashish Bhattacharya and Kamalesh Hatua, North Carolina State University, United States; NORTH CAROLINA STATE UNIVERSITY, United States; Indian Institute of Technology Madras, United States

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**Plenary Poster Session: Electric Vehicle Energy Management**
Monday, October 2, 5:00PM-7:30PM, Room: Expo, Chair: Kevin (Hua) Bai, Anand Sathyan
P1701 A Novel Dynamic Demand Control of an Electric Vehicle integrated in a Solar Nanogrid with Energy Storage [#253]
Adamantios Bampoulas and Athanasios Karlis, Democritus University of Thrace, Greece

P1702 Stackelberg Game Based Energy and Reserve Management for a Fast Electric Vehicle Charging Station [#337]
Tianyang Zhao, Xuewei Pan, Shuhan Yao and Peng Wang, Nanyang Technology University, Singapore; Harbin Institute of Technology (Shen Zhen), China

P1703 Multi-time Scale Forecast for Schedulable Capacity of EVs based on Big Data and Machine Learning [#399]
Meiqin Mao, Yang Wang, You Yue and Liuchen Chang, Hefei University of Technology, China

P1704 Three-port Bidirectional CLLC Resonant Converter Based Onboard Charger for PEV Hybrid Energy Management System [#548]
Xiaoying Lu and Haoyu Wang, ShanghaiTech University, China

P1705 V2G Bi-directional Battery Charger with Flexible AC/DC Converter [#898]
Yaguang Liu, Wenxing Zhong, Haoyuan Weng, Zheqing Li, Min Chen, Changsheng Hu and Dehong Xu, Zhejiang University, China

Plenary Poster Session: Sensing and Control for Power Converters
Monday, October 2, 5:00PM-7:30PM, Room: Expo, Chair: Tsai-Fu Wu, Amir Yaznadi

P1901 An Experimental Method for Extracting Stray Inductance of Bus Bars without High Bandwidth Current Measurement [#1303]
Ye Jiang, Liqiang Yuan, Zhengming Zhao, Haitao Zhang, Rong Yi, Yali Ding and Wei Gu, Tsinghua university, China; Tsinghu University, China; Rongxin Huiko Electric Technology Co.,Ltd., China; Anshan Information Engineering School, China

P1902 Comparative Evaluations on Three High Resolution Sampling Schemes for Digital Boundary Control [#983]
He Yuanbin, Lai Chun-Tak, Chung Shu-hung and Wu Weimin, City University of Hong Kong. Hong Kong; Shanghai Maritime University, China

P1903 Closed-loop Control of a Capacitive-Link Universal Converter with Minimum Number of Voltage Sensors [#1242]
Masih Khodabandeh and Mahshid Amirabadi, Northeastern University, United States

P1904 Wavelet-based prognostic-oriented temperature sensing with sigma-delta ADCs in power applications [#483]
Giorgio Pietrini, Alessandro Soldati, Davide Barater and Carlo Concari, University of Parma, Italy

Plenary Poster Session: Modelling and Control of MMC
Monday, October 2, 5:00PM-7:30PM, Room: Expo, Chair: Yongdong Li, Tzung-Lin Lee

P2101 Delta-Sigma Modulators for Modular Multilevel Converters [#1426]
Hao Jiang and Giri Venkataramanan, University of Wisconsin - Madison, United States

P2102 Hybrid Asymmetric Cascaded Multilevel Inverters Based on Three- and Nine-Level H-Bridges [#829]
Filipe Bahia, Cursino Jacobina, Nady Rocha, Italo Silva and Reuben Sousa, DEE UFCG, Brazil; DEE UFPE, Brazil; UFRPE, Brazil

P2103 Comparative Study of PES Net and SyCCo Bus: Communication Protocols for Modular Multilevel Converter [#1119]
Hao Tu and Srdjan Lukic, North Carolina State University, United States

P2104 Asymmetric Cascaded H-Bridge Topology with 25-Level Output Voltage Based on Modular Multilevel DSCC Inverters [#830]
Filipe Bahia, Cursino Jacobina, Nady Rocha, Italo Silva and Reuben Sousa, DEE UFCG, Brazil; DEE UFPE, Brazil; UFRPE, Brazil

P2105 System-on-Chip Implementation of Embedded Real-Time Simulator for Modular Multilevel Converters [#993]
Mattia Ricco, Marius Gheorghe, Laszlo Mathe and Remus Teodorescu, Aalborg University, Denmark
**A Novel Frequency Domain Control Method for Modular Multilevel Converters Under Non-sinusoidal Supply Conditions** [#245]
Rostan Rodrigues, Herb Ginn and Jun Li, ABB Inc, United States; University of South Carolina, Columbia, United States

**Modeling and Design of the Modular Multilevel Converter with Parametric and Model-Form Uncertainty Quantification** [#1375]
Niloofar Rashidi Mehrabadi, Rolando Burgos, Christopher Roy and Dushan Boroyevich, CPES - Virginia Tech, United States; Virginia Tech, United States

**Variable Structure Robust Voltage Regulator Design for Microgrid Master-Slave Control** [#666]
Tong Yao and Raja Ayyanar, Arizona State University, United States

**Stability Improvement of Current Control by Voltage Feedforward considering a Large Synchronous Inductance of Diesel Generator** [#202]
Jongmin Jo and Hanju Cha, Chungnam National University, Korea (South)

**Method to Reduce the Circulating Current of Paralleled Inverters with Different Capacities** [#406]
Xiang Li, Jiawei Chen and Jie Chen, Chongqing University, China; Nanjing University of Aero. and Astro., China

**Novel Hybrid Energy Storage Control for a Single Phase Energy Management System in a Remote Islanded Microgrid** [#825]
Giovanna Oriti, Alexander Julian, Norma Anglani and Gabriel Hernandez, Naval Postgraduate School, United States; Consultant, United States; University of Pavia, Italy; United States Navy, United States

**Dynamic Composite Load Signature Detection and Classification using Supervised Learning over Disturbance Data** [#1241]
Kelly Tray, Phyllicia Cicilio, Ted Brekken and Eduardo Cotilla-Sanchez, Oregon State University, United States

**A Highly Reconfigurable System Emulator for testing AC Microgrids** [#716]
Vijay A. S., Suryanarayana Doola and Mukul Chandorkar, Indian Institute of Technology Bombay, India

**An Unsupervised Approach for Disaggregating Major Loads in Small Commercial Buildings** [#1260]
Saman Mostafavi, John Troxler and Robert Cox, UNC Charlotte, United States

**Coordinate Control of Distributed Generation and Power Electronics Loads in Microgrid** [#546]
Guangqian Ding, Song Zhang, Jing Shan, Feng Gao and Xin Gu, University of Jinan, China; State Grid of China Technology College, China; State Grid Zaozhuang Power Supply Company, China; Shandong University, China

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**Harmonic Compensation Techniques for Microgrids**

**A Unified Selective Harmonic Compensation Strategy using DG-Interfacing Inverter in both Grid-Connected and Islanded Microgrid** [#472]
Qicheng Huang and Rajashekara Kaushik, University of Houston, United States

**Active Suppression of Photovoltaic System Related Harmonics in a DC Micro Grid** [#506]
Rabab Alsharif, Milijana Odavic and Kais Atallah, The University of Sheffield, United Kingdom
9:20AM A New Harmonic Current Sharing Control Strategy for Parallel-Connected Inverters [#885]
Yajuan Guan, Wei Feng, Josep M. Guerrero, Mehdi Savaghebi and Juan C. Vasquez, Aalborg University, Denmark; Tsinghua University, China

9:45AM Harmonic Current Control for LCL-Filtered VSCs Connected to Ultra-Weak Grids [#1391]
Xiongfeng Wang, Dongsheng Yang and Frede Blaabjerg, Aalborg University, Denmark

Power Converters for HVDC Grids
Tuesday, October 3, 8:30AM-10:10AM, Room: 203, Chair: Dianguo Xu, Brandon Grainger

8:30AM Asymmetric Mixed Modular Multilevel Converter Topology in Bipolar HVDC Transmission Systems [#125]
Jae-Jung Jung, Joon-Hee Lee and Seung-Ki Sul, Seoul National University, Korea (South)

9:20AM Efficient Modeling of Hybrid MMCs for HVDC Systems [#566]
Lei Zhang, Jiangchao Qin, Di Shi and Zhiwei Wang, Arizona State University, United States; GEIRI North America, United States

8:55AM Dynamic Performance and Fault-Tolerant Capability of a TLC-MMC Hybrid DC-DC Converter for Interconnection of MVDC and HVDC Grids [#857]
Shenghui Cui, Nils Soltan and Rik W. De Doncker, RWTH Aachen University, Germany

9:45AM A New Hybrid Modular Multilevel Converter With Increased Output Voltage Levels [#1043]
Mahendra B. Ghat, Anshuman Shukla and Ebin Cherian Mathew, Indian Institute of Technology Bombay, India; Power Grid Corporation of India Ltd, India

Solid State Transformers
Tuesday, October 3, 8:30AM-10:10AM, Room: 237/38, Chair: Alex Huang, Rolando Burgos

8:30AM A Switched-Winding Transformer with Low Quiescent Loss to Meet the Level VI Efficiency Standard at High Power Density [#510]
Weston Braun, Minjie Chen and David Perreault, Massachusetts Institute of Technology, United States; Princeton University, United States

9:20AM Comparison of Voltage Control Methods of CHB Converters for Power Routing in Smart Transformer [#1437]
Vivek Raveendran, Alessandro Mercante, Giampaolo Buticchi and Marco Liserre, University of Kiel, Germany; Waertslae Italia SpA, Italy

8:55AM A Winding Method of High Frequency High Voltage Transformer [#1280]
Ji Junpeng, Zhang Xingxia, Chen Wenjie, An Shaoliang and Yang Xu, Xi'an University of Technology, China; Xi'an Jiaotong University, China

9:45AM Generalized Average Modeling of DC Subsystem in Solid State Transformers [#629]
Jacob Mueller and Jonathan Kimball, Missouri University of Science and Technology, United States

Power Conversion for Solar Photovoltaic Systems III
Tuesday, October 3, 8:30AM-10:10AM, Room: 236, Chair: Wuhua Li, Rajeev Kumar Singh

8:30AM A Distributed Active and Reactive Power Control Strategy for Balancing Grid-tied Cascaded H-bridge PV Inverter System [#1167]
Hamidreza Jafarian, Namwon Kim and Babak Parkhidel, University of North Carolina at Charlotte, United States

9:20AM DC link side current control of inverters based on integer programming model predictive control [#785]
Omid Salari, Adel Nazemi, Alireza Bakhshai, Keyvan Hashtrudi Zaad and Praveen Jain, Queens University, Canada; K.N.Toosi University of Technology, Iran

8:55AM Advanced photovoltaic inverter controls development and validation in a controller-hardware-in-the-loop testbed [#874]
Kumaraguru Prabakar, Mariko Shirazi, Akanksha Singh and Sudipta Chakraborty, Research engineer, United States; Post doctoral fellow, United States; Senior engineer, United States

9:45AM GaN-based High Gain Soft Switching Coupled-Inductor Boost Converter [#880]
Jinia Roy, Yinglai Xia and Raja Ayyanar, Arizona State University, United States
Multi-Phase AC/DC Converters
Tuesday, October 3, 8:30AM-10:10AM, Room: 204, Chair: Fernando Briz, Norma Anglani

8:30AM Soft-Switching Parameter Design for an Isolated Three-Phase AC/DC Converter [#753]
Kazuma Suzuki, Wataru Kitagawa and Takaharu Takeshita, Nagoya Institute of Technology, Japan

8:55AM Dynamic and Control Analysis of Modular Multi-Parallel Rectifiers (MMR) [#484]
Firuz Zare, Arindam Ghosh, Pooya Davari and Frede Blaabjerg, The university of Queensland, Australia; Curtin University, Australia; Aalborg University, Denmark

DC/DC Converters II
Tuesday, October 3, 8:30AM-10:10AM, Room: 201, Chair: Dushan Borojevic, Grant Pitel

8:30AM A High Gain Non-isolated Soft-switching Bidirectional DC-DC Converter with PPS Control [#122]
Hyeonju Jeong, Minho Kwon and Sewan Choi, Seoultech, Korea (South)

8:55AM An Investigation on Zero-Voltage-Switching Condition in Synchronous-Conduction-Mode Buck Converter [#1233]
Chih-Shen Yeh, Xiaonian Zhao and Jih-Sheng Lai, Virginia Tech, United States

Single-Phase Grid Connected Converters
Tuesday, October 3, 8:30AM-10:10AM, Room: 230/31, Chair: Diego G. Lamar, Andrea Formentini

8:30AM Trapezium Current Mode (TPCM) Boundary Operation for Single Phase Grid-tied Inverter [#726]
JianTao Zhang, Rene Alexander Barrera Cardenas, Takanori Isobe and Hiroshi Tadano, University of Tsukuba, Japan

8:55AM Leakage Current Suppression and Ripple Power Reduction for Transformer-less Single-Phase Photovoltaic Inverters [#929]
Xin Li, Mei Su, Yonglu Liu, Zhongting Tang, Qi Zhu and Sun Yao, Central South University, China

Sensorless Methods and State and Parameter Estimation
Tuesday, October 3, 8:30AM-10:10AM, Room: 205, Chair: Yongsug Su, Maurizio Cirrincione

9:20AM A Reconfigurable Three- and Single-Phase AC/DC Non-Isolated Bi-directional Converter for Multiple Worldwide Voltages [#531]
Daniel Opila, Eun Oh, Keith Kintzley and Jedediah Lomax, United States Naval Academy, United States

9:45AM High-Frequency Link AC/DC Converter Using Matrix Converter with Soft-Switching Technique [#1193]
Yuto Matsui, Kazuma Suzuki and Takaharu Takeshita, Nagoya Institute of Technology, Japan

9:20AM Single-Wing Resonant Multilevel Converter Featuring Reduced Number of Resonant Inductors [#588]
Boris Curuvija, Yanchao Li, Xiaofeng Lyu and Dong Cao, North Dakota State University, United States

9:45AM Dual Active Bridge with Triple Phase Shift by obtaining Soft Switching in All Operation Range [#1149]
Carlos Calderon, Andres Barrado, Alba Rodriguez, Antonio Lazaro, Cristina Fernandez and Pablo Zumel, Universidad Carlos III de Madrid, Spain

Satoshi Nagai, Keisuke Kusaka and Jun-ichi Itoh, Nagaoka University of Technology, Japan; Nagaoka university of technology, Japan

9:45AM DC to Single-phase AC Grid-Connected Inverter using Back Type Active Power Decoupling Circuit without additional magnetic component [#791]
Jun-ichi Itoh, Tomokazu Sakuraba, Hiroki Watanabe and Nagisa Takaoka, Nagaoka university of technology, Japan
8:30AM  **Online Equivalent Series Resistance Estimation Method for Condition Monitoring of DC-Link Capacitors** [#482]
Prasanth Sundararajan, Mohamed Sathik Mohamed Halick, Sasonkgo Firman, Rejeki Simanjorang, Chuan Seng Tan and Tariq Mohd, Rolls-Royce NTU Corporate Lab, Singapore; Applied Technology Group, Rolls-Royce, Singapore

8:55AM  **A Novel Current Estimation Technique for Digital Controlled Switching Converters Operating in CCM and DCM** [#1266]
Rajat Channappanavar and Santanu Mishra, Indian Institute of Technology Kanpur, India

**Modeling and Control of Modular Multilevel Converter**
Tuesday, October 3, 8:30AM-10:10AM, Room: 200, Chair: Hirofumi Akagi, Navid Zargari

8:30AM  **Optimal Submodule Capacitor Sizing for Modular Multilevel Converters (MMCs) with Common Mode Voltage Injection and Circulating Current Control** [#1234]
Ziwei Ke, Jianyu Pan, Julia Zhang, Longya Xu, Karun Potty, William Perdikakis, Arvind Shanmuganathan, Fang Luo, Jin Wang and Muneer Al Sabbagh, The Ohio State University, United States

8:55AM  **A New Insertion Index Selection Method to Control Modular Multilevel Converters** [#1405]
Mohammad Sleiman, Luc-Andre Gregoire, Handy Fortin-Blanchette, Hadi Kanaan and Kamal Al-Haddad, Ecole de Technologie Superieure, Montreal, Quebec, Canada; OPAL-RT, Canada; ESIB-USJ, Lebanon

**Large Synchronous Machines**
Tuesday, October 3, 8:30AM-10:10AM, Room: 263, Chair: Ayman El-Refaie, Mohammad Islam

8:30AM  **Design of Brushless, Self-Excited Synchronous Field-Winding Machine Using Combined Finite Element/Rectifier Model** [#597]
Abdi Zeynu and Heath Hofmann, University of Michigan, United States

8:55AM  **Analysis of Magnetic Forces and Vibration in a Converter-Fed Synchronous Hydrogenerator** [#803]
Mostafa Valavi, Arne Nyrsveen, Roy Nilsen, Jean Le Besnerais and Emile Devillers, Norwegian University of Science and Technology, Norway; EOMYS Engineering, France

**Synchronous Reluctance Machines I**
Tuesday, October 3, 8:30AM-10:10AM, Room: 264, Chair: Robert D. Lorenz, Dan Ionel

9:45AM  **A Novel Approach to the Grid Inductance Estimation based on Second Order Generalized Integrators** [#1108]
Javier Moriano, Victor Bermejo, Mario Rizo, Ana Rodriguez and Emilio Bueno, University of Alcala, Spain; Gamesa Electric, Spain

9:20AM  **Distributed Balancing Control for Modular Multilevel Series/Parallel Converter with Capability of Sensorless Operation** [#673]
Zhongxi Li, Ricardo Lizana, Angel Peterchev and Stefan Goetz, Duke University, United States

9:45AM  **Independent positive- and negative-sequence control for MMC-SAPF with unbalanced PCC voltage** [#625]
Chengjing Li, Ke Dai, Derong Lin, Chen Xu, Cai Chen and Ziwei Dai, Huazhong University of Science and Technology, China; Rensselaer Polytechnic Institute, United States

9:20AM  **A Modified Circulating Current Suppressing Strategy for Nearest Level Control Based Modular Multilevel Converter** [#192]
Xingxing Chen, Jinjun Liu, Shaodi Ouyang, Shuguang Song and Hongda Wu, Xi'an Jiaotong University, China

9:45AM  **Reducing MMF Harmonics and Core Loss Effect of Non-Overlap Winding Wound Rotor Synchronous Machine** [#1003]
Karen Garner and Maarten J. Kamper, Stellenbosch University, South Africa
8:30AM  The Loss of Self-Excitation Capability in Stand-Alone Synchronous Reluctance Generators [#344]
Maged Ibrahim and Pragasen Pillay, Concordia University, Canada

8:55AM  Reluctance Synchronous Wind Generator Design Optimisation in the Megawatt, Medium Speed Range [#458]
Eduan Howard and Maarten Kamper, Stellenbosch University, South Africa

9:20AM  Choice of Flux-Barrier Position in Synchronous Reluctance Machines [#232]
Giacomo Bacco and Nicola Bianchi, University of Padova, Italy

9:45AM  Investigation of Torque Production and Torque Ripple Reduction Method for 6-stator/7-rotor-pole Variable Flux Reluctance Machines [#50]
Beomseok Lee, Z.Q. Zhu and Liren Huang, University of Sheffield, United Kingdom

Sensorless Drives II
Tuesday, October 3, 8:30AM-10:10AM, Room: 260/61, Chair: Fabio Giulii Capponi, David Diaz Reigosa

8:30AM  Extending Low Speed Self-Sensing via Flux Tracking with Volt-Second Sensing [#252]
Yang Xu, Yukai Wang, Ryo Iida and Robert Lorenz, University of Wisconsin-Madison, United States; Toshiba Mitsubishi-Electric Industrial Sys. Corp, Japan

8:55AM  Pseudo-sensorless Control of PMSM with Linear Hall-effect Sensor [#528]
Seung-Tae Lee, Young-Kyoun Kim and Jin Hur, Incheon National University, Korea, Republic of; Osan University, Korea, Republic of

9:20AM  Current Derivative Estimation by using AMR Current sensor for Sensorless Control of PMSM Drive [#721]
Deqi Guan, Xiao Dan, Faz Rahman and Minh Bui, University of New South Wales, Australia

9:45AM  Sensorless Commissioning of Synchronous Reluctance Machines Augmented with High Frequency Voltage Injection [#955]
Paolo Pescetto and Gianmario Pellegrino, Politecnico di Torino, Italy

PM and IPM Motor Drives I
Tuesday, October 3, 8:30AM-10:10AM, Room: 262, Chair: Ramakrishnan Rajavenkitasubramony, Davide Barater

8:30AM  Self Adaption of MTPA Tracking Controller for IPMSM and SynRM Drives Based on On-Line Estimation of Loop Gain [#1086]
Nicola Bedetti, Sandro Calligaro and Roberto Petrella, Gefran s.p.a., Italy; Free University of Bozen, Italy; DPIA - University of Udine, Italy

8:55AM  Control Method of PMSM Driving System With Small DC-Link Capacitor [#82]
Xi Xiao, Shubei Zhang, Youshuang Ding and Yuyang Song, Tsinghua University, China

9:20AM  Enabling Driving Cycle Loss Reduction in Variable Flux PMSMs via Closed-loop Magnetization State Control [#262]
Apoorva Athavale, Daniel J. Erato and Robert D. Lorenz, University of Wisconsin-Madison, WEMPEC, United States

9:45AM  Analysis and Design of IPMSM Drive System Based on Visualization Technique in Discrete Time Domain [#64]
Haoyuan Li, Xing Zhang, Shuying Yang, Fei Li, Jian Yang and Pengpeng Cao, HeFei University of Technology, China; Hefei University of Technology, China

GaN Device and Gate Drive
Tuesday, October 3, 8:30AM-10:10AM, Room: 207/208, Chair: Daniel Costinett, Chenhao Nan

8:30AM  Active Gate Current Control for Non-Insulating-Gate WBG Device [#1282]
He Li, Yousef Abdullah, Chengcheng Yao, Xiaodan Wang and Jin Wang, The Ohio State University, United States

8:55AM  Crosstalk Suppression in a 650-V GaN FET Bridge-leg Converter using 6.7-GHz Active Gate Driver [#374]
Jianjing Wang, Dawei Liu, Harry C. P. Dymond, Jeremy J. O. Dalton and Bernard H. Stark, University of Bristol, Great Britain
Yoontaek Lee, Sangwoo Han and Jaeha Kim, Seoul National University, Korea (South); Hongik University, Korea (South)

9:45AM  Applications and Characterization of Four Quadrant GaN Switch [#1182]
Utkarsh Raheja, Ghanshyamsinh Gohil, Kijeon Han, Sayan Acharya, B. Jayant Baliga, Subhhash Bhattacharya, Rakesh Lal, Michelle Labreque and Peter Smith, North Carolina State University, United States; Transphorm Inc., United States

Wide Band Gap Device Reliability
Tuesday, October 3, 8:30AM-10:10AM, Room: 206, Chair: Jerry Hudgins, Tanya Gachovska

8:30AM  Ron Increase in GaN HEMTs - Temperature or Trapping Effects [#961]
Jan Boecker, Carsten Kuring, Marvin Tannhaeuser and Sibylle Dieckerhoff, Technische Universitaet Berlin, Germany; Siemens AG, Germany; Technische Universitaet Berlin, Germany

8:55AM  Short-circuit Ruggedness Assessment of a 1.2 kV/180 A SiC MOSFET Power Module [#6]
Nawaz Muhammad, Ionita Claudiu, Ilves Kalle and Iannuzzo Francesco, ABB Corporate Research, Sweden; Aalborg University, Department of Energy, Denmark

Special Session:

Tuesday, October 3, 10:30AM-1:00PM

Plenary Poster Session: Datacenters and Telecommunication Applications
Tuesday, October 3, 10:30AM-1:00PM, Room: Expo, Chair: Xinke Wu, Al-Thaddeus Avestruz

P2501  Single-Stage Isolated 48V-to-1.8V Point-of-Load Converter Utilizing an Impedance Control Network for Wide Input Range Operation [#519]
Ashish Kumar and Khurram Afridi, University of Colorado Boulder, United States

P2502  Startup and Control of High Efficiency 48/1V Sigma Converter [#1210]
Mohamed H. Ahmed, Chao Fei, Virginia Li, Fred C. Lee and Qiang Li, Virginia Polytechnic University, United States

P2503  A Hybrid AC and DC Distribution Architecture in Data Centers [#1353]
Alexander Barthelme, Xiwen Xu and Tiefu Zhao, University of North Carolina at Charlotte, United States

P2504  Unidirectional Single-Phase AC-DC-AC Three-level and Two-level Three-leg Converters [#534]
Nustenil Segundo de Moraes Lima Marinus, Cursino Brandao Jacobina, Nady Rocha and Reuben Palmer Rezende Sousa, Federal Institute of Ceara, Brazil; Federal University of Campina Grande, Brazil; Federal University of Paraiba, Brazil

P2505  Data Center Power Distribution System Reliability Analysis Tool based on Monte Carlo Next Event Simulation Method [#1082]
Yang Lei and Alex Huang, North Carolina State University, United States

P2506  Resonant Filter Based Buck Converters with Tunable Capacitor [#1300]
Ben Guo, Suman Dwari, Lee Yongduk, Andy Ritter, Craig Nies, Shashank Priya, Khai Ngo, Lujie Zhang, Rolando Burgos, Joseph Mantese and Brian McCabe, United Technologies Research Center, United States; AVX, United States; Virginia Tech, United States
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<td>An Enhanced Control Scheme for Uninterruptible Power Supply [#967]</td>
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<td>An accurate Modeling Method for Electric Parameters Prediction of Contactless Slip Ring [#985]</td>
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<td>High Power Medium Frequency Power Electronic Traction Transformer based on Bidirectional Z-source-alike Impedance Network [#247]</td>
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<td>Battery Energy Storage System Integration to the More Electric Aircraft 270 V DC Power Distribution Bus using Peak Current Controlled Dual Active Bridge Converter [#1449]</td>
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<td>An Improved Phase-Shifted PWM Method for a Three-Phase Cascaded H-Bridge Multi-Level Inverter [#200]</td>
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<td><strong>P2902</strong></td>
<td>A Novel Voltage Balance Circuit for Three-Level Diode-Clamped Inverter With Small Inductor [#19]</td>
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<td>Performance Assessment of the 5-Level 3-Phase Back to Back E-Type Converter [#1032]</td>
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<td><strong>P2905</strong></td>
<td>Flying Capacitor Resonant Pole Inverter Applying Five Voltage Levels [#473]</td>
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<td><strong>P2906</strong></td>
<td>Single-phase AC-DC-AC Multilevel Converter Based on H-bridges and Three-Leg Converters Connected in Series [#1046]</td>
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**Plenary Poster Session: Applications of Electric Traction and Propulsion**

Tuesday, October 3, 10:30AM-1:00PM, Room: Expo, Chair: Bulent Sarlioglu, Suman Debnath

**P2705** Research on Excitation Control Method for the Three-Phase Brushless Asynchronous Excitation System of Wound-Field Synchronous Starter/Generators [#401]

Zan Zhang, Weiguo Liu, Shuai Mao, Jichang Peng, Chenghao Sun, Tao Meng and Ningfei Jiao, School of Automation, Northwestern Polytechnical, China

**P2706** Optimal Gear Ratios Selection for a Nissan Leaf: A Case Study of InGear Transmission System [#71]

Ahmed Abdelrahman, Khalil Algarny and Mohamed Youssef, UOIT, Canada

**P2707** A Novel Hybrid Approach Towards Drive-Cycle Based Design and Optimization of a Fractional Slot Concentrated Winding SPMSM for BEVs [#1165]

Philip Korta, Lakshmi Varaha Iyer, Chunyan Lai, Kaushik Mukherjee, Jimi Tjong and Narayan Kar, University of Windsor, Canada; Indian Institute of Engineering Science and Tech, India

**Plenary Poster Session: Multilevel Converters**

Tuesday, October 3, 10:30AM-1:00PM, Room: Expo, Chair: Sheldon Williamson, Pericle Zanchetta

**P2901** An Improved Phase-Shifted PWM Method for a Three-Phase Cascaded H-Bridge Multi-Level Inverter [#200]

June-Seok Lee, Kyo-Beum Lee and Youngjong Ko, Korea Railroad Research Institute, Korea (South); Ajou University, Korea (South); University of Kiel, Germany

**P2902** A Novel Voltage Balance Circuit for Three-Level Diode-Clamped Inverter With Small Inductor [#19]

Dongdong Cui, Zhida Zhou, Bo Yang, Qiongxuan Ge and Cong Zhao, Institute of Electrical Engineering, UCAS, China; Institute of Electrical Engineering, China

**P2903** Performance Assessment of the 5-Level 3-Phase Back to Back E-Type Converter [#1032]

Marco Di Benedetto, Alessandro Lidozzi, Luca Solero, Petar J. Grbovic and Fabio Crescimbini, Roma Tre University, Italy; Huawei Technologies Dusseldorf GmbH, Germany

**P2904** Modeling and Voltage Balancing Control for a Hybrid Stacked Five-level Converter [#1120]

Shuai Xu, Jianzhong Zhang and Xing Hu, Southeast University, China

**P2905** Flying Capacitor Resonant Pole Inverter Applying Five Voltage Levels [#473]

Sjef Settels, Jorge Duarte, Jeroen van Duivenbode and Elena Lomonova, Eindhoven University of Technology, Netherlands

**P2906** Single-phase AC-DC-AC Multilevel Converter Based on H-bridges and Three-Leg Converters Connected in Series [#1046]

Antonio de Paula Dias Queiroz, Cursino Brandao Jacobina, Nayara Brandao de Freitas, Ayshlan Caisson Noroes Maia and Victor Felipe Moura Bezerra Melo, Federal Institute of Paraiba, Brazil; Federal University of Campina Grande, Brazil; Federal Institute of Alagoas, Brazil; Federal Institute of Pernambuco, Brazil
Plenary Poster Session: DC/AC Converters
Tuesday, October 3, 10:30AM-1:00PM, Room: Expo, Chair: Sewan Choi, Carl Ho

P3101 Coupled Inductor Implementation Improves Performance of Output Feedback ZVT in Full Bridge Inverters [#662]
Yinglai Xia, Chenhao Nan, Siddharth Kulasekaran and Raja Ayyanar, Arizona State University, United States

P3102 A Novel Wireless Control Strategy for Input-Series Output-Parallel Inverter System [#198]
Xiaojian Jiang, Xiaopeng Cao, Liangcai Shu, Guangfu Ning and Wu Chen, Southeast University, China

P3103 Comparative Analysis of Cascaded Inverters Based on 5-level and 3-level H-bridges [#1036]
Reuben Palmer R. de Sousa, Cursino Brandao Jacobina, Filipe Bahia and Luciano M. Barros, Universidade Federal de Campina Grande, Brazil; Universidade Federal de Sergipe, Brazil

P3104 Differential power as a metric to optimize power converters and architectures [#1286]
Jose A Cobos, Helena Cristobal, Diego Serrano, Regina Ramos, Jesus A Oliver and Pedro Alou, CEI-UPM, Spain

Plenary Poster Session: DC/DC Converters
Tuesday, October 3, 10:30AM-1:00PM, Room: Expo, Chair: Wilson Eberle, Sudip Mazumder

P3301 Isolated and Wide Input Ranged Boost Full Bridge DC-DC Converter with Low Loss Active Snubber [#515]
Satoshi Ikeda and Fujio Kurokawa, Panasonic Corporation, Japan; Nagasaki Institute of Applied Science, Japan

P3302 Multi-port isolated LLC resonant converter for distributed energy generation with energy storage [#808]
Kevin Tomas Manez, Zhe Zhang and Ziwei Ouyang, Technical University of Denmark, Denmark
P3303 A New PWM Shoot-Through Control Technique to Reduce Switching Losses in Impedance Source DC/DC Converters [#933]
Yuba Raj Kafle, Saad Ul Hasan and Graham E. Town, Macquarie University, Australia

P3304 An Isolated High-Voltage High-Frequency Pulsed Power Converter for Non-Thermal Plasma Ozone Generation [#1209]
Changqi You, Mengqi Wang and Jin Ye, University of Michigan-Dearborn, United States; San Francisco State University, United States

P3305 Evaluation of isolated DC/DC converter topologies for future HVDC aerospace microgrids [#1141]
Luca Tarisciotti, Alessandro Costabeber, Adam Walker, Chen Linglin and Mikiel Galea, University of Nottingham, United Kingdom

P3306 High-Efficiency High-Bandwidth Switch-Linear Hybrid Envelope-Tracking Power Supply with Slew Rate Split-band Method [#137]
Yang Leng, Xinbo Ruan, Qian Jin and Yazhou Wang, Nanjing University of Aero. and Astro., China

P3307 Quadratic Gain Converter with Output Voltage Ripple Mitigation [#440]
Pedro Martin Garcia-Vite, Jonathan Carlos Mayo-Maldonado, Jesus Elias Valdez-Resendiz, Julio Cesar Rosas-Caro, Maria del Rosario Rivera-Espinosa and Antonio Valderrabano-Gonzalez, Instituto Tecnologico de Ciudad Madero, Mexico; Tecnologico de Monterrey, Mexico; Universidad Panamericana, Mexico

P3308 High Efficient Multiple-Input Positive Buck-Boost Converter [#681]
Jeongtae Kim and Sungwoo Bae, Yeungnam University, Korea, Republic of; Hanyang Univ. / Yeungnam Univ., Korea, Republic of

P3309 Dual Bridge LLC Resonant Converter With Frequency Adaptive Phase-Shift Modulation Control For Wide Voltage Gain Range [#637]
S M Showbyul Islam Shakib, Saad Mekhilef and Mutsuo Nakaoka, University of Malaya, Malaysia

P3310 Multiple-input Soft-switching Cuk Converter [#677]
Zhuoya Sun and Sungwoo Bae, Hanyang Univ. / Yeungnam Univ., Korea, Republic of

Plenary Poster Session: PV Applications
Tuesday, October 3, 10:30AM-1:00PM, Room: Expo, Chair: Sonny Xue, Qin Lei

P3501 Powerline Communications Strategy Enabling Fully Decentralized Control of AC-Stacked PV Inverters [#1240]
Daniel Evans and Robert Cox, UNC Charlotte, United States

P3502 A Simultaneous Voltage and Frequency Control Scheme for Photovoltaic Distributed Generation Units In Small-scale Power Systems [#1285]
Hossein Saberi and Shahab Mehraeen, Louisiana State University, United States

P3503 Performance and Mitigation Strategy of Distributed AC-Stacked PV Inverter Architecture under Grid Background Harmonics [#1424]
Namwon Kim, Hamidreza Jafarian, Johan Enslin and Babak Parkhideh, UNCC, United States

P3504 An analog MPPT controller without multiplier for PV applications based on improved PandO method [#1248]
Chenxi Wang, Min Chen, Xinghua Zhang and Mingzhi Gao, Zhejiang University, China

P3505 An Integrated Single Inductor-Single Sensor Based Photovoltaic Optimizer with an Optimal Current Point Tracking Strategy [#22]
Tianhua Zhu, Xinlu He, Tong Guan, Feng Wang, Hao Yi and Fang Zhuo, Xi'an Jiaotong University, China

P3506 A Regulated Incremental Conductance (r-INC) MPPT Algorithm for Photovoltaic System [#600]
Thusitha Wellawatta, Young-Tae Seo, Hong-Hee Lee and Sung-Jin Choi, University of Ulsan, Korea, Republic of

P3507 Dynamic Equivalent Circuit Modelling of Polycrystalline Silicon Photovoltaic Cells [#227]
Olufemi Olayiwola and Paul Barendse, University of Cape Town, South Africa

P3508 Modular Cascaded Converter for MVDC-Connected Photovoltaic Systems [#755]
Zheng Fan, Guangyao Qiao, Guangfu Ning and Liangcai Shu, Global Energy Interconnection Research Institute, China; Southeast University, China

P3509 An Efficient Ramp Rate and State of Charge Control for PV-Battery System Capacity Firming [#1493]
Amit Bhattacharjee, Nasser KutKut, Issa Batarseh and Haibing Hu, UCF, Florida Power Electronics Center, United States; Advanced Charging Technologies, United States; UCF, Florida Solar Energy Center, United States
P3510  Analysis of an Interleaved Current-Fed Capacitor-Less DC/AC Converter for PV Systems

Zhang Yue, Wang Zheng and Cheng Ming, Southeast University, China

Plenary Poster Session: EMI in Power Converters
Tuesday, October 3, 10:30AM-1:00PM, Room: Expo, Chair: Khurram Afridi, Yaow-Ming Chen

P3701  A Galvanic Isolated Voltage Probe for Noise Sources Identification in EMI / EMC Applications
Zhuxian Xu, Chingchi Chen and Richard Kautz, Ford Motor Company, United States

P3702  Common mode EMI reduction structure of EV/HEV inverters for high-speed switching
Akinori Okubo, Kraisorn Throngnumchai and Tetsuya Hayashi, Nissan Motor Co., Ltd., Japan

P3703  A Layout Method of Passive EMI Filter
Ji Junpeng, Chen Wenjie, Yang Xu, Zhang Xingxia and Zhi Na, Xi'an University of Technology, China; Xi'an Jiaotong University, China

P3704  Magnetic Material Selection for EMI Filters
Marcin Kacki, Marek Rylko, John Hayes and Sullivan Charles, SMA Magnetics, Poland; University college Cork, Ireland; Dartmouth College, United States

Plenary Poster Session: Advances in Special Electrical Machines
Tuesday, October 3, 10:30AM-1:00PM, Room: Expo, Chair: Greg Heins, Dan Ionel

P3901  A High Voltage Pulsed Power Supply with Reduced Device Voltage Stress for Industrial Electrostatic Precipitators
Ming Tang, Guangfu Ning, Wu Chen, Guangyao Qiao, Liangcai Shu, Xiaohui Qu and Baojian Ji, Southeast University, China; Southeast University, China; Global Energy Interconnection Research Institute, China; Nanjing University of Technology, China

P3902  Novel Hybrid Rotor Machines with Shifted Reluctance Axis
Hui Yang, Ya Li, Heyun Lin, Z. Q. Zhu, Shukang Lyu, Haitao Wang, Shuhua Fang and Yunkai Huang, Southeast University, China; University of Sheffield, Great Britain

P3903  Electromagnetic Design of an Ultra-high Speed Switched Reluctance Machine over 1 Million rpm
Cheng Gong and Thomas Habetler, Georgia Tech, United States

P3904  Research on the Rotor Pole Number Influence of Rotor Permanent Magnet Flux Switching Machine
Peng Su, Wei Hua, Chuang Hou and Mingjin Hu, Southeast University, China

P3905  Wirelessly Powered Coil-Type Robot with 1D Self-Actuation Capability
Lee Jun and Ha Jung-ik, Seoul National University, Korea (South)

P3906  A dq-Axis Framework for Electrostatic Synchronous Machines and Charge Oriented Control
Baoyun Ge, Aditya Ghule and Daniel Ludois, University of Wisconsin -Madison, United States

Plenary Poster Session: Induction and Permanent Magnet AC Machines
Tuesday, October 3, 10:30AM-1:00PM, Room: Expo, Chair: Dong Jiang, Kyo-Beum Lee

P4101  State-Space Space-Vector Model of the Induction Motor Including Magnetic Saturation and Iron Losses
Marcello Pucci, ISSIA-CNR, Italy

P4102  The Rotor Copper and Iron Loss Analysis of the Inverter-fed Induction Motor Considering Rotor Slip Frequency
Dongdong Zhang, Haisen Zhao and Thomas Wu, Xian Jiaotong University, China; North China Electric Power University, China; University of Central Florida, United States
Plenary Poster Session: Motor Drives II
Tuesday, October 3, 10:30AM-1:00PM, Room: Expo, Chair: Giyanna Oriti, Ziaur Rahman

**P4103** GA-based Off-Line Parameter Estimation of the Induction Motor Model Including Magnetic Saturation and Iron Losses [#141]
Angelo Accetta, Francesco Alonge, Maurizio Cirrincione, Filippo D'Ippolito, Marcello Pucci and Antonino Sferlazza, ISSIA-CNR, Italy; University of Palermo, Italy; University of South Pacific, Fiji; CNRS, LAAS, France

**P4104** Simplified Equivalent Model of PMSM with Inter-turn Fault [#537]
Seung-Tae Lee and Jin Hur, Incheon National University, Korea, Republic of

**P4105** Analysis of Cogging Torque and Torque ripple according to Unevenly Magnetized Permanent Magnets Pattern in PMSM [#529]
Dong-ho Lee, Chae-lim Jeong and Jin Hur, Incheon National University, Korea (South)

**P4106** Optimized Design of PMSM with Hybrid Type Permanent Magnet for Improving Performance and Reliability [#505]
Chae-Lim Jeong, Young-Kyoun Kim and Jin Hur, Incheon National University, Korea, Republic of; Osan University, Korea, Republic of

**P4107** Reluctance Magnetic Gear and Flux Switching Magnetic Gear for High Speed Motor System [#1378]
Kohei Aiso, Kan Akatsu and Aoyama Yasuaki, Shibaura Institute of Technology, Japan; Hitachi, Ltd., Research and Development Group, Japan

**P4108** Influence of Gear Ratio on Electromagnetic Performance and Geometries of Vernier Permanent Magnet Synchronous Machines [#5]
Liu Yue and Zhu Zi-Qiang, University of Sheffield, United Kingdom

**P4109** A Family of Vernier Permanent Magnet Machines Utilizing An Alternating Rotor Leakage Flux Blocking Design [#1056]
Wenbo Liu and Thomas A. Lipo, University of Wisconsin Madison, United States

Plenary Poster Session: Switching Devices II
Tuesday, October 3, 10:30AM-1:00PM, Room: Expo, Chair: Ruxi Wang, Xiaoqing Song

**P4301** A Novel Active Common-Noise Canceler Combining Feedforward and Feedback Control [#846]
Shunsuke Ohara, Satoshi Ogasawara, Takemoto Masatsugu, Koji Orikawa and Yushin Yamamoto, Hokkaido University, Japan; TMEIC, Japan

**P4302** Harmonics Performance and System Stability Evaluation between 18-Pulse and LCL Filter Based Active Front End Converters under Weak Grid and Distorted Source Voltage Conditions [#492]
Kevin Lee, Wenxi Yao, Yuxi Huang and Carnovale Daniel, Eaton Corporation, United States; Zhejiang University, China

**P4303** Harmonic Analysis of a Regulated DC Voltage Space Vector Modulation Technique for High Speed Electrical Drives [#1456]
Vito Giuseppe Monopoli, Pierluigi Sidella and Francesco Cupertino, Politecnico di Bari, Italy

**P4304** Distributed Speed Control for Multi-Phase Electrical Motors with Improved Power Sharing Capability [#858]
Alessandro Galassini, Alessandro Costabeber, Alberto Tessarolo and Chris Gerada, The University of Nottingham, United Kingdom; The University of Trieste, Italy

**P4305** Single-Stage Soft-Switching Solid-State Transformer for Bidirectional Motor Drives [#1116]
Liran Zheng, Rajendra Prasad Kandula, Karthik Kandasamy and Deepak Divan, GEORGIA INSTITUTE OF TECHNOLOGY, United States
**P4501** Aging Precursors and Degradation Effects of SiC MOSFET Module Under Highly Accelerated Power Cycling Conditions [#334]
Haoze Luo, Francesco Iannuzzo, Marcello Turnaturi, Emilio Mattiuazzo and Freda Błażjerg, Aalborg University, Denmark; Vishay Semiconductor Italiana, Italy

**P4502** A Measurement Method to Extract the Transient Junction Temperature Profile of Power Semiconductors at Surge Conditions [#586]
Yu Du, Rostan Rodrigues and Taosha Jiang, ABB Inc., United States; ABB Inc, United States

**P4503** Lifetime Extension of a Multi-die SiC Power Module using Selective Gate Driving with Temperature Feed-forward Compensation [#781]
Jeffrey Ewanchuk, Julio Brandelero and Stefan Mollov, Mitsubishi Electric Research Centre Europe, France

**P4504** Degradation of SiC MOSFETs with gate oxide breakdown under short circuit and high temperature operation [#1174]
Vamsi Mulpuri and Choi Seungdeog, University of Akron, United States

**P4505** The Effect of Load Properties on the Reliability of Machine Drives - The Temperature and Stress Analysis of Power Module Bond Wires [#1486]
He Niu, General Motors, Global Propulsion System, United States

**P4506** Power Cycling Test of a 650 V Discrete Enhancement mode GaN-on-Si Power Component with a Laminated Packaging Embedding Technology [#426]
Song Sungyoung, Munk-Nielsen Stig, Uhrenfeldt Christian and Pedersen Kjeld, Energy Technology, Aalborg University, Denmark; Physics and Nanotechnology, Aalborg University, Denmark

**P4507** Gate Driver Design for a High Power Density EV/HEV Traction Drive Using Silicon Carbide MOSFET Six-Pack Power Modules [#1295]
Rui Gao, Li Yang, Wensong Yu and Iqbal Husain, North Carolina State University, United States

**P4508** Isolation Design Considerations for Power Supply of Medium Voltage Silicon Carbide Gate Drivers [#1478]
Tushar Batra, Ghanshyamsinh Gohil, Nicholas Rodriguez, Arun Kumar Sesham and Subhashish Bhattacharya, NCSU, United States

**Plenary Poster Session: Wireless Power Transfer**
Tuesday, October 3, 10:30AM-1:00PM, Room: Expo, Chair: Mark J Scott, Jin Wang

**P4701** A Phase-Shift Soft-Switching Control Strategy for Dual Active Wireless Power Transfer System [#725]
Fenghua Liu, Wanjun Lei, Tengbo Wang, Cheng Nie and Yue Wang, Xi’an Jiaotong University, China

**P4702** Modeling and Experimentation of Multi-coil Switching Coupler for Wireless Power Transfer Systems [#404]
Pingan Tan, Chunxia Liu, Liangwei Ye and Tao Peng, Xiangtan University, China

**P4703** Analysis and Optimization of 3-Coil Magnetically Coupled Resonant Wireless Power Transfer System for Stable Power Transmission [#1150]
Weiwei Ye, Lu Chen, Fuxin Liu, Xuling Chen and Xuehua Wang, Nanjing Univ. of Aeronautics and Astronautics, China; Huazhong Univ. of Science and Technology, China

**P4704** A Double-Frequency Superposition Methodology for High Efficiency and Oriented Power Distribution of MCR WPT System with Two Receivers [#223]
Yong Yang, Ze Ding, Fuxin Liu and Xuling Chen, Nanjing University ofAeronautics andAstronautics, China

**P4705** Resonant Converter with Coupling and Load Independent Resonance for Omnidirectional Wireless Power Transfer Application [#1250]
Junjie Feng, Minfan Fu, Qiang Li and Fred Lee, Virginia Tech CPES, United States

**P4706** ANN-Based Algorithm for Estimation and Compensation of Lateral Misalignment in Dynamic Wireless Power Transfer Systems for Electric Vehicle Charging [#884]
Reza Tavakoli and Zeljko Pantic, Utah State University, United States
**P4707** Comparative Evaluation of Secondary-Side ZVS-PWM Controlled GaN-HFET Resonant Converters for Inductive Power Transfer [#795]

Tomokazu Mishima and Eitaro Morita, Kobe University, Japan

**Plenary Poster Session: DC and Hybrid AC/DC Systems**
Tuesday, October 3, 10:30AM-1:00PM, Room: Expo, Chair: Meiqin Mao, Adel Nasiri

**P4901** Coordinated Control and Optimization of DC Power Systems [#272]
Bhanu Babaiahgari, Md. Habib Ullah and Jae-Do Park, University of Colorado Denver, United States

**P4902** Controller Design of DC Microgrids with Multiple Sources and Constant Power Loads [#514]
Luis Herrera, Benjamin Palmer, Xiu Yao and Bang-Hung Tsao, Rochester Institute of Technology, United States; University of Cincinnati, United States; University at Buffalo, United States; University of Dayton Research Institute, United States

**P4903** A Study on High-Efficiency Floating Multi-Terminal Power Flow Controller for Next-Generation DC Power Networks [#1454]
Kenji Natori, Toru Tanaka, Yoshinori Takahashi and Yukihiko Sato, Chiba University, Japan

**P4904** Operational Cost Reduction Based on Distributed Adaptive Droop Control in DC Microgrids [#1432]
Mohamed Zaery, Emad M. Ahmed, Mohamed Orabi and Mohamed Youssef, APEARC, Aswan, Egypt; UOIT, Canada

**P4905** Hurst Exponent-Based Adaptive Detection of DC Arc Faults [#1278]
Yousef Abdullah, Boxue Hu, Zhuo Wei, Yafeng Wang, Jin Wang and Amin Emrani, The Ohio State University, United States; Ford Motor Company, United States

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**Tuesday, October 3, 2:00PM-4:30PM**

**Plenary Poster Session: Applications of MMC**
Tuesday, October 3, 2:00PM-4:30PM, Room: Expo, Chair: Dianguo Xu, Maryam Saeedifard

**P5101** Impact of DC Fault in Multi-terminal DC Grid on Connected AC System Stability [#1273]
Shuoting Zhang, Yalong Li and Fred Wang, The University of Tennessee, United States; Texas Instruments, United States

**P5102** Analysis of Single-Phase-to-Ground Faults at the Valve-Side of HB-MMCS in Bipolar HVDC Systems [#1142]
Gen Li, Jun Liang, Fan Ma, Carlos E Ugalde-Loo, Hai Feng Liang and Hui Li, Cardiff University, United Kingdom; Naval University of Engineering, China; North China Electric Power University (Baoding), China; Beijing InformationScienceTechnology University, China

**P5103** Feedback Linearization applicable to the state-space modelling of an HVDC terminal based on Modular Multilevel Converter and DC Grids on FPGA with Sub-microsecond Time-step [#1257]
Hui Pang, Fei Zhang, Hailong Bao, Geza Joos, Wei Wang, Wei Li, Luc-Andre Gregoire and Xuebing Zhai, Global Energy Interconnection Research Institute, China; McGill University, Canada; State Grid Shanghai Municipal Electric Power Com, China; OPAL-RT Technologies Inc., Canada

**P5104** Interactions Between Bandwidth Limited CPLs and MMC Based MVDC Supply [#234]
Uzair Javaid, Alexandre Christe, Francisco Daniel Frejedo and Dzena Dujic, Power Electronics Laboratory, EPFL, Switzerland

**P5105** Medium-Voltage DC Grid Connection Using Modular Multilevel Converter [#587]
Seyyedmahdi Jafarishiadeh, Mehdi Farasat and Arash Khoshkbar Sadigh, Louisiana State University, United States; Extron Electronics, United States
Tuesday, October 3, 2:00PM-4:30PM

**P5107** A Power Hardware-in-the-Loop-Simulation (P-HILS) System Using two Modular Multilevel DSCC Converters for a Synchronous-Motor Drive [#635]
Kenichiro Saito and Hirofumi Akagi, Tokyo Institute of Technology, Japan

**P5108** Switching Function Based Analysis of the Modular Multilevel Converter for Low/medium Voltage Applications [#861]
Olorunfemi Ojo, Josiah Haruna and Rere Fatunmbi, Tennessee Technological University, United States

**P5109** Fast Control of a Modular Multilevel Converter STATCOM using Optimized Pulse Patterns [#397]
Vedrana Spudic and Tobias Geyer, ABB Corporate Research Center, Switzerland

**P5110** A Modular Multilevel Converter with Isolated Energy-Balancing Modules for MV Drives Incorporating Symmetrical Six-Phase Machines [#1016]
Mohamed Said Diab, Barry Williams, Derrick Holiday, Ahmed Massoud and Shehab Ahmed, Strathclyde University, United Kingdom; Qatar University, Qatar; Texas AM University in Qatar, Qatar

**Plenary Poster Session: Batteries and Wireless EV Charging**
Tuesday, October 3, 2:00PM-4:30PM, Room: Expo, Chair: Veda Prakash Galigekere, Jin Ye

**P5301** A Star-Structured Switched-Capacitor Equalizer for Series-Connected Battery Strings [#1037]
Yunlong Shang, Bing Xia, Fei Lu, Chenghui Zhang, Naxin Cui, Chunyu Wang and Chris Mi, Shandong University, China; San Diego State University, United States; University of Michigan, United States

**P5302** A Multiplexing LCL Module Using Individual Transmitters for Dynamic Wireless Charging of Electric Vehicles [#295]
Shaocong Zhou, Chunbo Zhu, Chunlai Yu and C.C. Chan, Harbin Institute of Technology, China; Heilongjiang Electric Power Research Institute, China

**P5303** Robust Double D Topology for Roadway IPT Applications [#308]
Matthew Pearce, Hanyu Gao, Amrit Ramadugu, Grant Covic and John Boys, The University of Auckland, New Zealand

**P5304** A Sorting Balance Control for Battery Sources in a Single Phase Multilevel Inverter [#425]
Chun-Yu Yang, Yaow-Ming Chen and Kai-Cheung Juang, Dept. of Electr. Eng., Natl. Taiwan Univ., Taiwan; Industrial Technology Research Institute, Taiwan

**Plenary Poster Session: AC/DC Converters**
Tuesday, October 3, 2:00PM-4:30PM, Room: Expo, Chair: Wuhua Li, Praveen Jain

**P5501** Investigation of Power Rectifier Under Non-Sinusoidal Input Based on Hybrid Multilevel Converter [#1052]
Alan S. Felinto, Cursino B. Jacobina, Edgard L. L. Fabricio, Victor F. M. B. Melo and Joao Paulo R. A. Mello, Federal University of Campina Grande, Brazil; Federal Institute of Paraiba, Brazil

**P5502** Series Connected Three-phase AC-DC Power Converters [#1041]
Reuben Palmer R. de Sousa, Cursino Brandao Jacobina and Luciano M. Barros, Universidade Federal de Campina Grande, Brazil; Universidade Federal de Sergipe, Brazil

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**P5505** Active Cell Balancing Algorithm for Serially Connected Li-Ion Batteries based on Power to Energy Ratio [#703]
Geon-Hong Min and Jung-Ik Ha, Seoul National University, Korea (South)

**P5306** Battery Impedance Measurement Using Sinusoidal Ripple Current Emulator [#521]
Md.Kamal Hossain, S M Rakiul Islam and Sung-Yeul Park, University of Connecticut, United States

**P5307** A new Magnetic Coupler for EVs Chargers Based on Plug-In and IPT Technologies [#470]
Emanuel Marques, Sandra V. da Silva and Andre Manuel Santos Mendes, University of Coimbra/ Inst. de Telecomunicacoes, Portugal

**P5308** Sensorless Estimation of Coupling Coefficient Based on Current and Voltage Harmonics Analysis for Wireless Charging System [#1276]
Mostak Mohammad and Seungdeog Choi, The University of Akron, United States

**P5309** High Power Density Z-Source Resonant Wireless Charger with Line Frequency Sinusoidal Charging [#1151]
Hulong Zeng, Xiaorui Wang and Fangz Peng, Michigan State University, United States

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P5503 A Novel Filter Structure to Suppress Harmonic Currents Based on the Sequence of Sideband Harmonics [#896]
Sungjae Ohn, Hyun-Sam Jung and Seung-Ki Sul, CPES, Virginia Tech, United States; Seoul National University, Korea (South)

P5504 Asymmetrical Cascaded Three-Phase AC-DC Converters with Injection Transformers [#555]
Joao Paulo Mello and Cursino Jacobina, Federal University of Campina Grande, Brazil

P5505 Voltage Independence Control of Split-DC Bus for A Three-Phase/Level T-type Converter with Unbalanced Loads [#229]
Wenlong Ding, Jiajun Liu, Bin Duan, Xiangyang Xing and Chenghui Zhang, Shandong University, China

Plenary Poster Session: Modeling and Control of Multilevel Converters
Tuesday, October 3, 2:00PM-4:30PM, Room: Expo, Chair: S. Ali Khajehoddin, Rostan Rodrigues

P5701 An Optimized Neutral-point Potential Balancing Algorithm for Seven-level ANPC Inverters [#310]
Weihui Sheng and Qiongxuan Ge, Institute of electrical engineering CAS, China

P5702 A Novel Model Predictive Control based Fault-Tolerant Control Strategy for T-Type Three-Level Inverters [#128]
Jie Chen, Alian Chen, Chenghui Zhang and Ke Li, Shandong University, China

P5703 A Repetitive Control Scheme for Circulating Current Suppression in Parallel Three-Level T-Type Inverters under Unbalanced Conditions [#225]
Changwei Qin, Alian Chen, Xiangyang Xing, Chunshui Du, Guangxian Zhang, Chenghui Zhang and Wenlong Ding, Shandong University, China

Plenary Poster Session: Modeling and Control of Grid Connected Converters
Tuesday, October 3, 2:00PM-4:30PM, Room: Expo, Chair: Jiacheng Wang, Kyo-Beum Lee

P5901 Flexible Power Control of Virtual Synchronous Generators Under Unbalanced Grid Voltage Conditions [#208]
Meng Chen, Xiangning Xiao, Chang Yuan and Shun Tao, North China Electric Power University, China

P5902 Visualization Analysis of Grid-Connected Inverter System based on Z-domain D-partition Method [#712]
Fei Li, Jizhong Xi, Haoyuan Li, Mingyao Ma, Wenxiang Zhou, Peng Liu and Fan Wu, Hefei University of Technology, China
P5903 Systematic Control Design for Half-Bridge Converters with LCL Output Filters through Virtual Circuit Similarity Transformations [#1118]
Korawich Niyomsatian, Piet Vanassche, Ruth Sabariego and Johan Gyselinck, KU Leuven, ULB, Belgium; Triphase NV, Belgium; KU Leuven, Belgium; ULB, Belgium

P5904 State Estimation of IEEE 14bus with Unified Interphase Power Controller (UIPC) Using WLS Method [#111]
Mohammad Amin Chitsazan, Mohammad Sami Fadali and Andrzej M. Trzynadlowski, University of Nevada, Reno, United States

P5905 Control of a Three-Phase Inverter under Unbalanced Grid Conditions [#644]
Vikram Roy Chowdhury, Subhajyoti Mukherjee, Pourya Shamsi and Mehdi Ferdowsi, Missouri University of Science and Technology, United States

P5906 Three-Phase Short-Circuit Fault Implementation in Converter Based Transmission Line Emulator [#283]
Shuoting Zhang, Bo Liu, Sheng Zheng, Yiwei Ma, Fred Wang and Leon M. Tolbert, The University of Tennessee, United States

P5907 Impedance-phase reshaping of LCL-filtered grid-connected inverters to improve the stability in a weak grid [#937]
Yan Du, Lin bo Cui, Xiang zhen Yang, Jianhui Su and Fei Wang, Hefei University of Technology, China; Hefei University of Technology, China; Shanghai University, China

P5908 A Control Method to Mimic Synchronous Generator Characteristics for Two-Stage Converters [#720]
Jun Zhu, Feng Gao, Xifeng Liu and Jing Xiao, Shandong University, China; Shandong Electric Power Maintenance Company, China

P5909 Study on The Virtual Inertia Optimization of Grid-friendly Single-Phase Synchronverter [#913]
Hong Li, Xiaochao Zhang, Tiancong Shao and Trillion Q. Zheng, Beijing Jiaotong University, China

P5910 Predictive frequency-based sequence estimator for control of grid-tied converters under highly distorted conditions [#1442]
Pablo Garcia, Cristian Blanco, Angel Navarro-Rodriguez and Mark Sumner, University of Oviedo, Spain; The University of Nottingham, United Kingdom

P5911 Single-Loop All-Pass-Filter-based Active Damping for VSCs with LCL filters Connected to the Grid [#931]
Javier Roldan-Perez, Emilio Bueno, Rafael Pena-Alzola and Alberto Rodriguez-Cabero, IMDEA Energy Institute, Spain; Alcala de Henares University, Spain; University of Strathclyde, United Kingdom

P6101 Single-Phase Universal Active Power Filter Based on Four-Leg AC/DC/AC Converters [#642]
Phelipe Leal Serafim Rodrigues, Cursino Brandao Jacobina, Mauricio Beltrao de Rossiter Correa and Italo Roger Ferreira Moreno Pinheiro da Silva, DEE UFCG, Brazil; UACSA UFRPE, Brazil

P6102 A Transformer-less Unified Power Quality Conditioner Having Fast Dynamic Control [#413]
Sui Pung Cheung, Shun Cheung Yeung, Shu Hung Chung, Wai Lun Lo and Weimin Wu, City University of Hong Kong, Hong Kong; Chu Hai College of Higher Education, Hong Kong; Shanghai Maritime University, China

Plenary Poster Session: Power Quality
Tuesday, October 3, 2:00PM-4:30PM
Room: Expo
Chair: Xiaqiang Guo, Feng Gao

P6103 Application of Singular Value Sensitivity on Harmonic Resonance Analysis for Inverter-Based Power Systems [#266]
Zhikang Shuai, Yang Li, John Shen and Yi Hong, Colg of Elec and Info Eng,Hunan University, China; Dept. of Elec and Cmpt Eng, Illinois Inst. of Tec, United States

P6104 Harmonics Compensation With Constant DC-Capacitor Voltage-Control-Based Strategy of Smart Charger for Electric Vehicles in Single-Phase Three-Wire Distribution Feeder Under Distorted Source Voltages and Load Currents Conditions [#1381]
Fuka Ikeda, Kei Nishikawa, Hiroaki Yamada, Toshihiko Tanaka and Masayuki Okamoto, Yamaguchi University, Japan; National Institute of Technology, Ube College, Japan
P6105  Power Quality Improvement Utilizing Photovoltaic Generation Connected to a Weak Grid [#124]
Hanny Tumbelaka, Eduard Muljadi and Wenzhong Gao, Petra Christian University, Indonesia; National Renewable Energy Laboratory (NREL), United States; University of Denver, United States

P6106  A New Control Scheme Based on R-APF for Harmonic Power Sharing in Islanded Microgrids [#1229]
Zhirong Zeng, Hao Yi, Fang Zhuo and Zhenxiong Wang, Xi’an Jiaotong University, China

Plenary Poster Session: Stability of Converter Systems
Tuesday, October 3, 2:00PM-4:30PM, Room: Expo, Chair: Jian Sun, Xiongfei Wang

P6301  A Comprehensive Study on the Gate-Loop Stability of the SiC MOSFET [#593]
Xudong Wang, Zhengming Zhao, Yicheng Zhu, Kainan Chen and Liqiang Yuan, Tsinghua University, China

P6302  Flexible PFC control featuring adaptive gain, mode estimation, and dual feedforward compensation [#197]
Joshua Ivaldi and Sung-Yeul Park, University of Connecticut, United States

P6303  A Stability Analysis Method based on Floquet Theory for Multi-stage DC-DC Converters System [#930]
Hong Li, Zhongya Guo, Fang Ren, Xiaochao Zhang and Bo Zhang, Beijing Jiaotong University, China; South China University of Technology, China

P6304  Stability Enhancement of Single-Loop Inverter-Side Current Feedback Controlled Grid-Connected Inverters with LCL Filters [#748]
Teng Liu, Zeng Li, Jinjun Liu, Yiming Tu and Zhipeng Liu, Xi'an Jiaotong University, China

P6305  Design of Online Supplementary Adaptive Dynamic Programming for Current Control in Power Electronic Systems [#455]
Ujjwol Tamrakar, Naresh Malla, Dipesh Shrestha, Zhen Ni and Reinaldo Tonkoski, South Dakota State University, United States

Plenary Poster Session: Other Topics in Control, Modeling and Optimization of Power Converters
Tuesday, October 3, 2:00PM-4:30PM, Room: Expo, Chair: Luca Solero, Grant Pitel

P6501  Control of a single phase inverter with multiple modulation strategies based on plant inversion [#445]
Regina Ramos, Diego Serrano, Jesus A. Oliver and Jose A. Cobos, Universidad Politecnica de Madrid, Spain

P6502  Derivation of Transfer Function of LLC Current Resonant Converter Using Numerical Calculation [#1312]
Masahito Shoyama, Takuma Sagara, Yusuke Yamashita, Jun Imaoka, Yu Yonezawa and Yoshiyasu Nakashima, Kyushu University, Japan; Fujitsu Laboratories LTD., Japan

P6503  FPGA-Based Direct Repetitive Control for High Performance Ground Power Units [#963]
Alessandro Lidozzi, Chao Ji, Stefano Bifaretti, Pericle Zanchetta, Luca Solero and Fabio Crescimbini, C-PED, ROMA TRE University, Italy; Protean Electric, United Kingdom; C-PED, University of Roma ‘tor Vergata’, Italy; The University of Nottingham, Dept. of Elect., United Kingdom

P6504  Interleaved Hybrid Control Concept for Multiphase DC-DC Converters [#818]
Georgios Tsolaridis and Juergen Biela, ETH Zurich, Switzerland
P6505 Active damping of power converters with Modular Basic Crossover Correction Cells [#438]
Veaceslav Spinu, Baris R. Dai, Mircea Lazar and Jorge L. Duarte, Eindhoven University of Technology, Netherlands

P6506 Training Neural-Network-Based Controller on Distributed Machine Learning Platform for Power Electronics Systems [#981]
Wenguan Wang, Henry Shu-Hung Chung, Ralph Cheng, Chi-Sing Leung, Xiaoqing Zhan, Alan Wai-lun Lo, James Kwok, Chun Jason Xue and Jun Zhang, City University of Hong Kong, Hong Kong; Chu Hai College of Higher Education, Hong Kong; Hong Kong University of Science and Technology, Hong Kong; South China University of Technology, China

P6507 FPGA Implementation of a Real-Time Model Predictive Controller for Hybrid Power Systems [#1237]
Seyed Ataollah Raziei and Zhenhua Jiang, University of Dayton, United States

P6508 Equivalent Circuit Model for High Voltage Power Generation Architectures [#1232]
Mao Saijun, Li Chengmin, Li Wuhua, Popovic Jelena and Ferreira Jan Abraham, TU Delft, Netherlands; Zhejiang University, China

P6509 Improved delayed signal cancellation-based SRF-PLL for three-phase inverters operated in unbalanced grid [#156]
Tuomas Messo, Yang Dongsheng, Xiongfei Wang, Frede Blaabjerg and Jussi Sihvo, Tampere University of Technology, Finland; Aalborg University of Technology, Denmark

Plenary Poster Session: Analysis Techniques in Electrical Machines
Tuesday, October 3, 2:00PM-4:30PM, Room: Expo, Chair: Peter Wung, Wei Xu

P6701 Numerical and Experimental Evaluation of Magnetostriction and Magnetic Forces on Transformer Stacks and Joints for the Assessment of Core Vibrations [#170]
Sigrid Jacobs, Jan Rens, Maarten Van Poucke and Emmanuel Attrazic, ArcelorMittal Global RandD, Belgium; ArcelorMittal Global RandD Gent, Belgium; ArcelorMittal Saint Chely d’Apcher, France

P6702 Reliability Analysis of an Adaptive Third-Harmonic Differential Voltage Stator Ground Fault Protection Scheme Using a Lab-Scale Generating Station [#274]
Amir Negahdari, Khaleed AlJaafari, Hamid A. Toliyat, Nader Safari-Shad and Russel Franklin, Texas AM University, United States; Petroleum Institute, United Arab Emirates; University of Wisconsin-Platteville, United States; Alliant Energy, United States

P6703 An Improved Core-Loss Calculation Method for Doubly Salient Electromagnetic Motor [#297]
Jia Wanying, Xiao Lan, Wu Hongfei and Zhu Deming, NUAA, China; Department of Engineering and Technology, China

P6704 Damper Current Analysis of Hydro-Generators Considering Interbar Currents [#592]
Yang Zhan, Kangkang Kong, Guorui Xu and Haisen Zhao, North China Electric Power University, China

P6705 Active Cooling for On-machine Device [#74]
Xikai Sun, Paul J. Grosskreuz and Mark R. Cooper, Rockwell Automation, China; Rockwell Automation, United States

P6706 Improved analytical modeling of high frequency conductive losses in isolated rectangular conductor [#400]
Xiaohui Wang, Li Wang, Ling Mao and Yaojia Zhang, Nanjing University ofAeronautics andAstronautics, China; Nanjing University ofAeronautics andAstronautics, China

P6707 Nonlinear Analytical Model of an Inductance Considering Saturation and Temperature Variation [#1264]
Hilmi Gurleyen, Erkan Mese, Ju Hyung Kim and Bulent Sarlioglu, Yildiz Technical University, Turkey; Ege University, Turkey; University of Wisconsin Madison, United States

Plenary Poster Session: AC Electrical Machines: Performance Estimation
Tuesday, October 3, 2:00PM-4:30PM, Room: Expo, Chair: Avoki Omekanda, Ronghai Qu

Jun Hang, Shichuan Ding, Hao Li and Qunjing Wang, Anhui University, China

P6902 A Model-based Signal Processing Method for Fault Diagnosis in PMSM Machine [#513]
Mehrdad Heydarzadeh, Mohsen Zafarani, Enes Uğur, Bilal AKin and Mehrdad Nourani, The University of Texas at Dallas, United States
P6903  Separation of Induction Motor Rotor Faults and Low Frequency Load Oscillations Through the Radial Leakage Flux  
Taner Goktas, Muslum Arkan, M. Salih Mamis and Bilal AKin, Inonu University, Turkey; The University of Texas at Dallas, United States

P6904  Efficiency Estimation of Induction Machines using Nonintrusive No-load Low Voltage Test  
Muhammad Aminu, Paul Barendse and Mohamed Azeem Khan, University of Cape Town, South Africa, South Africa

P6905  Assembly Effects on Stator Cores of Small Synchronous Reluctance Motors  
Zbigniew Gmyrek and Andrea Cavagnino, Lodz University of Technology, Poland; Politecnico di Torino, Italy

P6906  Analysis of Stator/Rotor Pole Combinations in Variable Flux Reluctance Machines Using Magnetic Gearing Effect  
Huang Liren, Zhu Z.Q., Feng Jianghua, Guo Shuying, Shi Junxu and Chu Wenqiang, Sheffield University, United Kingdom; CRRC Zhuzhou Institute Co. Ltd, China

Plenary Poster Session: Component Technologies
Tuesday, October 3, 2:00PM-4:30PM, Room: Expo, Chair: Ben Guo, Tsorng-Juu Liang

P7101  Reduction of the Parasitic Capacitance of a Power Inductor through Conductors Placement  
Shushu Zhu, Xibo Yuan and Phil Mellor, Nanjing University of Aeronautics and Astronauti, China; University of Bristol, United Kingdom

P7102  A Half-Turn Winding for Compact, High-Current, High-Turns-Ratio, Low-Leakage-Inductance Transformer  
Kartik Iyer, Minyu Cai, Dakshina Murthy-Bellur, Brad Palmer and Ned Mohan, University of Minnesota, United States; Purdue University, United States; Cummins Corporate R and T, United States

P7103  Power Loss Evaluation for Active and Magnetic Components in a SiC MOSFET-Based Power Electronic System  
Yi Deng, Zach Pan, Harish Suryanarayana, Arun Kadavelugu, Liming Liu, Christopher Belcastro and Esa-Kai Paatero, ABB Corporate Research Center, United States; ABB Power Solutions, United States; ABB Oy, Finland

P7104  A Method for Hotspot Temperature Estimation of Aluminum Electrolytic Capacitors  
Holger Jedtberg, Giampaolo Buticchi, Marco Liserre and Huai Wang, Kiel University, Germany; Aalborg University, Denmark

P7105  Effect of Conductive Magnetic Field Concentrators on the Performance of Anisotropic Magnetoresistors in High Frequency Contactless Current Sensing  
Shahriar Jalal Nibir and Babak Parkhideh, University of North Carolina at Charlotte, United States

P7106  Optimized Design for Three Port Transformer Considering Leakage Inductance and Parasitic Capacitance  
Ritwik Chattopadhyay, Mark A. Juds, Ghanshyamshinh Gohil, Srinivas Gulur, Paul R. Ohodnicki and Subhashish Bhattacharya, North Carolina State University, United States; Eaton Corporate Research and Technology, United States; National Energy Technology Laboratory, United States

P7107  A Tunable Inductor Based on a Magnetic Flux Valve  
Junwei Cui, Haosen Wang, Liyan Qu and Wei Qiao, University of Nebraska-Lincoln, United States
Plenary Poster Session: Renewable Energy and Grid Integration
Tuesday, October 3, 2:00PM-4:30PM, Room: Expo, Chair: Dehong Mark Xu, Yilmaz Sozer

Rong Zeng, Zhiqiang Wang and Madhu Sudhan Chinthavali, Oak Ridge National Laboratory, United States

P7302 Phase Stability Enhancement in big Power Networks using Renewable Generation Units Controlled by SPC [#1419]
Mostafa Abdollahi, Jose Ignacio Candela, Joan Rocabet, Raul Santiago Munoz Aguilar and Juan Ramon Hermoso, Technical University of Catalonia - UPC - SEER, Spain

P7303 Single-Phase to Three-Phase Generation System Based on Doubly-Fed Induction Generator [#949]
Nady Rocha, Cursino Brandao Jacobina, Italo Andre Cavalcanti de Oliveira and Edison Roberto Cabral da Silva, UFPB, Brazil; UFCG, Brazil

P7304 Wind Energy Conversion System based on DFIG with Series Grid Side Converter without Transformer [#1012]
Italo Andre Cavalcanti de Oliveira, Nady Rocha, Edison Roberto Cabral da Silva, Luanna Maria Silva de Siqueira, Ely Cavalcanti de Menezes and Cursino Brandao Jacobina, UFPB, Brazil; UFCG, Brazil

P7305 HCS Based MPPT Control for a Dual Power Flow Wind Energy Conversion System [#799]
Ying Zhu, Jun Hang, Haixiang Zang and Jingtao Zhao, Hohai University, China; Anhui University, China; NARI Technology Development Co., Ltd., China

P7306 Impedance Modeling and Control of STATCOM for Damping Renewable Energy System Resonance [#796]
Yang Zhang, Xin Chen and Jian Sun, Nanjing University of Aero. and Astro., China; Rensselaer Polytechnic Institun, United States

P7307 Modeling, Analysis and Parameters Design of Rotor Current Control in DFIG-based Wind Turbines for Dynamic Performance Optimizing [#121]
Yuanzhu Chang and Jiabing Hu, Huazhong University of Science and Technology, China

P7308 Predictive Voltage Control of Direct Matrix Converter with Reduced Number of Sensors for the Renewable Energy and Microgrid Applications [#87]
Jianwei Zhang, Li Li, Zahra Malekjamshidi and David Dorrell, University of Technology Sydney, Australia; University of KwaZulu-Natal, South Africa

Wednesday, October 4, 8:30AM-10:10AM

Wind Energy Systems
Wednesday, October 4, 8:30AM-10:10AM, Room: 236, Chair: Dinesh Kumar, Wei Qiao

8:30AM Field Excitation Scheme using a Machine-side 4-leg Converter in MW-range WRSG Wind Turbine Systems [#101]
Yongsug Suh and Thomas Lipo, Chonbuk National University, Korea (South); University of Wisconsin - Madison, United States

8:55AM Modeling and Control of Interconnected Wind Turbine Drivetrains [#385]
Mohsen Farbood, Elaheh Taherian Fard, Afshin Izadian, Mokhtar Sha Sadeghi and Taher Niknam, Shiraz University of Technology, Iran; Purdue School of Engineering and Technology, United States

Sayan Acharya, Samir Hazra, Kasunaidu Vechalapu and Subhashish Bhattacharya, NC STATE UNIVERSITY, United States

9:45AM A Universal Multiple-Vector-Based Model Predictive Direct Power Control for Doubly Fed Induction Generators [#1388]
Yongchang Zhang, Donglin Xu and Dong Jiang, North China University of Technology, China; Huaizhong University of Science and Technology, China

Droop Control in Microgrids
Wednesday, October 4, 8:30AM-10:10AM, Room: 233, Chair: Sara Ahmed, Amir Yaznadi
8:30AM  Breaking the Boundary: A Droop and Master-Slave Hybrid Control Strategy for Parallel Inverters in Islanded Microgrids [#1218]
Shike Wang, Jinjun Liu, Ronghui An and Meng Xin, Xi'an Jiaotong University, China

8:55AM  Hybrid Impedance-based Modelling and Stability Analysis of IMG-PIDCPS [#285]
Meiqin Mao, Yong Ding, Yatao Shen and Liuchen Chang, Hefei University of Technology, China

9:20AM  A Hybrid Adaptive Droop Control Technique with Embedded DC-bus Voltage Regulation for Single-Phase Microgrids [#573]
Sajjad Makhdoomi Kaviri, Hadis Hajebrahimi, Majid Pahlevani, Praveen Jain and Alireza Bakhshai, Queen's University, Canada; University of Calgary, Canada

9:45AM  Enforcing Coherency in Droop-Controlled Inverter Networks through Use of Advanced Voltage Regulation and Virtual Impedance [#988]
Philip Hart, Robert Lasseter and Thomas Jahns, University of Wisconsin-Madison, United States

Grid Connected Converter Stability
Wednesday, October 4, 8:30AM-10:10AM, Room: 237/38, Chair: Johan HR Enslin, Suryanarayana Doolla

8:30AM  Stabilization of Grid-Connected Inverter System with Feed-Forward Control [#85]
Toshiji Kato, Kaoru Inoue and Yusuke Nakajima, Doshisha University, Japan

8:55AM  Impedance-based Stability Criterion for Multiple Offshore Inverters Connected In Parallel with Long Cables [#849]
Xin Zhang, Henry Shu-Hung Chung, Lingling Cao, Jeff Po Wa Chow and Weimin Wu, City University of Hong Kong, Nanyang Technologi, Hong Kong; City University of Hong Kong, Hong Kong; City University of Hong Kong, Hong Kong; The Hong Kong Poly, Hong Kong; Shanghai Maritime University, China

9:20AM  DAH-FF Approach to Improve the Current Quality and Stability of the LCL Type Grid-Connected Inverter [#1076]
Zhang Xin, Chung Shu-hung Henry, He Yuan-Bin, Lai Chun-Tak and Wu Weimin, City University of Hong Kong, Nanyang Technologi, Hong Kong; City University of Hong Kong, Hong Kong; City University of Hong Kong, Hong Kong; Shanghai Maritime University, China

9:45AM  Power Factor Correction Capacitors for Multiple Parallel Three-Phase ASD Systems: Analysis and Resonance Damping [#1429]
Yongheng Yang and Frede Blaabjerg, Aalborg University, Denmark

Control and Modulation of Multi-Phase AC/DC Converters
Wednesday, October 4, 8:30AM-10:10AM, Room: 204, Chair: Adam Skorek, Dong Cao

8:30AM  Direct Power Control of PWM Rectifier with Elimination of DC Voltage Oscillations and Current Harmonics under Unbalanced Network [#798]
Yongchang Zhang, Jie Liu, Jihao Gao and Haitao Yang, North China University of Technology, China; University of Technology Sydney, Australia

8:55AM  Improved SVPWM Schemes for Vienna Rectifiers without Current Distortion [#431]
Houjian Xu, Wenxi Yao and Shuai Shao, college of Electrical Engineering, Zhejiang Univ, China

9:20AM  Improved Eight-Segment PWM Scheme with Non-Equally Distributed Zero-Vector Intervals for a Three-Phase Isolated Buck Matrix-Type Rectifier [#1073]
Jahanigr Afsharian, Dewei (David) Xu, Bin Wu, Bing Gong and Zhihua Yang, PhD student, Canada; Professor, Canada; Advanced Team Lead Engineering, Canada; Director of Front end AC/DC Converter, Canada

9:45AM  A Modified SVPWM Strategy Applied to a Three-Phase Three-Port Bidirectional AC-DC Rectifier for Efficiency Enhancement [#806]
Hongfei Wu, Tingting Liu, Tianyu Yang, Jiangfeng Wang, Shun Ding and Yan Xing, Nanjing University of Aeronautics Astronautics, China

DC/DC Converter Topologies
Wednesday, October 4, 8:30AM-10:10AM, Room: 201, Chair: Regan Zane, Wilson Eberle
8:30AM High Efficiency LC Resonant Boost Topology: Analysis and Design [#1166]
Hamed Valipour and Martin Ordonez, The University of British Columbia, Canada

8:55AM A Zero-Voltage-Switching, Physically Flexible Multilevel GaN DC-DC Converter [#1423]
Derek Chou, Yutian Lei and Robert Pilawa-Podgurski, University of Illinois at Urbana-Champaign, United States

9:20AM Design of Very-High-Frequency Synchronous Resonant DC-DC Converter for Variable Load Operation [#1327]
Lei Gu, Wei Liang and Juan Rivas Davila, Stanford University, United States

AC-AC Converters I
Wednesday, October 4, 8:30AM-10:10AM, Room: 230/31, Chair: Junichi Itoh, Lee Empringham

8:30AM A Ride-Through Method Using Input-Filter Capacitors for Three-Level Indirect Matrix Converter based Open-End Winding Drive [#692]
Santhosh Krishnamoorthi, Saurabh Tewari, Siddharth Raju, Daniel Opila, Abhijit Kshirsagar and Ned Mohan, University of Minnesota, United States; United States Naval Academy, United States

8:55AM A Family of Highly Reliable and Efficient Inductive-Link Universal Power Converters [#1239]
Khalegh Mozaffari and Mahshid Amirabadi, Northeastern University, United States

Reliability, Diagnostic, and Faults Analysis in Power Converters I
Wednesday, October 4, 8:30AM-10:10AM, Room: 205, Chair: Ke Ma, Marco Liserre

8:30AM An Active Capacitor with Self-power and Internal Feedback Control Signals [#876]
Haoran Wang and Huai Wang, Aalborg University, Denmark

8:55AM Impacts of Rotor Current Control Targets on DC-link Capacitor Lifetime in DFIG-based Wind Turbine during Grid Voltage Unbalance [#1435]
Holger Jedtberg, Marius Langasser, Rongwu Zhu, Giampaolo Buticchi and Marco Liserre, Kiel University, Germany

Design Optimization of Power Converters
Wednesday, October 4, 8:30AM-10:10AM, Room: 200, Chair: Fred Wang, Arijit Banerjee

8:30AM Efficiency Optimization of DC-DC Solid State Transformer based on Modular Multilevel Converters [#704]
Lei Zhang, Zhe Zhao and Jiangchao Qin, Arizona State University, United States

8:55AM Mission-Profile based Multi-Objective Optimization of Power Electronics Converter for Wind Turbines [#1172]
Ghanshyam Gohil, Remus Teodorescu, Tamas Kerekes, Frede Blaabjerg and Subhashish Bhattacharya, North Carolina State University, United States; Aalborg University, Denmark
9:20AM  Reducing Reverse Conduction and Switching Losses in GaN HEMT-based High-Speed Permanent Magnet Brushless DC Motor Drives [#1271]
Woongkul Lee, Di Han, Wooyoung Choi and Bulent Sarlioglu, UW-Madison, WEMPEC, United States

9:45AM  Design by Optimization Methodology: Application to a Wide Input and Output Voltage Ranges Interleaved Buck Converter [#997]
Mylene Delhommeais, Jean-Luc Schanen, Frederic Wurtz, Cecile Rigaud and Sylvain Chardon, Tronico, G2ELab, France; G2ELab, France; Tronico, France

Thermal and Faults of Electric Machines
Wednesday, October 4, 8:30AM-10:10AM, Room: 263, Chair: Yilmaz Sozer, Sang Bin Lee

8:30AM  An Enhanced Active DC-Flux Injection Based Approach for Thermal Monitoring of Induction Machines with Direct Torque Control Schemes [#671]
Sufei Li, Shen Zhang, Chen Jiang, Lijun He and Ronald G. Harley, Georgia Institute of Technology, United States; General Electric, United States

8:55AM  Comparison of Thermal Stresses Developed during Transients on a Damaged Rotor Cage [#98]
Vicente Climente-Alarcon, Antero Arkkio and Jose Alfonso Antonino-Daviu, Aalto University, Finland; Universitat Politecnica de Valencia, Spain

9:20AM  A High-Frequency Torque Injection-Based Rotor Magnet Thermal Monitoring Scheme for Direct-Torque-Controlled Interior Permanent Magnet Synchronous Machines [#1301]
Shen Zhang, Sufei Li, Lijun He, Jose A. Restrepo and Thomas G. Habetler, Georgia Institute of Technology, United States; GE Global Research, United States; Universidad Simon Bolivar, Venezuela

9:45AM  Evaluation of the detectability of rotor faults and eccentricities in induction motors via transient analysis of the stray flux [#201]
Jose Antonino-Daviu, Alfredo Quijano-Lopez, Vicente Climente-Alarcon and Hubert Razik, Universitat Politecnica de Valencia, Spain; Aalto University, Finland; Universite Claude Bernard Lyon 1, France

PM Machines and Windings
Wednesday, October 4, 8:30AM-10:10AM, Room: 264, Chair: Abraham Gebregergis, Greg Heins

8:30AM  Preliminary Study on Differences in the Performance Characteristics of Concentrated and Distributed Winding IPM Machines with Different Rotor Topologies [#1320]
Alireza Pouramin, Rukmi Dutta and M. F. Rahman, University of New South Wales, Australia

8:55AM  Shaft-to-Frame Voltage Mitigation Method by Changing Winding-to-Rotor Parasitic Capacitance of IPMSM [#512]
Jun-Kyu Park, Se-Hyun Ryu and Jin Hur, Korea Electronics Technology Institute (KETI), Korea, Republic of; Incheon National University, Korea, Republic of

9:20AM  Current control strategy for dynamic winding reconfiguration of a brushless DC motor [#444]
Florian Copt, Douglas Martins Araujo, Christian Koechli and Yves Perriard, EPFL, Switzerland

9:45AM  Design and Analysis of Low Cost and High power density IPM Machine for Automotive Engine Torque Management [#67]
Hao Lei, Pandi Murali, Mavuru Chandra, Namuduri Chandra, Omekanda Avoki and Nehl Thomas, General Motors, United States; general Motors, United States

Energy Efficient Motor Drives
Wednesday, October 4, 8:30AM-10:10AM, Room: 260/61, Chair: Sayeed Mir, Gui-Jia Su

8:30AM  Open-Ended Induction Motor Drive with a Floating Capacitor Bridge at Variable DC Link Voltage [#244]
Albino Amerise, Michele Mengoni, Luca Zorri, Angelo Tani, Sandro Rubino and Iustin Radu Bojoi, University of Bologna, Italy; Politecnico di Torino, Italy

8:55AM  Dynamic Loss Minimization Control of Linear Induction Machine [#341]
Dong Hu, Wei Xu, Renjun Dian, Yi Liu and Jianguo Zhu, Huazhong University of Science and Technology, China; University of Technology Sydney, Australia
9:20AM  **Dynamic Loss Minimizing Control of a PM Servomotor Operating Even at the Voltage Limit When Using DB-DTFC [#768]**
Huthaifa Flieh, Robert Lorenz, Eigo Totoki, Shinichi Yamaguchi and Yuichiro Nakamura, University of Wisconsin Madison, United States; Mitsubishi Electric Corp., Japan

9:45AM  **Comparison of Postfault Control Strategies in Terms of Converter Losses for Dual Three-Phase Machines [#775]**
Fernando Baneira, Jesus Doval-Gandoy, Alejandro Yepes, Oscar Lopez and Diego Perez-Estevez, University of Vigo, Spain

**Induction Motor Drives**
Wednesday, October 4, 8:30AM-10:10AM, Room: 262, Chair: Marcello Pucci, Jingbo Liu

8:30AM  **A Three-Dimensional Predictive Current Trajectory Control Method for Open-End Winding Induction Motor [#498]**
Bohang Zhu and Kaushik Rajashekara, University of Texas at Dallas, United States; University of Houston, United States

8:55AM  **Comparison of Steady-State Induction Motor-Drive Efficiency Control Schemes [#631]**
Andrew Strandt and Lixiang Wei, Rockwell Automation, United States

9:20AM  **Model Predictive Direct Flux Vector Control of Multi Three-Phase Induction Motor Drives [#992]**
Sandro Rubino, Bojoi Radu, Odhano Shafiq Ahmed and Zanchetta Pericle, Politecnico di Torino, Italy; University of Nottingham, United Kingdom

9:45AM  **Open-End Six-Phase Machine Drive System With Six Three-Leg Converters [#1138]**
Nayara Brandao de Freitas, Cursino Brandao Jacobina, Victor Melo, Bruna Seibel Gehrke and Louelson Costa, Federal University of Campina Grande, Brazil

**Packaging I**
Wednesday, October 4, 8:30AM-10:10AM, Room: 207/208, Chair: Jelena Popovic, Zhuxian Xu

8:30AM  **Bonding of Large Substrates by Silver Sintering and Characterization of the Interface Thermal Resistance [#488]**
Shan Gao, Zhenwen Yang, Yansong Tan, Xin Li, Xu Chen, Zhan Sun and Guoquan Lu, Virginia Tech, United States; Tianjin University, China; Harbin Institute of Technology, China

8:55AM  **A High power-density and High Efficiency Insulated Metal Substrate Based GaN HEMT Power Module [#442]**
Juncheng(Lucas) Lu, Di Chen and Lyubov Yushyna, GaN Systems Inc, Canada

9:20AM  **A High Power Density Multichip Phase-Leg IGBT Module with Void-Free Die Attachment Using Nanosilver Paste [#315]**
Shancan Fu, Yunhui Mei, Xin Li and Guo-Quan Lu, Tianjin University, China; Virginia Tech, United States

9:45AM  **Paralleling 650 V/60 A GaN HEMTs for High Power High Efficiency Applications [#1307]**
Nidhi Haryani, Jun Wang and Rolando Burgos, CPES, Virginia Tech., United States

**LED Drivers**
Wednesday, October 4, 8:30AM-10:10AM, Room: 203, Chair: S. Ali Khajehoddin, Marcos Alonso

8:30AM  **Application of Artificial Neural-Network to Control the Light of Multi-Color LED System [#1195]**
Xiaoqing Zhan, Wenguan Wang and Henry Shu-hung Chung, City University of Hong Kong, Hong Kong

8:55AM  **GaN-Based High-Power-Density Electrolytic-Free Universal Input LED Driver [#1290]**
Saad Pervaiz, Ashish Kumar and Khurrram Afridi, University of Colorado Boulder, United States

9:20AM  **Forward-Flyback Converter for LED Driving with Reduced Number of Components [#1114]**
Jong-Woo Kim, Jung-Muk Choe and Jih-Sheng Lai, Virginia Tech, United States

9:45AM  **High frequency dc-dc AC-LED driver based on ZCS-QRCs [#984]**
Ignacio Castro, Sergio Lopez, Kevin Martin, Manuel Arias, Diego G. Lamar and Javier Sebastian, University of Oviedo, Spain

**Special Session:**
**Special Session:**

**Wednesday, October 4, 10:30AM-12:10PM**

**Wind Energy Applications**
Wednesday, October 4, 10:30AM-12:10PM, Room: 236, Chair: Nathan Weise, Eduard Muljadi

**10:30AM** Wind Turbine Bearing Fault Diagnosis Based on Sparse Representation of Condition Monitoring Signals [#728]
Jun Wang, Wei Qiao and Liyan Qu, University of Nebraska-Lincoln, United States

**10:55AM** Performance Evaluation of Slip Couplers with Spoke- and Surface-Mounted PM for Wind Energy Applications [#934]
Niniva Dumakude and Maarten Kamper, Stellenbosch University, South Africa

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**Power Sharing Techniques in Microgrids**
Wednesday, October 4, 10:30AM-12:10PM, Room: 233, Chair: Koji Orikawa, M. Guerrero Josep

**10:30AM** A Proportional Harmonic Power Sharing Scheme for Hierarchical Controlled Microgrids Considering Unequal Feeder Impedances and Nonlinear Loads [#131]
Hong Li, Yang Han, Ping Yang, Jingqi Xiong, Congling Wang and M. Guerrero Josep, Univ. Electron. Science and Tech. of China, China; Aalborg University, Denmark

**10:55AM** Adaptive Synchronous Reference Frame Virtual Impedance Controller for Accurate Power Sharing in Isolated AC-Microgrids: A Faster Alternative to the Conventional Droop Control [#270]
Carlos Andres Macana Moreno and Hemanshu Pota, The University of New South Wales, Australia

**DC Circuit Breaker Design**
Wednesday, October 4, 10:30AM-12:10PM, Room: 237/38, Chair: Ty McNutt, Rob Cuzner

**10:30AM** Fault Discrimination Using SiC JFET Based Self-Powered Solid State Circuit Breakers in a Residential DC Community Microgrid [#708]
Robert M. Cuzner, Karthik Palaniappan, Sedano Willy, Hoeft Nicholas and Shen John, University of Wisconsin-Milwaukee, United States; Illinois Institute of Technology, United States

**10:55AM** Optimization of Operation Temperature of Gate Commutated Thyristors for Hybrid DC Breaker [#1431]
Gang Lyu, Jiapeng Liu, Wenpeng Zhou, Rong Zeng, Xueqiang Zhang and Patrick R Palmer, Tsinghua University, China; UNIVERSITY OF CAMBRIDGE, United Kingdom; University of Cambridge, United Kingdom
11:20AM  A Topology of the Multi-Port DC Circuit Breaker for Multi-terminal DC System Fault Protection [710]
Wenjun Liu, Fei Liu, Xiaoming Zha, Chao Chen and Tianyi Yu, Wuhan University, China

11:45AM  Optimization of a Z-Source, Ultra-Fast Mechanically Switched, High Efficiency DC Circuit Breaker [1328]
Landon Mackey, Md Rifat Kaisar Rachi, Chang Peng and Iqbal Husain, North Carolina State University, United States; FREEDM Systems Center, United States

LLC Converters
Wednesday, October 4, 10:30AM-12:10PM, Room: 204, Chair: Regan Zane, Rivas-davila Juan

10:30AM  Efficiency Improvement of Three-Phase LLC Resonant Converter Using Phase Shedding [1245]
Sayed Abbas Arshadi, Martin Ordonez, Mehdi Mohammadi and Wilson Eberle, University of British Columbia, Canada

10:55AM  LLC Synchronous Rectification Using Homopolarity Cycle Modulation [1066]
Mehdi Mohammadi and Martin Ordonez, University of British Columbia, Canada

11:20AM  A Lagrangian Dynamics Model of Integrated Transformer Incorporated in a Multi-phase LLC Resonant Converter [942]
Mostafa Noah, Kazuhiro Umetani, Shun Endo, Hiroki Ishibashi, Jun Imaoka and Masayoshi Yamamoto, Shimane University, Japan; Okayama University, Japan; Kyushu University, Japan; Nagoya University, Japan

AC-AC Converters II
Wednesday, October 4, 10:30AM-12:10PM, Room: 230/31, Chair: Patrick Wheeler, Luca Zarri

10:30AM  Improvement of the Input-Output Quality of Three-level NPC Inverters with Small DC-link Capacitor [275]
Hyo Chul In, Seok-Min Kim and Kyo-Beum Lee, Ajou University, Korea (South)

Nayara Brandao de Freitas, Cursino Brandao Jacobina and Bruna Seibel Gehlke, Federal University of Campina Grande, Brazil

11:20AM  Control of Solid-State Transformer for Minimized Energy Storage Capacitors [936]
Takanori Isobe, Zijin He, Yang Zou and Hiroshi Tadano, University of Tsukuba, Japan

11:45AM  Analysis and Design of LC Filters for the 5-Level 3-Phase Back to Back E-Type Converter [1430]
Marco Di Benedetto, Alessandro Lidozzi, Luca Solero, Petar J. Grbovic and Fabio Crescimbini, Roma Tre University, Italy; Huawei Technologies Duesseldorf GmbH, Germany

Reliability, Diagnostic, and Faults Analysis in Power Converters II
Wednesday, October 4, 10:30AM-12:10PM, Room: 205, Chair: Yilmaz Sozer, Mario Pacas

10:30AM  Thermal stress mitigation by Active Thermal Control: Architectures, models and specific hardware [258]
Alessandro Soldati, Fabrizio Dossena, Giorgio Pietrini, Davide Barater, Carlo Concari and Francesco Iannuzzo, University of Parma, Italy; Aalborg University, Denmark

10:55AM  Impacts of PV Array Sizing on PV Inverter Lifetime and Reliability [471]
Ariya Sangwongwanich, Yongheng Yang, Dezso Sera and Frede Blaabjerg, Aalborg University, Denmark
11:20AM  Reliability Metrics Extraction for Power Electronics Converter Stressed by Thermal Cycles [#951]
Ke Ma, Ui-Min Choi and Frede Blaabjerg, Shanghai Jiao Tong University, China; Aalborg University, Denmark

11:45AM  Study of PWM Frequency and Its Impact to Adjustable Speed Drive Reliability [#1213]
Lixiang Wei, Jeffrey McGuire and Jiangang Hu, Rockwell Automation, United States

Modulation Techniques I
Wednesday, October 4, 10:30AM-12:10PM, Room: 201, Chair: Babak Parkhideh, Minjie Chen

10:30AM  Impact of carrier phase shift PWM on the DC link current of single and interleaved three-phase voltage source converters [#583]
Zhongyi Quan and Yunwei Li, University of Alberta, Canada

10:55AM  A DPWM-Controlled Three-Level T-Type Inverter for Photovoltaic Generation Considering Unbalanced Neutral-Point Voltage [#313]
MohammadMahdi Hashempour, Meng Ying Yang and Tzung Lin Lee, National Sun Yat-sen University, Taiwan

11:20AM  Over-modulation associated to Flash Memory Based Multi-Optimal PWM for Three-Phase Inverters [#257]
Dorin O. Neacsu and Bradley Lehman, Technical University of Iasi, Romania; Romania; Northeastern University, Boston, USA, United States

Modeling and Control of Grid Connected Converters I
Wednesday, October 4, 10:30AM-12:10PM, Room: 260/61, Chair: Paolo Mattavelli, Carl Ho

10:30AM  Improved Resonant Current Controller for Grid-Tied Converters [#1040]
Diego Perez-Estevéz, Jesus Doval-Gandoy, Alejandro Yepes, Oscar Lopez and Fernando Baneira, University of Vigo, Spain

10:55AM  Filter Capacitor Current Estimation and Grid Current Control in LCL based Grid Connected Inverter [#1097]
Subhajyoti Mukherjee, Vikram Roy Chowdhury, Pourya Shamsh and Mehdi Ferdowski, University of Austin, United States

11:20AM  A Dual Loop Current Control Structure With Improved Disturbance Rejection For Grid Connected Converters in the Synchronous Rotating Reference Frame [#1315]
Srinivas Guler, Vishnu Mahadeva Iyer and Subhashish Bhattacharya, North Carolina State University, United States

Synchronous Reluctance Machines II
Wednesday, October 4, 10:30AM-12:10PM, Room: 263, Chair: Ziaur Rahman, David Dorrell

10:30AM  Synchronous Reluctance Motor with Concentrated Windings for IE4 Efficiency [#855]
Matteo Gamba, Gianmario Pellegrino, Eric Armando and Simone Ferrarri, Politecnico di Torino, Italy

10:55AM  Carbon-Fiber Wrapped Synchronous Reluctance Traction Motor [#784]
Steven Galioto, Kevin Grace, Karthik Bodla and Ayman El-Refaie, General Electric, United States; Marquette University, United States

11:20AM  A Novel Fabrication and Assembly Method for Synchronous Reluctance Machines [#1294]
Chirag Desai, Hetal Mehta and Pragasesh Pillay, Concordia University, Canada; Happy Engineering, India

Variable Flux PM Machines
Wednesday, October 4, 10:30AM-12:10PM, Room: 264, Chair: Sang Bin Lee, Zi-Qiang Zhu

10:30AM  Synchronous Reluctance Motor with Concentrated Windings for IE4 Efficiency [#855]
Matteo Gamba, Gianmario Pellegrino, Eric Armando and Simone Ferrarri, Politecnico di Torino, Italy

10:55AM  Carbon-Fiber Wrapped Synchronous Reluctance Traction Motor [#784]
Steven Galioto, Kevin Grace, Karthik Bodla and Ayman El-Refaie, General Electric, United States; Marquette University, United States

11:45AM  High Speed Motors: a Comparison between Synchronous PM and Reluctance Machines [#238]
Cristian Babetto, Giacomo Bacco, Grazia Berardi and Nicola Bianchi, University of Padova, Italy
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<tr>
<td>10:30AM</td>
<td>PM and IPM Motor Drives II</td>
<td>Permanent Magnet Synchronous Machine Drive Control Using Analog Hall-Effect Sensors [#717]</td>
<td>David Reigosa, Daniel Fernandez, Cristina Gonzalez, Sang Bin Lee and Fernando Briz, University of Oviedo, Spain; Dept. of Elec. Eng., Korea University, Seoul, Korea (South)</td>
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<td>10:30AM</td>
<td>PM and IPM Motor Drives II</td>
<td>A New Zero-Sequence Current Suppression Control Strategy for Five-Phase Open-Winding FTFSCW-IPM Motor Driving System [#340]</td>
<td>RongHua Cui, Ying Fan and Ming Cheng, Southeast University, China</td>
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<td>11:30AM</td>
<td>Packaging II</td>
<td>A Novel Low Inductive 3D SiC Power Module Based on Hybrid Packaging and Integration Method [#964]</td>
<td>Zhizhao Huang, Yuxiong Li, Lichuan Chen, Yifan Tan, Cai Chen, Yong Kang and Fang Luo, Huazhong University of Science and Technology, China; Huazhong University of Science and Technology, China; University of Arkansas, United States</td>
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<td>11:30AM</td>
<td>Packaging II</td>
<td>Design of a Novel, High-Density, High-Speed 10 kV SiC MOSFET Module [#1063]</td>
<td>Christina DiMarino, Mark Johnson, Bassem Mouawad, Jianfeng Li, Dushan Boroyevich, Rolando Burgos, Guo-Quan Lu and Meiyu Wang, CPES, Virginia Tech, United States; University of Nottingham, United Kingdom</td>
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<td>11:20AM</td>
<td>Flexible Epoxy-Resin Substrate Based 1.2 kV SiC Half Bridge Module with Ultra-low Parasitics and High Functionality [#466]</td>
<td>Xin Zhao, Bo Gao, Yifan Jiang, Liqi Zhang, Sizhen Wang, Yang Xu, Kenji Nishiguchi, Yoshi Fukawa and Douglas Hopkins, North Carolina State University, United States; Risho Kogyo Co., Ltd, Japan; TOYOTech LLC, United States</td>
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**PM and IPM Motor Drives II**
Wednesday, October 4, 10:30AM-12:10PM, Room: 262, Chair: Ali Bazzi, Prerit Pramod
10:30AM Achieving Low Magnetic Flux Density and Low Electric Field Intensity for an Inductive Wireless Power Transfer System [#873]
Guangqi Zhu and Robert D. Lorenz, University of Wisconsin - Madison, WEMPEC, United States

10:55AM FOM-rd plane: An Effective Design and Analysis Methodology for Resonant Energy Link in Inductive Power Transfer [#1317]
Chae-Ho Jeong, Hee-Su Choi and Sung-Jin Choi, University of Ulsan, Korea, Republic of

Special Session:

Special Session:

Wednesday, October 4, 2:00PM-3:40PM

PV Plants and PV Farms
Wednesday, October 4, 2:00PM-3:40PM, Room: 236, Chair: Raja Ayyanar, Fei Gao

2:00PM AC Impedance Derivation of Utility Scale PV Farm [#120]
Ye Tang, Rolando Burgos, Chi Li and Dushan Boroyevich, CPES, Virginia Tech, United States

2:25PM A New Approach for Increasing Energy Harvest in Large Scale PV Plants Employing a Novel Voltage Balancing Topology [#1349]
Ahmed Morsy, Sabeel Sinan and Prasad Enjeti, Texas A and M University, United States; Texas A and M University/ Qatar Foundation, United States

2:50PM On-line Health Monitoring of PV plants [#740]
Manjunath Matam, Venugopal Reddy Barry, Ye Zhao and Brad Lehman, National Institute of Technology Goa, India; Northeastern University, United States

3:15PM Hybrid solar plant with synchronous power controllers contribution to 12-bus system stability [#750]
Daniel Remon, Antoni M. Cantarellas, Jorge Martinez Garcia, Juan M. Escano and Pedro Rodriguez, Technical University of Catalonia, Spain; Abengoa, Technical University of Catalonia, Spain; Abengoa, Spain; Loyola University Andalusia, Spain; Loyola University Andalusia, Technical Universit, Spain

Droop Techniques for Microgrid Operation
Wednesday, October 4, 2:00PM-3:40PM, Room: 233, Chair: Rolando Burgos, Hui Li

2:00PM Comparison between Inverters Based on Virtual Synchronous Generator and Droop Control [#10]
Xin Meng, Zeng Liu, Jinjun Liu, Shike Wang, Baojin Liu and Ronghui An, Xi’an Jiaotong University, China

2:25PM Hybrid Isochronous-Droop Control for Power Management in AC Microgrids [#1322]
Inam Ullah Nutkani, Lasantha Meegahapola, LIM Chee Shen and Donald Grahame Holmes, School of Eng, RMIT University, Melbourne, Australia; University of Southampton, Malaysia, Malaysia
2:00PM *Admittance-type RC-mode Droop Control to Introduce Virtual Inertia in DC Microgrids* [#870]
Zheming Jin, Meng Lexuan, Han Renke, Guerrero Josep M. and Vasquez Juan C., Aalborg University, Denmark

2:25PM *Power-Based Droop Control Suppressing the Effect of Bus Voltage Harmonics for DC Microgrids* [#1065]
Guangyuan Liu, Tommaso Caldognetto, Paolo Mattavelli and Paolo Magnone, Padova university, Italy

2:50PM *A Modified Q-Vdot Droop Control for Accurate Reactive Power Sharing in Distributed Generation Microgrid* [#691]
Jiuyang Zhou and Po-tai Cheng, National Tsing Hua University, Taiwan

### Resonant DC/DC Converters

**Wednesday, October 4, 2:00PM-3:40PM, Room: 204, Chair: Aleksandar Prodic, Hongliang Wang**

2:00PM *An Improved Voltage Balancing Technique for a Soft-Switched High-Gain Converter with Low Voltage Stress Using Duty Ratio Control for Wind Energy Application* [#655]
Mehdi Abbasi and John Lam, York University, Canada

2:25PM *A Power Converter for an Electrostatic Precipitator using SiC MOSFETs* [#94]
Pedro J. Villegas Saiz, Juan A. Martin Ramos, Juan Diaz Gonzalez and Juan A. Martinez Esteban, Oviedo University, Spain

2:50PM *A Hybrid Resonant Three-Level Converter for Renewable Energy in MVDC Collection Systems* [#228]
Guangfu Ning, Xiaopeng Cao, Liangcai Shu, Wu Chen and Baojian Ji, Southeast University, China; Nanjing University of Technology, China

3:15PM *Time Domain Analysis of LLC Resonant Converters in the Boost Mode for Battery Charger Applications* [#1013]
Navid Shafiei, Mohammad Ali Saket and Martin Ordonez, The University of British Columbia, Canada

### Modular Multilevel Converters (MMC)

**Wednesday, October 4, 2:00PM-3:40PM, Room: 230/31, Chair: Luca Solero, Rostan Rodrigues**

2:00PM *A Fault-Tolerant Operation Scheme for a Modular Multilevel Converter with a Distributed Control Architecture* [#278]
Shunfeng Yang, Yi Tang, Pengfei Tu and Peng Wang, Nanyang Technological University, Singapore

2:25PM *Redistributed Pulse Width Modulation of MMC Battery Energy Storage System under Submodule Fault Condition* [#547]
Xin Gu, Feng Gao, Farooq Aamir, Xinfeng Liu and Jing Xiao, Shandong University, China; Shandong University, Pakistan; Shandong Electric Power Maintenance Company, China

2:50PM *Compensation Method of Arm Current Sensor Scaling Error in MMC System* [#718]
Belete Belayneh Negesse, Chang-Hwan Park and Jang-Mok Kim, Pusan National university, Korea, Republic of

3:15PM *A Novel Submodule Topology for MMC Against DC Side Short-Circuit Faults* [#365]
Yao Xue, Xiaofeng Yang, Trillion Q Zheng, Bowei Chen and Yan Li, Beijing Jiaotong University, China; Electric Power Research Institute, China
Reliability, Diagnostic, and Faults Analysis for Power Devices
Wednesday, October 4, 2:00PM-3:40PM, Room: 205, Chair: Behrooz Mirafzal, Jun Wang

2:00PM Fault Detection Method for IGBT
Open-circuit Faults in the Modular Multilevel Converter Based on predictive model [#373]
Kunshan Xu, Shaojun Xie, Ye Yan, Zhao Zhang, Binfeng Zhang and Qiang Qian, Nanjing University of aeronautics.astronautics., China

2:25PM Asymmetric Power Device Rating Selection for Even Temperature Distribution in NPC Inverter [#66]
Ui-Min Choi and Frede Blaabjerg, Aalborg University, Denmark

2:50PM Impact of Lifetime Model Selections on the Reliability Prediction of IGBT Modules in Modular Multilevel Converters [#1137]
Yi Zhang, Huai Wang, Zhongxu Wang, Yongheng Yang and Frede Blaabjerg, Aalborg University, Denmark

3:15PM Open-circuit Fault Diagnosis of Switching Devices in a Modular Multilevel Converter with Distributed Control [#912]
Shunfeng Yang, Yi Tang and Peng Wang, Nanyang Technological University, Singapore

Modulation Techniques II
Wednesday, October 4, 2:00PM-3:40PM, Room: 201, Chair: Jason Lai, Martin Ordenez

2:00PM New Constraint in SHE-PWM for Single Phase Inverter Applications [#195]
Mohammad Sharifzadeh, Hani Vahedi and Kamal Al-Haddad, Ecole de technologie superieure, Canada; Ossiaco Inc., Canada

2:25PM Novel Modulation Schemes and Switching Pattern for Z-Source Ultra-Sparse Matrix Converter [#1136]
Amir Masoud Bozorgi, Mehdi Farasat and Ekrem Karaman, Louisiana State University, United States; Warner Power LLC, United States

2:50PM A New Adaptive Switching Frequency Modulation for Optimizing Low Power Cascaded Buck-Boost Converter [#589]
Xi Chen, Anirudh Ashok Pise, John Elmes and Issa Batarseh, University of Central Florida, United States; Advanced Power Electronics Corporation. United States

3:15PM An Improved Modulation Strategy for the Three-Phase Z-Source Inverters (ZSIs) [#1004]
Ahmed Abdelhakim, Pooya Davari, Frede Blaabjerg and Paolo Mattavelli, University of Padova, Italy; Aalborg University, Denmark

Modeling and Control of Grid Connected Converters II
Wednesday, October 4, 2:00PM-3:40PM, Room: 260/61, Chair: Jian Sun, Mahshid Amirabadi

2:00PM Improved Control Strategy of Grid Connected Inverter without Phase Locked Loop on PCC Voltage Disturbance [#191]
Liang Chen, Nian Heng, Boliang Lou and HongYang Huang, Zhejiang University, China; State Grid Zhejiang Electric Power Company, China

2:25PM Automated and Scalable Optimal Control of Three-Phase Embedded Power Grids including PLL [#807]
David Dewar, Andrea Formentini and Pericle Zanchetta, University of Nottingham, United Kingdom

2:50PM Optimal Variable Switching Frequency Scheme for Grid Connected Full Bridge Inverters with Bipolar Modulation Scheme [#650]
Yinglai Xia, Jinia Roy and Raja Ayyanar, Arizona State University, United States

3:15PM Grid-Connected Power Converters with Distributed Virtual Power System Inertia [#62]
Jingyang Fang, Xiaoqiang Li and Yi Tang, Nanyang Technological University, Singapore

Linear Machines
Wednesday, October 4, 2:00PM-3:40PM, Room: 263, Chair: Siavash Pakdelen, David Diaz Reigosa
2:00PM Analysis and Comparative Study of Coreless-Type Permanent Magnet Linear Synchronous Machines with Concentrated Windings [#1226]
Seun Guy Min and Bulent Sarlioglu, UW-Madison, WEMPEC, United States

2:25PM Comparative Study of Novel Tubular Flux-Reversal Transverse Flux Permanent Magnet Linear Machine [#495]
Shaohong Zhu, Tom Cox and Chris Gerada, The University of Nottingham, United Kingdom

2:50PM Electrical Losses Minimization of Linear Induction Motors Considering the Dynamic End-effects [#48]
Angelo Accetta, Maria Carmela Di Piazza, Massimiliano Luna and Marcello Pucci, ISSIA-CNR, Italy

PM Motor Design, Control and Testing
Wednesday, October 4, 2:00PM-3:40PM, Room: 264, Chair: Junichi Asama, Andrea Cavagnino

2:00PM Inductance Testing According to the New IEEE Std 1812 Application and Possible Extensions for IPM Machines [#1458]
Vandana Rallabandi, Narges Taran, Dan Ionel and Ping Zhou, University of Kentucky, United States; Ansoft Corporation, United States

2:25PM Parametric Design Method for SPM Machines Including Rounded PM Shape [#990]
Chao Lu, Simone Ferrari, Gianmarco Pellegrino, Matteo Davoli and Claudio Bianchini, Politecnico di Torino, Italy; University of Modena and Reggio Emilia, Italy

2:50PM Investigation of Different Servo Motor Designs for Servo Cycle Operations and Loss Minimizing Control Performance [#477]
Huthaifa Flieh, Robert Lorenz, Eigo Totoki, Shinichi Yamaguchi and Yuichiro Nakamura, University of Wisconsin Madison, United States; Mitsubishi Electric Corp., Japan

Drive Applications
Wednesday, October 4, 2:00PM-3:40PM, Room: 262, Chair: Mazharul Chowdhury, Annette Muetze

2:00PM Over-voltage Mitigation on SiC based motor drives through an Open End Winding Configuration [#1433]
Salvatore De Caro, Salvatore Foti, Giacomo Scelba, Tommaso Scimone, Antonio Testa, Sebastiano Russo and Mario Pulvirenti, University of Messina, Italy; University of catania, Italy; STmicroelectronics, Italy

2:25PM A Fault Monitoring System for a Reciprocating Pump Driven by a Linear Motor for Oil Pumping Systems [#601]
Hussain Hussain and Hamid Toliyat, Texas A_and_M University, United States

2:50PM The Impact of Grid Unbalances on the Reliability of DC-link Capacitors in a Motor Drive [#1415]
Huai Wang, Pooya Davari, Dinesh Kumar, Firuz Zare and Frede Blaabjerg, Aalborg University, Denmark; Danfoss Drives A/S, Denmark; The university of Queensland, Australia

High Voltage Devices
Wednesday, October 4, 2:00PM-3:40PM, Room: 207/208, Chair: Daniel Costinett, Ruxi Wang

2:00PM Development of PSpice Modeling Platform for 10kV/100A SiC MOSFET Power Module [#33]
Nawaz Muhammad, Pedro Rodrigues Martins Joao, Ilves Kalle and Iannuzzo Francesco, ABB Corporate Research, Sweden; Aalborg University, Department of Energy, Denmark

2:25PM Continuous Switching Operation of 15 kV FREEDM Super-Cascode [#1283]
Soumik Sen, Xiaojing Song, Liqi Zhang and Alex Huang, North Carolina State University, United States
2:50PM  Experimental Optical Transistor for All-Optical SiC ETO Thyristor [#1438]
Alireza Mojab and Sudip Mazumder, UIC, United States

3:15PM  Modeling and power loss evaluation of ultra wide band gap Ga2O3 device for high power applications [#1304]
Inhwan Lee, Avinash Kumar, Ke Zeng, Uttam Singisetti and Xiu Yao, University at Buffalo, United States

Wireless Power Transfer III
Wednesday, October 4, 2:00PM-3:40PM, Room: 200, Chair: Xu She, Alireza Safaee

2:00PM  The Effect of Matrix Power Repeaters on Magnetic Field Distribution of IPT Systems [#569]
Rong Hua, Aiguo Patrick Hu and Ho Fai Leung, University of Auckland, New Zealand

2:25PM  Soft-Switching Self-Tuning H-bridge Converter for Inductive Power Transfer Systems [#246]
Masood Moghaddami, Andres Cavada and Arif Sarwat, Florida International University, United States

2:50PM  Load-independent transconductance and ZPA input for symmetrical resonant converter in IPT system [#333]
Jianghua Lu, Guorong Zhu, Jin Jiang, Wenjing Li, Bo Li and Jin Wang, Wuhan University of Technology, China; University of Western Ontario, Canada

3:15PM  Design of Wireless Power Transfer System for Devices Carried by a Freely Moving Animal in Cage [#377]
Jeff Po Wa Chow, Henry Shu Hung Chung, Leanne Lai Hang Chan, Nathan Judson McDannold and Sai Chun Tang, City University of Hong Kong, Hong Kong; Brigham and Women's Hospital, United States

Special Session:

Special Session:

Wednesday, October 4, 4:00PM-5:40PM

Solar Photovoltaic Technologies
Wednesday, October 4, 4:00PM-5:40PM, Room: 236, Chair: Afshin Izadian, Yongheng Yang

4:00PM  Subcell Modelling of Partially Shaded Solar Photovoltaic Panels [#146]
Pallavi Bharadwaj and Vinod John, Dept of EE, Indian Institute of Science, India

4:25PM  Effect of water on parasitic capacitance of photovoltaic panel [#1455]
Shaolin Yu, Jianing Wang and Xing Zhang, Hefei University of Technology, China

4:50PM  An Application of Support Vector Machine to PV Power Forecasting under Different Weather Conditions [#206]
Utpal Kumar Das, Kok Soon Tey, Mohd Yamani Idris Mekhilef and Mutsuo Nakaoka, University of Malaya, Malaysia

5:15PM  High Performance Buck-boost Converter based PV Characterisation Set-up [#144]
Pallavi Bharadwaj and Vinod John, Dept of EE, Indian Institute of Science, India

Control and Design Techniques for Microgrids I
Wednesday, October 4, 4:00PM-5:40PM, Room: 237/38, Chair: M. Guerrero Josep, Mohammad B Shadmand

4:00PM  An Application of Support Vector Machine to PV Power Forecasting under Different Weather Conditions [#206]
4:00PM A Stabilization Method of LC Input Filter Feeding Constant Power Loads in DC Microgrids [#609]
Wang Hao, Han Hua, Liu Zhangjie, Sun Yao, Su Mei, Hou Xiaochao and Yang Peng, Central South University, China

4:25PM Model-Predictive-Control-Based Distributed Control Scheme for Bus Voltage Unbalance and Harmonics Compensation in Microgrids [#402]
Jia Liu, Yushi Miura and Toshifumi Ise, Osaka University, Japan

Datacenters and Telecommunication Applications
Wednesday, October 4, 4:00PM-5:40PM, Room: 207/208, Chair: Al-Thaddeus Avestruz, Ashish Kumar

4:00PM A High Efficiency Resonant Switched-Capacitor Converter for Data Center [#1100]
Yanchao Li, Xiaofeng Lyu, Boris Curuvija, Ze Ni and Dong Cao, North Dakota State University, United States

4:25PM A Series-Stacked Architecture with 4-to-1 GaN-Based Isolated Converters for High-Efficiency Data Center Power Delivery [#1299]
Yizhe Zhang, Enver Candan and Robert Pilawa-Podgurski, University of Illinois at Urbana-Champaign, United States

Power Electronics in Electrified Vehicles
Wednesday, October 4, 4:00PM-5:40PM, Room: 233, Chair: Matthias Preindl, Gui-Jia Su

4:00PM Range Extension of Electric Vehicles by Two Battery HEECS Chopper based Power Train [#1121]
Ayataro Tamura, Koji Kobayashi, Yukinori Tsuruta, Kazuaki Kojima, Hidehiko Obara and Atsuo Kawamura, Yokohama National University, Japan

4:25PM A Delta-Structured Switched-Capacitor Equalizer for Series-Connected Battery Strings [#1026]
Yunlong Shang, Bing Xia, Jufeng Yang, Chenghui Zhang, Naxin Cui and Chris Mi, Shandong University, China; San Diego State University, United States

DAB DC/DC Converters
Wednesday, October 4, 4:00PM-5:40PM, Room: 204, Chair: Alessandro Costabeber, Madhav Manjrekar

4:00PM Wide Range ZVS Operation of Three-Phase Dual Active Bridge Converters using Reduced Coupling Factor Transformers [#1296]
Carlos Teixeira, Jan Riedel, Brendan McGrath and Donald Grahame Holmes, RMIT University, Australia

4:25PM Modelling and Analysis of the Transformer Current Resonance in Dual Active Bridge Converters [#1447]
Zian Qin, Zhan Shen and Frede Blaabjerg, Aalborg University, Denmark
**4:50PM** A Novel ISOP Current-Fed Modular Dual-Active-Bridge (CF-MDAB) DC-DC Converter with DC Fault Ride-Through Capability for MVDC Application [#686]
Yuxiang Shi, Ran Mo, Hui Li and Zhiguo Pan, ABB Inc., United States; Florida State University, United States

**5:15PM** Design Considerations For a High-power Dual Active Bridge DC-DC Converter With Galvanically Isolated Transformer [#678]
Lee Youngsil, Gaurang Vakil, Alan Watson and Patrick Wheeler, University of Nottingham, United Kingdom

**MMC Modulation and Control**
Wednesday, October 4, 4:00PM-5:40PM, Room: 230/31, Chair: Pericle Zanchetta, Jean-Luc Schanen

**4:00PM** Lagrange-Based Optimization of Cell Voltage and Arm Current with Zero-Sequence Current Injection in Modular Multilevel Converter [#1146]
Tsai-Fu Wu, Jun-Wei Huang and Tzu-Chieh Chou, National Tsing Hua University, Taiwan

**4:25PM** Discontinuous PWM Scheme for a Modular Multilevel Converter with Advanced Switching Losses Reduction Ability [#314]
Min-Gyo Jeong, Seok-Min Kim and Kyo-Beum Lee, Ajou University, Korea (South)

**4:50PM** Dynamic Matrix Predictive Control on AC-AC Modular Multilevel Converter: Design, Control and Real-Time Simulation [#305]
Jorge Gonzalez, Jose Espinoza, Homero Miranda and Marcelo Perez, Autonoma San Luis Potosi University, Mexico; Concepcion University, Chile; UFSM, Chile

**5:15PM** Capacitor Voltage Ripples Characterization and Reduction of Hybrid Modular Multilevel Converter With Circulating Current Injection [#389]
Cong Zhao, Yaohua Li, Fei Xu, Xixin Li, Ping Wang and Ming Lei, Institute of Electrical Engineering, CAS, China

**Control of Grid Connected Converter**
Wednesday, October 4, 4:00PM-5:40PM, Room: 260/61, Chair: Joseph Olorunfemi Ojo, Xiongfei Wang

**4:00PM** An Envelope-Based Detection Method for Resonance Damping in Grid-Connected Converters [#16]
Chia-tse Lee, Akira Kikuchi and Tomomichi Ito, Hitachi,Ltd., Japan

**4:25PM** Manitoba Inverter - Single Phase Single-Stage Buck-Boost VSI Topology [#263]
Carl Ngai Man Ho and Ken King Man Siu, University of Manitoba, Canada

**4:50PM** Direct Decoupled Active and Reactive Predictive Power Control of Grid-tied Quasi-Z-Source Inverter for Photovoltaic Applications [#1202]
Sarthak Jain, Sivasai Praneeth Nanduri, Mohammad B. Shadmehr, Robert S. Balog and Haitham Abu-Rub, Texas A and M University, United States; Texas A and M University at Qatar, Qatar

**5:15PM** Optimal phase shifted method to reduce current ripples for a parallel grid-connected voltage source inverter under unequal DC-link voltage [#279]
June-Hee Lee and Kyo-Beum Lee, Ajou University, Korea (South)

**Modeling and Control of AC-DC Converters**
Wednesday, October 4, 4:00PM-5:40PM, Room: 205, Chair: Frede Blaabjerg, Marco Dalla Costa

**4:00PM** A Robust Deadbeat Predictive Power Control with Sliding Mode Disturbance Observer for PWM Rectifiers [#112]
Haitao Yang, Yongchang Zhang, Jiejunyi Liang, Nong Zhang and Paul Walker, University of Technology, Sydney, Australia; North China University of Technology, China

**4:25PM** A Control Strategy to Compensate for Current and Voltage Measurement Errors in Three-phase PWM Rectifiers [#840]
Quoc Nam Trinh, Fook Hoong Choo, Yi Tang and Peng Wang, Nanyang Technological University, Singapore
4:50PM Carrier Based PWM for Reduced Capacitor Voltage Ripple in Three-Phase Three-Switch Buck-Type Rectifier System [#965]
Beomseok Chae, Tahyun Kang and Yongsug Suh, Chonbuk National University, Korea (South); Milimsyscon Co., Korea (South)

5:15PM Direct Power Control of PWM Rectifier under Unbalanced Network Using Extended Power Theory [#852]
Yongchang Zhang, Jie Liu and Jihao Gao, North China University of Technology, China

Model Predictive Control of Power Converters I
Wednesday, October 4, 4:00PM-5:40PM, Room: 201, Chair: Ralph Kennel, Tobias Geyer

4:00PM Modulated Model Predictive Control for Active Split DC-bus 4-leg Inverters [#1061]
Stefano Bifaretti, Luca Tarisciotti, Alessandro Lidozzi, Sabino Pipolo, Pericle Zanchetta and Luca Solero, C-PED, University of Rome Tor Vergata, Italy; University of Nottingham, United Kingdom; C-PED, ROMA TRE University, Italy

4:25PM On the Inherent Relationship between Finite Control Set Model Predictive Control and SVM-based Deadbeat Control for Power Converters [#1352]
Yongchang Zhang, Jie Liu and Shengwen Fan, North China University of Technology, China

4:50PM Predictive Current Control for Stabilizing Power Electronics Based AC Power Systems [#1427]
Ma Awal, Iqbal Husain and Wensong Yu, North Carolina State University, United States

4:50PM Predictive Current Control for Stabilizing Power Electronics Based AC Power Systems [#1427]
Ma Awal, Iqbal Husain and Wensong Yu, North Carolina State University, United States

5:15PM Computationally Efficient Long-Horizon Direct Model Predictive Control for Transient Operation [#476]
Petros Karamanakos, Tobias Geyer and Ricardo Aguiera, Tampere University of Technology, Finland; ABB Corporate Research, Switzerland; University of Technology Sydney, Australia

Thermal Model of Electric Machines
Wednesday, October 4, 4:00PM-5:40PM, Room: 263, Chair: Davide Barater, Rashmi Prasad

4:00PM Improved thermal model for predicting end-windings heat transfer [#776]
Gabriele Luca Basso, Yew Chuan Chong, Dave Staton and James Goss, Motor Design Ltd, United Kingdom

4:25PM Reducing the complexity of thermal models for electric machines via sensitivity analyses [#460]
Bassel Assaad, Khadija El-kadri, Guy Friedrich, Stephane Vivier and Antoine Michon, Renault, France; University of technology of compiegne, France; CETIM, France

5:15PM Reduced Lumped Parameter Thermal Model for External Rotor Permanent Magnet Motor Design [#1096]
Aitor Tovar-Barranco, Amaia Lopez-de-Heredia, Irma Villar and Fernando Briz, IK4-Ikerlan Technology Research Centre, Spain; Universidad de Oviedo, Spain

PM Machines, Demagnetization, Eccentricity and Losses
Wednesday, October 4, 4:00PM-5:40PM, Room: 264, Chair: Gianmario Pellegrino, Bulent Sarliglu

4:00PM On-line Detection of Rotor Eccentricity for PMSMs based on Hall-effect Field Sensor Measurements [#754]
Yonghyun Park, Daniel Fernandez, Sang Bin Lee, Doosoo Hyun, Suneel Kommuri, Changhee Cho, David Reigosa, Fernando Briz and Myung Jeong, Korea University, Korea, Republic of; University of Oviedo, Spain; Dongyang Mirae University, Korea, Republic of; Kyunggi College of Science and Technology, Korea, Republic of

4:25PM Detection of Demagnetization in Permanent Magnet Synchronous Machines Using Hall-Effect Sensors [#749]
David Reigosa, Daniel Fernandez, Yonghyun Park, Alberto B. Diez, Sang Bin Lee and Fernando Briz, University of Oviedo, Spain; Dept. of Elec. Eng.,Korea University, Seoul, Korea (South)

4:50PM Demagnetization Study of an Interior Permanent Magnet Synchronous Machine considering Transient Peak 3 Phase Short-Circuit Current [#183]
Seong Lee, Borg Warner, Power Drive Systems, United States
5:15PM Reduction of Inverter Carrier Harmonic Losses in Interior Permanent Magnet Synchronous Motors by Optimizing Rotor and Stator Shapes [#339]
Katsumi Yamazaki, Yusuke Togashi, Takeshi Ikemi, Shunji Ohki and Ryoichi Mizokami, Chiba Institute of Technology, Japan; Nissan Motor Co., Ltd., Japan

Control of Electric Drives II
Wednesday, October 4, 4:00PM-5:40PM, Room: 262, Chair: Michael Harke, Alireza Fatemi

4:00PM Robust control for high performance induction motor drives based on partial state-feedback linearization [#240]
Francesco Alonge, Maurizio Cirrincione, Filippo D'Ippolito, Marcello Pucci, Roberto Rabbeni and Antonino Sferlazza, University of Palermo, Italy; University of the South Pacific, Fiji; ISSIA CNR, Italy; CNRS, LAAS, France

4:25PM The Vector Space Decomposition Based Control for Multiple-Channel Indirect Matrix Converter Fed Dual three-phase PMSM Drives [#331]
Yang Xiao and Zheng Wang, EE, Southeast University, China

Emerging Applications
Wednesday, October 4, 4:00PM-5:40PM, Room: 200, Chair: Jin Wang, Mark J Scott

4:00PM Design of a Linear Permanent Magnet Synchronous Motor for Needle-free Jet Injection [#355]
Nick N. L. Do, Andrew J. Taberner and Bryan P. Ruddy, Auckland Bioengineering Institute, New Zealand; University of Auckland, New Zealand

4:25PM An Energy Harvesting Scheme for Dielectric Elastomer Generators [#1342]
Ramanuja Panigrahi, Santanu Mishra, Arpit kumar Srivastava and Sumit Basu, Indian Institute of Technology Kanpur, India

Special Session:

Special Session:

Thursday, October 5, 8:30AM-10:10AM

Other Topics in Renewable Energy Applications
Thursday, October 5, 8:30AM-10:10AM, Room: 236, Chair: Fei Gao, John Lam

8:30AM Performance of Anti-Islanding of an Improved Reactive Power Variation Method based on Positive Feedback [#201]
Jongmin Jo and Hanju Cha, Chungnam National University, Korea (South)

8:55AM Shaping of PWM Converter Admittance with Outer Power Control Loop [#316]
Byeong-Heon Kim and Seung-Ki Sul, North Carolina State University, Korea (South); Seoul National University, Korea (South)
9:20AM  Hydrokinetic powered Irrigation Network Automation: A scalable architecture for the enablement of real-time automated decentralized control of the irrigation water delivery system in developing countries [657]
Mohammad A. Bharmal, Syeda Q. Akbar, Sana Noor, Rabiya Farooq and Nauman A. Zaffar, Lahore University of Management Sciences, Pakistan

9:45AM  Wind farm grounding system analysis [95]
Massoud Shahrpoosh, David Dorrell and Li Li, University of Technology Sydney, Australia; University of KwaZulu-Natal, South Africa

Power Quality of Grid Connected Converters I
Thursday, October 5, 8:30AM-10:10AM, Room: 233, Chair: Brandon Grainger, Stefano Bifaretti

8:30AM  Diversifying the role of distributed generation grid side converters for improving the power quality of distribution networks using advanced control techniques [939]
Zunaib Ali, Nicholas Christofides, Lenos Hadjidemetriou and Elias Kyriakides, Frederick University, Nicosia, Cyprus, Cyprus; University of Cyprus, Cyprus

8:55AM  Circulating Resonant Current Suppression for Current-controlled Inverters Based on Output Impedance Shaping [975]
Qiang Qian, Binfeng Zhang, Zhaohui Ni, Shaojun Xie, Jinming Xu and Kunshan Xu, Nanjing University of Aero. and Astronautics, China

Control and Design Techniques for Microgrids II
Thursday, October 5, 8:30AM-10:10AM, Room: 237/38, Chair: Ron Hui, Tsai-Fu Wu

8:30AM  Multi-microgrids Energy Optimization based on Centralized-Decentralized Hybrid Hierarchical Control [842]
Meiqin Mao, Yangyang Wang, Liuchen Chang and Yan Du, Hefei University of Technology Hefei 230009, China; University of New Brunswick, Canada

8:55AM  Coordinated Failure Response and Recovery in a Decentralized Microgrid Architecture [605]
Adel Nasiri, Salar Bani-Ahmed and Mohammad Rashidi, UW-Milwaukee, United States

Wireless Charging for EV
Thursday, October 5, 8:30AM-10:10AM, Room: 232, Chair: ChunTaek Rim, Dong Dong

8:30AM  Load Power Agnostic 6.6 kW Wireless Electric Vehicle Charger with LCL Tuned Primary and Secondary Side Regulation [886]
Veda Prakash Galigekere, Omer Onar, Chinthavali MadhuSudhan and Wang Zhiqiang, Oak Ridge National Laboratory, United States

8:55AM  High Power Factor Z-Source Resonant Wireless Charger with Soft Switching [813]
Hulong Zeng and Fangz Peng, Michigan State University, United States

9:20AM  Sensorless Unbalance Correction as an Ancillary Service for LV 4-Wire 3-Phase Power Converters [1503]
Andres Suarez Gonzalez, Pablo Garcia Garcia, Angel Navarro-Rodriguez, Geber Villa Fernandez and Jose M. Cano, University of Oviedo, Spain

9:45AM  Convertible Static Transmission Controller Model and Supervisory Vector Control for Operation under Unbalanced Grid Conditions [1254]
Faris Alfaris and Subhashish Bhattacharya, North Carolina State University, United States

9:20AM  Analysis and Improvement of Synchronous Stability of Micro-Grids with Parallel Connected Inverters [638]
Vikram Roy Chowdhury, Subhajyoti Mukherjee, Pourya Shamsi and Mehdi Ferdowsi, Missouri University of Science and Technology, United States

9:45AM  Smart Resistor: Trajectory Control of Constant Power Loads in DC Microgrids [1140]
Eric Bauer, Karun Arjun Potty, He Li and Jin Wang, The Ohio State University, United States

9:20AM  Bifurcation Phenomenon Limits for Three Phase IPT Systems With Constant Coupling Coefficient [129]
Ugaitz Iruretagoyena, Irma Villar, Asier Garcia-Bediaga, Luis Mir and Haritzca Camblong, IK4-Ikerlan Technology Research Centre, Spain; University of the Basque Country, Spain
9:45AM A Practical Static Simulator for Dynamic Wireless Charging of Electric Vehicle Using Receiver Open Circuit Voltage Equivalent [#286]
Shuangcheng Song, Qianfan Zhang, Chunbo Zhu and Diri Wang, Harbin Institute of Technology, China

Multilevel Converters Applications
Thursday, October 5, 8:30AM-10:10AM, Room: 204, Chair: Sheldon Williamson, Liliana De Lillo

8:30AM Low-Voltage-Ride-Through Control of a Modular Multilevel SDBC Inverter for Utility-Scale Photovoltaic Systems [#887]
Paul Sochor, Nadia M. L. Tan and Hirofumi Akagi, Tokyo Institute of Technology, Japan; Universiti Tenaga Nasional, Malaysia

8:55AM Common-Mode Voltage Analysis and Suppression in Five-Level Modular Composited Converter [#298]
Jiawei Hu, Junsong Tang, Ye Mei, Senjun Hu, Wuhua Li and Xiangning He, Zhejiang University, China

MMC New Topologies
Thursday, October 5, 8:30AM-10:10AM, Room: 230/31, Chair: Andrea Formentini, Marcello Pucci

8:30AM ESBC: an Enhanced Modular Multilevel Converter with H-Bridge Front End [#100]
Emmanuel Amankwah, Alessandro Costabeber, David Trainer, Omar Jasim and Jon Clare, The University of Nottingham, United Kingdom; GE Energy Connections, United Kingdom

8:55AM Investigation of a New Modular Multilevel Converter with DC Fault Blocking Capability [#336]
Xing Hu, Jianzhong Zhang, Shuai Xu and Yongjiang Jiang, Southeast University, China

Modeling and Control of DC-DC Converters I
Thursday, October 5, 8:30AM-10:10AM, Room: 205, Chair: Praveen Jain, Petros Karamanakos

8:30AM Seamless Transition of the Operating Zones for the Extended-Duty-Ratio Boost Converter [#702]
Jinia Roy and Raja Ayyanar, Arizona State University, United States

8:55AM A Digital Closed-Loop Control Strategy For Maintaining The 180 Phase Shift Of An Interleaved BCM Boost Converter for PFC Applications [#105]
Robert Ryan, John Hayes, Richard Morrison and Diarmuid Hogan, University College Cork, Ireland; University college Cork, Ireland; Excelsys Technologies, Ireland

Model Predictive Control of Power Converters II
Thursday, October 5, 8:30AM-10:10AM, Room: 201, Chair: Jian Guo Zhu, Jose Rodriguez

9:20AM A New Hybrid MMC with Integrated Battery Energy Storage [#968]
Ping Wang, Tao Zhang and Rui Li, Shanghai Jiao Tong University, China

9:45AM Enhanced Modular Multilevel Converter Based Battery Energy Storage System [#143]
Xiaofeng Yang, Yao Xue, Bowei Chen, Fan Yang, Trillion Q. Zheng and Youyun Wang, Beijing Jiaotong University, China; Tianshui Electric Drive Research Institute Co. L, China

9:20AM Low Voltage Ride Through Performance of a STATCOM based on Modular Multilevel Cascade Converters for Offshore Wind Application [#1079]
Takaaki Tanaka, Huai Wang, Ke Ma and Frede Blaabjerg, Aalborg University / Fuji Electric CO., LTD., Denmark; Aalborg University, Denmark; Shanghai Jiao Tong University, China

9:45AM Asymmetrical Hybrid Unidirectional T-Type Rectifier for High-Speed Gen-Set Applications [#1370]
Salvatore Foti, Alessandro Lidozzi, Giacomo Scelba, Luca Solero, Antonio Testa and Valerio Sabatini, University of Messina, Italy; C-PED, ROMA TRE University, Italy; University of catania, Italy

9:20AM Digital Type II Compensation with Forced-Output Control of an Interleaved Two-Phase Coupled-Inductor Boost Converter [#172]
Brendan C. Barry, John G. Hayes, Marek S. Rylko, Stala Robert, Adam Penczek, Andrzej Mondzik and Robert T. Ryan, University College Cork, Ireland; dtw Sp. z o.o., Poland
8:30AM  Long Horizon Linear MPC of Grid-Connected VSI: Regulation Problems and a Plug-In Solution [#811]
Chee Shen Lim, Sze Sing Lee, Xin Kong and Inam Ullah Nutkani, University of Southampton Malaysia Campus, Malaysia; Agency for Science Technology and Research, Singapore; Royal Melbourne Institute of Technology, Australia

8:55AM  Voltage Sensorless Improved Model Predictive Direct Power Control for Three-Phase Grid-Connected Converters [#581]
Amir Masoud Bozorgi, Hosein Gholami-Khesht, Mehdi Farasat, Shahab Mehraeen and Mohammad Monfared, Louisiana State University, United States; Ferdowsi University of Mashhad, Iran

9:20AM  Finite Control Set Model Predictive Control Assisted by a Linear Controller for True Parameter Uncertainty Compensation [#545]
Rodrigo Mendez, Jose Espinoza, Daniel Sbarbaro and Christian Rojas, Concepcion University, Chile; UFSM, Chile

9:45AM  Model Predictive Control of Dual-Mode Operations Z-Source Inverter: Islanded and Grid-connected [#1382]
Reza Ahmadi and Sally Sajadian, University of Kansas, United States

Stability in Power Converters
Thursday, October 5, 8:30AM-10:10AM, Room: 260/61, Chair: Yam Siwakoti, Jiangchao Qin

8:30AM  LCL Filter Design based on Non-Minimum-Phase Stability Region for Grid-Connected Inverters in Weak Grid [#133]
Liu Fang, Zhang Jie, Xu Haizhen, Zhang Xing, Zhao Wenguang and Wang Meng, Hefei University of Technology, China

8:55AM  A way of increasing stability margin of current control in VSCs connected to the grid through LCL filters [#1134]
Leonardo Marin, Pedro Rodriguez, Jose Ignacio Candela and Joan Rocabert, Polytechnic University of Catalonia, Spain

Shahil Shah and Leila Parsa, Rensselaer Polytechnic Institute, United States; University of California, Santa Cruz, United States

9:45AM  Current-Mode Controlled Single-Inductor Dual-Output Buck Converter with Ramp Compensation [#319]
Yao Wang, Jianping Xu, Shuhan Zhou, Tianyang Zhao and Kai Liao, School of Electrical and Information Engineering, China; School of Electrical Engineering Southwest Jiaot, China; Nanyang Technological University, Singapore

High Torque Machines
Thursday, October 5, 8:30AM-10:10AM, Room: 263, Chair: Hamid A. Toliyat, Wei Xu

8:30AM  A New Perspective on the PM Vernier Machine Mechanism [#570]
Kangfu Xie, Dawei Li, Ronghai Qu, Xiang Ren and Yuan Pan, Huazhong University of Science and Technology, China

8:55AM  Internal Rotor Airgap-less Electric Motors [#490]
Omar Nezamuddin, Maryam Alibeik, Rishikesh Bagwe, Matthew Rubin and Euzeli dos Santos, Purdue University-Indianapolis, United States; Indiana University, United States

9:20AM  Design, Construction, and Analysis of a Large Scale Inner Stator Radial Flux Magnetically Geared Generator for Wave Energy Conversion [#562]
Matthew Johnson, Matthew Gardner, Hamid A. Toliyat, Steven Englebretson, Wen Ouyang and Colin Tschida, Texas A and M University, United States; ABB Inc. US Corporate Research, United States

9:45AM  Magnetic Gearing Effect in Vernier Permanent Magnet Synchronous Machines [#4]
Liu Yue and Zhu Zi-Qiang, University of Sheffield, United Kingdom

Small PM Motors
Thursday, October 5, 8:30AM-10:10AM, Room: 264, Chair: Akira Chiba, Rajib Mikail
8:30AM  Design Optimization of a Small Single-Phase Motor with Auxiliary Permanent Magnet [#765]
Mauro Andriollo, Andrea Tortella and Stefano Trubian, University of Padova, Italy

8:55AM  Slotless Lightweight Motor for Drone Applications [#1396]
Md Sariful Islam, Rajib Mikail and Iqbal Husain, Research Assistant, North Carolina State Univ, United States; Scientist, ABB Inc., United States; Professor, North Carolina State University, United States

Mingjie He, Wei Xu and Caiyong Ye, Huazhong University of Science and Technology, China

9:45AM  Design Optimization of a Line-Start PMSM Considering both Transient and Steady-state Performance Objectives [#107]
Albert Johan Sorgdrager, Rong-Jie Wang and Andries Johannes Grobler, University of Stellenbosch, South Africa; North-West University, South Africa

Electric Drives for Wind and Other Renewable Integration
Thursday, October 5, 8:30AM-10:10AM, Room: 262, Chair: Jiangbiao He, Yue Zhao

8:30AM  Power Conversion and Control of a Magnetic Gear Integrated Permanent Magnet Generator in Wave Energy Conversion System [#1499]
Samir Hazra, Prathamesh Kamat, Subhashish Bhattacharya, Wen Ouyang and Steven Englebreton, North Carolina State University, United States; ABB Corporate Research Center, United States

8:55AM  A Novel Active Damping Scheme For Use With Regenerative Converters [#36]
Mahesh Swamy, Yaskawa America, Inc., United States

9:20AM  Model Predictive Power Control of a Brushless Doubly Fed Twin Stator Induction Generator [#346]
Xinchi Wei, Ming Cheng, Jinguo Zhu, Haitao Yang and Wei Hua, Southeast University, China; University of Technology, Sydney, Australia

9:45AM  A New Rotor Speed Observer for Stand-Alone Brushless Doubly-Fed Induction Generators [#627]
Yi Liu, Wei Xu, Teng Long and Frede Blaabjerg, Huazhong University of Science and Technology, China; University of Cambridge, United Kingdom; Aalborg University, Denmark

SiC Switching I
Thursday, October 5, 8:30AM-10:10AM, Room: 207/208, Chair: Francesco Iannuzzo, Shashank Krishnamurthy

8:30AM  Low Inductance Switching for SiC MOSFET Based Power Circuit [#724]
Edward Shelton, Xueqiang Zhang, Tianqi Zhang, Nikita Hari and Patrick Palmer, UNIVERSITY OF CAMBRIDGE, United Kingdom; University of Cambridge, United Kingdom

8:55AM  Self-Supplied Isolated Gate Driver for SiC Power MOSFETs Based on Bi-Level Modulation Scheme [#845]
Jorge Garcia, Emre Gurpinar, Alberto Castellazzi and Pablo Garcia, University of Oviedo, Spain; University of Nottingham, United Kingdom

9:20AM  Multi-level active gate driver for SiC MOSFETs [#1111]
Harry C. P. Dymond, Dawei Liu, Jeremy J. O. Dalton, Jianjing Wang and Bernard H. Stark, University of Bristol, United Kingdom

9:45AM  Analytical Investigation on Design Instruction to Avoid Oscillatory False Triggering of Fast Switching SiC-MOSFETs [#1211]
Yusuke Sugihara, Yuma Hayashi, Kyota Aikawa, Kazuhiro Umetani, Kimihiro Nanamori, Seiya Ishiwaki, Masayoshi Yamamoto and Eiji Hiraki, Shimane University, Japan; Okayama University, Japan; Nagoya University, Japan

New Device, Circuit and Control Strategies
Thursday, October 5, 8:30AM-10:10AM, Room: 200, Chair: Xiu Yao, Lihua Chen
**Energy Storage Systems**

**Thursday, October 5, 10:30AM-12:10PM, Room: 236, Chair: Jae-Do Park, Bilal Akin**

**10:30AM** Fractional Converter for High Efficiency High Power Battery Energy Storage System [#84]
Fei Xue, Ruiyang Yu and Alex Huang, North Carolina State University, United States

**10:55AM** Investigation of Hybrid Electrode Optimization for Energy Storage Applications with Varying Energy and Power Requirements using HPPC Cycling [#679]
Kevin J. Frankforter, Thomas M. Jahns, Marc A. Anderson and M. Isabel Tejedor-Tejedor, University of Wisconsin-Madison, United States; IMDEA Energy Institute, Spain

**Power Conversion Systems for AC and DC Grids**

**Thursday, October 5, 10:30AM-12:10PM, Room: 237/38, Chair: Yuzan Alsmadi, Srdjan Lukic**

**10:30AM** A Modular SCR-Based DC-DC Converter for Medium Voltage Direct Current (MVDC) Grid Applications [#1109]
Abdulgafor Alfares, Ehsan Afshari, Mahshid Amirabadi and Brad Lehman, Northeastern University, United States

**10:55AM** N-Series Modules based on SST for Mobile Power Substations [#1058]
Cheng Deng, Tao Yang and Balda Juan, University of Arkansas, United States

**Power Quality of Grid Connected Converters II**

**Thursday, October 5, 10:30AM-12:10PM, Room: 233, Chair: Liuchen Chang, Jonathan Kimball**

**11:20AM** A novel Battery Management System Using a Duality of the Adaptive Droop Control Theory [#1472]
Sifat Chowdhury, Mohamed Badawy, Yilmaz Sozer and Jose Alexis De Abreu-Garcia, University of Akron, United States; San Jose State University, United States

**11:45AM** Re-Synchronization Strategy for the Synchronous Power Controller in HVDC Systems [#1022]
Cristian Verdugo, J. Ignacio Candela and Pedro Rodriguez, Polytechnic University of Catalonia, Spain; Polytechnic University of Cataloniax1, Spain

**9:20AM** High-Frequency Induction Heating for Small-Foreign-Metal Particle Detection Using 400 kHz SiC-MOSFETs Inverter [#1374]
Takuya Shijo, Shinya Kurachi, Yuki Uchino, Yujiro Noda, Hiroaki Yamada and Toshihiko Tanaka, Yamaguchi University, Japan

**9:45AM** Compact Integrated Gate Drives and Current Sensing Solution for SiC Power Modules [#1354]
Dazhong Gu and Parag Kshirsagar, United technologies research center, United States

**8:30AM** Comparison of 1.7kV/450A SiC-MOSFET and Si-IGBT based Modular Three Phase Power Block [#779]
Sayan Acharya, Xu She, Rajib Datta, Maja Harfman Todorovic and Gary Mandrusiak, North Carolina State University, United States; GE global research, United States; GE global research, United States

**8:55AM** A Fast Dynamic Photovoltaic Simulator with Instantaneous Output Impedance Matching Controller [#646]
Isuru Jayawardana, Carl Ngai Man Ho, Mandip Pokhare and Escobar Gerardo, University of Manitoba, Canada; Universidad Autonoma del Carmen, Mexico

**9:20AM** High-Frequency Induction Heating for Small-Foreign-Metal Particle Detection Using 400 kHz SiC-MOSFETs Inverter [#1374]
Takuya Shijo, Shinya Kurachi, Yuki Uchino, Yujiro Noda, Hiroaki Yamada and Toshihiko Tanaka, Yamaguchi University, Japan

**9:45AM** Compact Integrated Gate Drives and Current Sensing Solution for SiC Power Modules [#1354]
Dazhong Gu and Parag Kshirsagar, United technologies research center, United States
10:30AM  *Four-Wired Dynamic Voltage Restorers Based on Cascade Open-End Winding Transformers* [#322]
Gregory Carlos, Cursino Jacobina, Joao Mello and Alexandre Oliveira, Federal Institute of Alagoas, Brazil; Federal University of Campina Grande, Brazil

10:55AM  *Investigation of CCL Filter for Multilevel Selective Harmonic Compensation (SHC) with Staircase Waveform* [#735]
Zhao Hui, Wang Shuo, Moeini Amirhossein and Yang Le, University of Florida, United States

10:30AM  *Power Electronics Intelligence at the Network Edge* [#114]
Hung-Ming Chou, Le Xie, Prasad Enjeti and P.R. Kumar, Dominion Energy, United States; Texas AM University, United States

10:55AM  *Performance Investigation of AC Active Filter with New Voltage Synchronization* [#872]
Richard Beddingfield, David Storelli, Hesam Mirzaee and Subhashish Bhattacharya, North Carolina State University, United States; Quanta Technology, United States

**Modeling and Monitoring of Batteries I**
Thursday, October 5, 10:30AM-12:10PM, Room: 232, Chair: Veda Prakash Galigekere, Fei Gao

10:30AM  *On-board State-of-health Estimation Based on Charging Current Analysis for LiFePO4 batteries* [#299]
Jufeng Yang, Bing Xia, Wenxin Huang and Chris Mi, Nanjing University of Aeronautics and Astronauti, China; San Diego State University, United States

10:55AM  *A Compact Unified Methodology via a Recurrent Neural Network for Accurate Modeling of Lithium-Ion Battery Voltage and State-of-Charge* [#767]
Ruxiu Zhao, Phillip Kollmeyer, Robert Lorenz and Thomas Jahns, University of Wisconsin-Madison, United States; McMaster University, Canada

11:20AM  *A Novel Li-ion Battery Pack Modeling Considering Single Cell Information and Capacity Variation* [#370]
Jaehyung Lee, Jung-Hoon Ahn and Byoung Kuk Lee, Sungkyunkwan University, Korea (South)

11:45AM  *A Real-Time Condition Monitoring for Lithium-Ion Batteries Using a Low-Priced Microcontroller* [#497]
Taesic Kim, Amit Adhikaree, Daewook Kang, Myoungho Kim, Chang-Yeol Oh and Juwon Baek, Texas A and M University-Kingsville, United States; Korea Electrotechnology Research Institute, Korea (South)

**Multilevel Converters I**
Thursday, October 5, 10:30AM-12:10PM, Room: 204, Chair: Pericle Zanchetta, Luca Solero

10:30AM  *Interleaved Operation of Paralleled Neutral-Point Clamped Inverters with Reduced Circulating Current* [#914]
Zhixiang Zou, Frederik Hahn, Sebastian Brueske, Sandro Guenter, Giampaolo Buticchi, Marco Liserre and Friedrich W. Fuchs, University of Kiel, Germany

10:55AM  *A New Modulation Method for a Five-Level Hybrid-Clamped Inverter with Reduced Flying Capacitor Size* [#665]
Boran Fan, Kui Wang, Zedong Zheng, Lie Xu and Yongdong Li, Tsinghua University, China

11:20AM  *A Novel Multilevel Converter with Reduced Switch Count for low and medium voltage applications* [#926]
Margarita Norambuena, Jose Rodriguez, Samir Kouro and Akshay Rathore, Universidad Tecnica Federico Santa Maria, Chile; Universidad Andres Bello, Chile; Concordia University, Canada

11:45AM  *Five Level Reduced Hybrid Inverter With Coupled Inductors* [#376]
Diego Acevedo-Bueno, Juliano Silva, Edison da Silva and Montie Vitorino, UFCG, Brazil; IFRN-Mossoro, Brazil; UFCG/UFPB, Brazil

**PFC Converters**
Thursday, October 5, 10:30AM-12:10PM, Room: 230/31, Chair: Gerry Moschopoulos, Giacomo Scelba
10:30AM *Dynamic Response Optimization for Interleaved Boost PFC Converter with Improved Dual Feedforward Control* [#622]
Lei Bai, Xiaoyong Ren, Qi Hui, Yu Wu, Kunqi Li, Zhehui Guo and Yue Zhang, Nanjing University of Aeronautics and Astronautics, China; State Grid Nanjing Power Supply Company, China

10:55AM *Manitoba Rectifier - Bridgeless Buck-Boost PFC* [#184]
Ken King Man Siu and Carl Ngai Man Ho, University of Manitoba, Canada

*Modeling and Control of DC-DC Converters II*
Thursday, October 5, 10:30AM-12:10PM, Room: 205, Chair: Xinbo Ruan, Khurram Afridi

10:30AM *Approximate-Model-Based Predictive Current Control for Buck Converter in CCM* [#115]
Benfei Wang, Liang Xian, Abhisek Ukil and Hoay Beng Gooi, Nanyang Technological University, Singapore; EPGC, A Star, Singapore

10:55AM *Stable Output Current Estimation for Switching Power Converter* [#800]
Hidenori Maruta, Shingo Watanabe, Fujio Kurokawa, Nobumasa Matsui and Ilhami Colak, Nagasaki University, Japan; Nagasaki Institute of Applied Science, Japan; Nisantasi University, Japan

11:20AM *Low THD Multipliers for BCM Buck and Cascaded Buck-Boost PFC Converters* [#973]
Ramanujam Ramabhadran, Yehuda Levy, Bruce Roberts and Pradeep V., GE Global Research, United States; No affiliation, Israel; Current Powered by GE, United States; GE Global Research, India

11:45AM *Multi-objective Optimisation of a Bidirectional Single-Phase Grid Connected AC/DC Converter (PFC) with Two Different Modulation Principles* [#256]
Johan Le Leslie, Remy Caillaud, Florent Morel, Nicolas Degrenne, Cyril Buttay, Roberto Mrad, Christian Vollaire and Stefan Mollov, Laboratoire Ampere, France; Mitsubishi Electric R.D Centre Europe, France; Mitsubishi Electric R.D Centre, France

*Modeling and Control of DC-AC Converters I*
Thursday, October 5, 10:30AM-12:10PM, Room: 201, Chair: Luca Zarri, Yi Tang

10:30AM *IGBT-SiC Dual Fed Ground Power Unit* [#854]
Luca Rovere, Andrea Cassia, Andrea Formentini, Giovanni Lo Calzo, Pericle Zanchetta and Mario Marchesoni, University of Nottingham, United Kingdom; University of Genova, Italy

10:55AM *Multi-rate Modeling for Low Switching Frequency VSCs Applying Multi-sampling Control* [#1471]
Hao Tian, Yunwei Li and Qing Zhao, University of Alberta, Canada

11:20AM *H-Infinity Current Control of the LC Coupled Voltage Source Inverter* [#178]
Lucas Koleff, Lourenco Matakas Jr., Diego Colon and Eduardo Pellini, University of Sao Paulo, Brazil

11:45AM *Analytical Averaged Loss Model of Three-Phase T-type STATCOM with Virtual Zero Level Modulation* [#1212]
Jun Wang, Xibor Yuan, Yonglei Zhang, Kfir J. Dagan, Xu Liu, David Drury, Phil Mellor and Andrew Bloor, University of Bristol, United Kingdom; Safran Electrical and Power UK, United Kingdom

*EMI in Power Converters*
Thursday, October 5, 10:30AM-12:10PM, Room: 260/61, Chair: Jason Lai, Lixiang Wei
10:30AM  A Symmetrical Resonant Converter and PCB Transformer Structure for Common Mode Noise Reduction [#1263]
Bin Li, Qiang Li, Fred Lee and Yuchen Yang, Virginia Tech, United States

10:55AM  Aperiodic Pulse Modulation Technique to Reduce Peak EMI in Impedance Source DC-DC Converters [#950]
Saad Ul Hasan, Yuba Raj Kafle and Graham E. Town, Macquarie University, Australia

11:20AM  Integrated Common Mode and Differential Mode Inductors with Low Near Magnetic Field Emission [#1450]
Huan Zhang, Boyi Zhang and Shuo Wang, University of Florida, United States

11:45AM  Design, Implementation, and Evaluation of a GaN-based Four-Leg Inverter with Minimal Common Mode Voltage Generation [#1346]
Di Han, Silong Li, Wooyoung Choi and Bulent Sarlioglu, University of Wisconsin-Madison, United States

High Speed Machines
Thursday, October 5, 10:30AM-12:10PM, Room: 263, Chair: Jonathan Bird, Ronghai Qu

10:30AM  Design and Rotor Shape Modification of a Multiphase High Speed Permanent Magnet Assisted Synchronous Reluctance Motor for Stress Reduction [#1131]
Md Tawhid Bin Tarek and Seungdeog Choi, The University of Akron, United States

10:55AM  Rotor Losses Reduction in High Speed PM Generators for Organic Rankine Cycle Systems [#142]
Grazia Berardi and Nicola Bianchi, University of Padova, Italy; University of Padova, Italy

11:20AM  Ripple Compensation of Suspension Force and Torque in a Bearingless SPM Motor with Integrated Winding [#530]
Junichi Asama, Kenta Sasaki, Takaaki Oiwa and Akira Chiba, Shizuoka University, Japan; Tokyo Institute of Technology, Japan

11:45AM  Electromagnetic and Thermodynamic Design of a Novel Integrated Flux-Switching Motor-Compressor with Airfoil-shaped Rotor [#1251]
Hao Ding, Yingjie Li, Seun Guy Min and Bulent Sarlioglu, WEMPEC, UW-Madison, United States

Noise, Vibration, Short Circuit of Electric Machines
Thursday, October 5, 10:30AM-12:10PM, Room: 264, Chair: Konstantinos Gyftakis, Rashmi Prasad

10:30AM  Inter-turn Short Circuit Ratio Estimation in IPMSMs Based on a Fault Index Current Observer [#539]
Pablo Castro, Dheeraj Bobba and Bulent Sarlioglu, University of Wisconsin-Madison, United States

10:55AM  A Review of Condition Monitoring of Induction Motors Based on Stray Flux [#1075]
Chen Jiang, Sufei Li and Thomas Habetler, Georgia Institute of Technology, United States

11:20AM  Investigation of Design Based Solutions to Reduce Vibration in Permanent Magnet Synchronous Machines with Low Order Radial Forces [#1463]
Iftekhar Hasan, Subhra Paul, Rakib Islam, Yilmaz Sozer and Alejandro Pina Ortega, University of Akron, United States; Nexteer Automotive, United States

11:45AM  Analysis of Noise and Vibration in Distributed Winding Permanent Magnet Synchronous Motor Driven by Voltage Source PWM Inverters [#31]
Takafumi Hara, Toshiyuki Ajima, Masanori Watanabe, Yousuke Tanabe, Katsuhiro Hoshino and Oyama Kazuto, Hitachi, Ltd., Japan; Hitachi Automotive Systems Ltd., Japan

Electric Drives for Aerospace and Traction Applications
Thursday, October 5, 10:30AM-12:10PM, Room: 262, Chair: John Neely, Long Wu

10:30AM  A Current-Fed Quasi Z-Source Inverter with SiC Power Modules for EV/HEV Applications [#643]
Faris Alfaris and Subhashish Bhattacharyya, North Carolina State University, United States

10:55AM  High performance 12 kW motor and drive for modern aircrafts [#574]
Sayeed Mir, John Neely and Stan Seely, Eaton Aerospace, United States
11:20AM  Temperature Effects Compensation Control Algorithm of IPM Machines Utilizing Current Pulse Injection and Online Multi-Parameter Estimation for Traction Applications [#392]
Silong Li, Di Han and Bulent Sarlioglu, University of Wisconsin-Madison, United States

11:45AM  A Versatile Power-Hardware-in-the-loop Based Emulator for Rapid Testing of Electric Drives [#766]
Amitkumar K. S., R. Sudharshan Kaarthik and Pragasen Pillay, Concordia University, Canada; Indian Institute of Space Science and Technology, India

SiC Switching II
Thursday, October 5, 10:30AM-12:10PM, Room: 207/208, Chair: Keiji Wada, Ben Guo

10:30AM  Extraction of Parasitic Inductances of SiC MOSFET Power Modules Based on Two-Port S-Parameters Measurement [#56]
Tianjiao Liu, Yanjun Feng, Runtao Ning, Wendi Wang, Thomas T. Y. Wong and Z. John Shen, Illinois Institute of Technology, United States

10:55AM  High Speed dV/dt Control Technology for SiC Power Module for EV/HEV Inverters [#626]
Taku Shimomura, Takayuki Ikari, Akinori Okubo, Ryusei Yamada and Tetsuya Hayashi, Nissan Motor Co., Ltd, Research Division, Japan

Wireless Power Transfer IV
Thursday, October 5, 10:30AM-12:10PM, Room: 200, Chair: Huang-jen Chiu, Luis Herrera

10:30AM  Optimization of Coils and Control Strategy for a Three-Phase Magnetically Coupled Resonant Wireless Power Transfer System Oriented by the Optimal Output Power Characteristics [#607]
Xiewei Fu, Fuxin Liu and Xuling Chen, Nanjing University of Aeronautics and Astronautics, China

Keisuke Kusaka, Kent Inoue and Jun-ichi Itoh, Nagaoka University of Technology, Japan; Nagaoka university of technology, Japan

11:20AM  Switching Performance of a SiC MOSFET Body Diode and SiC Schottky Diodes at Different Temperatures [#940]
Md Rishad Ahmed, Rebecca Todd and Andrew Forsyth, The University of Manchester, United Kingdom

11:45AM  Digital Control Based Voltage Balancing for Series Connected SiCMOSFETs under Switching Operations [#1261]
Katsuya Shingu and Keiji Wada, Tokyo Metropolitan University, Japan

Hybrid Energy Systems
Thursday, October 5, 2:00PM-3:40PM

2:00PM  Direct Storage Hybrid (DSH) Inverter: A New Concept of Intelligent Hybrid Inverter [#905]
Ha Pham, University of Technology, Sydney, Australia

2:25PM  New Soft-switched High Frequency Multi-Input Stepup/ down Converters for High Voltage DC-Distributed Hybrid Renewable Systems [#1152]
Sanjida Moury and John Lam, York University, Canada

2:50PM  Optimal Sizing of Photovoltaic-Wind Hybrid System for Community Living Environment and Smart Grid Interaction [#1383]
Mohammad B. Shadmand, Mehran Mirjafari and Robert S. Balog, Kansas State University, United States; Dell Incorporation, United States; Texas A and M University, United States
3:15PM  *Modeling and Control of Brushless DC Motor for Compressor Driving* [#361]
Zhiguang Hua, Dongdong Zhao, Manfeng Dou, Liming Yan and Haitao Zhang, Northwestern Polytechnical University, China

**Wave Energy System**
Thursday, October 5, 2:00PM-3:40PM, Room: 236, Chair: Martin Ordenez, Mazharul Chowdhury

2:00PM  *Electromechanical Design and Experimental Evaluation of a Double-Sided, Dual Airgap Linear Vernier Generator for Wave Energy Conversion* [#836]
Jennifer Vining, Tim Mundon and Balakrishnan Nair, Oscilla Power, United States

2:25PM  *Grid-Connected Operation of Direct-Drive Wave Energy Converter by Using HVDC line and Undersea Storage System* [#706]
Seyyedmahdi Jafarishiadeh, Mehdi Farasat and Shahab Mehraeen, Louisiana State University, United States

**Grid Connected Inverters and LCL Filter Design**
Thursday, October 5, 2:00PM-3:40PM, Room: 233, Chair: Edison da Silva, Mahshid Amirabadi

2:00PM  *Analysis and design of LCL filter based Synchronverter* [#812]
Roberto Rosso, Jair Cassoli, Giampaolo Buticchi, Marco Liserre and Soenke Engelken, WRD GmbH, Germany; Christian Albrechts University of Kiel, Germany

2:25PM  *A Common Magnetic Integration Method for Single-Phase LCL Filters and LLCL Filters* [#838]
Xiaoqiang Li, Jingyang Fang, Pengfeng Lin and Yi Tang, Nanyang Technological University, Singapore

2:50PM  *Power Conversion and Control of a Pole-Modulated Permanent Magnet Synchronous Generator for Wave Energy Generation* [#1297]
Samir Hazra, Prathamesh Kamat, Subhashish Bhattacharya, Wen Ouyang and Steven Englebretson, North Carolina State University, United States; ABB Corporate Research Center, United States

3:15PM  *Competitive control of wave power plants through price-signal optimum allocation of available resources* [#736]
Antoni M. Cantarellas, Daniel Remon, Jorge Martinez-Garcia and Pedro Rodriguez, Abengoa, Spain; Technical University of Catalonia, Spain; Loyola University, Technical University of Catalo, Spain

**Modeling and Monitoring of Batteries II**
Thursday, October 5, 2:00PM-3:40PM, Room: 232, Chair: Phillip Kollmeyer, Mohammad Anwar

2:00PM  *An Advanced SOF Estimation Algorithm for LiFePO4 SLI Battery of Vehicle with Online Update of Cranking Resistance* [#375]
Tae-Won Noh, Jung-Hoon Ahn and Byoung Kuk Lee, Sungkyunkwan University, Korea (South)

2:25PM  *Online Condition Monitoring of Lithium-Ion Batteries Using Impedance Spectroscopy* [#436]
Sean Moore and Paul Barendse, University of Cape Town, South Africa

2:50PM  *A New State of Charge Estimation Method for Lithium-ion Battery Based on Sliding Mode Observer* [#960]
Chunyu Wang, Naxin Cui, Miao Liu and Chenghui Zhang, Shandong University, China
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<tr>
<th>Time</th>
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<tr>
<td>3:15PM</td>
<td>Accelerated Ageing of Lithium-Ion Batteries</td>
<td>based on Electric Vehicle Mission Profile [1093]</td>
<td>Laserna Egoitz, Saraske Zabala Elizabet and Knudsen Kaer Soren, Aalborg University, Denmark; IK4-Ikerlan, Spain</td>
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<td>Stroe Daniel-Ioan, Swierzynski Maciej,</td>
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<td><strong>Single-Phase AC/DC Converters</strong></td>
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<td>2:00PM</td>
<td><strong>Half-Wave Class DE Low dv/dt Rectifier</strong></td>
<td>Using Thinned-Out Method with Delta-Sigma Modulation [1350]</td>
<td>Akinobu Shigeno and Hirotaka Koizumi, Tokyo University of Science, Japan</td>
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<td>2:25PM</td>
<td><strong>A Single-Stage Asymmetrical Half-Bridge</strong></td>
<td>AC/DC Converter With Coupled Inductors [398]</td>
<td>Chia Hao Li, Ying Ting Huang and Yaow Ming Chen, National Taiwan University, Taiwan</td>
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<td>2:50PM</td>
<td><strong>A 220V AC, LUT-Controlled 6-Segmented LED</strong></td>
<td>Driver with Background Calibration [715]</td>
<td>Hyunseung Lee, Eunseo Kim and Jaeha Kim, Seoul National University, Korea (South)</td>
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<td>3:15PM</td>
<td><strong>A Moving Pole-Placement Compensation</strong></td>
<td>Design Method to Increase the Bandwidth of RC-Damper-Based Dual Buck-Boost AC-DC Converter [216]</td>
<td>Weimin Wu, Weibo Qin, Marco Lisserre, FRED Blaabjerg, Min Huang and Houqing Wang, Shanghai Maritime University, China; Kiel University, Germany; Aalborg University, Denmark</td>
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<td><strong>Multilevel Converters II</strong></td>
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<td>2:00PM</td>
<td><strong>On-Line Switching Loss Reduction Scheme</strong></td>
<td>by General Space Vector PWM for Multilevel NPC Inverter [123]</td>
<td>Toshiji Kato, Kaoru Inoue and Takumi Sono, Doshisha University, Japan</td>
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<td>2:25PM</td>
<td><strong>Two-stage Decoupled 3-level Active NPC</strong></td>
<td>Converter with SiC MOSFET and Si IGBT [1048]</td>
<td>Di Zhang, Jiangbiao He and Sachin Madhusoodhanan, GE Global Research Center, United States</td>
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<td>2:50PM</td>
<td><strong>A Ladder Transistor-Clamped Multilevel</strong></td>
<td>Inverter with High Voltage Variation [1160]</td>
<td>Eshet Wodajo, Malik Elbuluk, Seungdeog Choi and Haitham Abu Rub, The University of Akron, United States; Texas A and M University, Qatar</td>
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<td>3:15PM</td>
<td><strong>Predictive Control of Modular Multilevel</strong></td>
<td>Series/Parallel Converter for Battery Systems [667]</td>
<td>Zhongxi Li, Ricardo Lizana, Angel Peterchev and Stefan Goetz, Duke University, United States</td>
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<td><strong>Isolated DC/DC Converters</strong></td>
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<td>2:00PM</td>
<td><strong>High-gain Soft-switching DC-DC converter</strong></td>
<td>with Voltage-doubler Rectifier Modules [915]</td>
<td>Rohit Suryadevara, Tao Li, Kumar Modepalli and Leila Parsa, Rensselaer Polytechnic Institute, United States; Dialog Semiconductor, United States; FINsix Corporation, United States; University of California Santa Cruz, United States</td>
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<td>2:25PM</td>
<td><strong>Driving piezoelectric-transformer-based</strong></td>
<td>dc/dc converters using pulse density modulation [168]</td>
<td>Juan Diaz, Miguel J. Prieto, Fernando Nuno, Juan A. Martin-Ramos and Juan A. Martinez, Oviedo University, Spain</td>
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<td>2:50PM</td>
<td><strong>Bidirectional DC-DC Converter Utilizing</strong></td>
<td>Magnetic and Capacitive Power Transfer-97.1% Efficiency at 1.2-MHz Switching [1107]</td>
<td>Jong-Won Shin, Masanori Ishigaki, Eric Dede and Jae Seung Lee, Toyota Research Institute of North America, United States; Toyota Central RD Labs., Inc., Japan</td>
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<td>3:15PM</td>
<td><strong>LLC Resonant Converter with Shared Power</strong></td>
<td>Switches and Dual Coupled Resonant Tanks to Achieve Automatic Current Sharing [104]</td>
<td>Hongliang Wang, Yang Chen, Yan-Fei Liu, Zhihua Yang, Jahangir Afsharian and Bing Gong, Queen's University, Canada; Murata Power Solutions, Canada</td>
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<td><strong>Grid Synchronization Techniques</strong></td>
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<td><strong>Accelerated Ageing of Lithium-Ion Batteries</strong></td>
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2:00PM  A Voltage Sensorless Phase Locked Loop Structure for Single Phase Grid Connected Converter System [#711]
Subhajyoti Mukherjee, Vikram Roy Chowdhury, Pourya Shamsi and Mehdi Ferdowsi, Missouri University of Science and Technology, United States; Missouri University of Science and Technology, United States

2:25PM  Comparative Analysis about Dynamic performances of grid synchronization schemes [#1157]
Hao Yi, Xiongfei Wang, Frede Blaabjerg and Fang Zhuo, Xi'an Jiaotong University, China; Aalborg University, Denmark

2:50PM  A Phase-Locked Loop Based on Cascaded Least-Error Squares Filter [#218]
Bowen Wang, Li Peng, Manlin Chen, Weibiao Wu and Yuntao Xiao, Huazhong University of Science and Technology, China

3:15PM  New Frequency and Amplitude Estimation Techniques for Grid-connected DC/AC Inverters [#1153]
Iman Askarian, Suzan Eren, Majid Pahlevani and Andy Knight, University of Calgary, Canada; Queen’s University, Canada

Modeling and Control of DC-AC Converters II
Thursday, October 5, 2:00PM-3:40PM, Room: 201, Chair: Leon M Tolbert, Dong Dong

2:00PM  Anti-Windup Control for Stationary Frame Current Regulators Using Digital Conditioning Architectures [#927]
Brendan McGrath and Grahame Holmes, RMIT University, Australia

2:25PM  A Current Sharing Technique for Parallel-Operated Unipolar-PWM Inverters [#182]
Dong Li, Carl Ngai Man Ho and Ken King Man Siu, University of Manitoba, Canada

2:50PM  Low Frequency Current Ripple Reduction of a Current-fed Switched Inverter [#1379]
Anil Gambhir and Santanu Mishra, IIT kanpur, India

3:15PM  Accuracy Analysis of the Zero-Order Hold Model for Digital Pulsewidth Modulation. [#1220]
Junpeng Ma, Xiongfei Wang, Frede Blaabjerg, Lennart Harnefors and Wensheng Song, Southwest Jiaotong University, China; Aalborg University, Denmark; ABB Corporate Research Center, Sweden

Testing, Measurement, and Validation of Power Converters
Thursday, October 5, 2:00PM-3:40PM, Room: 260/61, Chair: Vladimir Blasko, Qin Lei

2:00PM  DC Current Determination in Grid-Connected Transformerless Inverter Systems using a DC Link Sensing Technique [#480]
Weichi Zhang, Matthew Armstrong and Mohammed Elgendy, NEWCASTLE UNIVERSITY, United Kingdom

2:25PM  Online Measurement of Bus Impedance of Interconnected Power Electronics Systems Using Orthogonal Sequences [#174]
Tomi Roinila, Silvia Arrua, Hessamaldin Abdollahi and Enrico Santi, University of South Carolina, United States

2:50PM  Switching Frequency Characterization of Hysteresis Control in a Pump Back Test Configuration [#889]
Xu She, Tony Frangieh and Rajib Datta, GE global research, United States; GE global research, United States

3:15PM  Capacitance Estimation Algorithm based on DC-Link Voltage Harmonics Using ANN in Three-Phase Motor Drive Systems [#778]
Hammam Abdelaal Soliman, Pooya Davari, Huai Wang and Frede Blaabjerg, Aalborg University, Denmark

Motors for Transportation
Thursday, October 5, 2:00PM-3:40PM, Room: 264, Chair: Ronghai Qu, Khwaja Rahman

2:00PM  Principle of Variable Leakage Flux IPMSM Using Arc-Shaped Magnet Considering Variable Motor Parameter Characteristics Depending on Load Current [#851]
Takashi Kato, Toru Matsuzuka, Kensuke Sasaki and Tsutomu Tanimoto, Nissan Motor Co., ltd., Japan

2:25PM  Performance Analysis of Surface Permanent Magnet Synchronous Machine Topologies with Dual-Wound Stators [#1132]
Subhra Paul, Alejandro Pina Ortega, Cong Ma, Rakesh Mitra, Prerit Pramod and Rakib Islam, Nexteer Automotive, United States
2:50PM  Breakdown Resistance Analysis of Traction Motor Winding Insulation under Thermal Ageing [#154]
Konstantinos N. Gyftakis, Panagiotis A. Panagiotou, Neophytois Lophitis, David A. Howey and Malcolm D. McCulloch, Coventry University, United Kingdom; University of Oxford, United Kingdom

3:15PM  High Torque Density PM Motor for Racing Applications [#453]
Marco Munaro, Nicola Bianchi and Giovanni Meneghetti, University of Padova, Italy

General Topics in Electrical Machines
Thursday, October 5, 2:00PM-3:40PM, Room: 263, Chair: Jose Antonino-Daviu, Dong Jiang

2:00PM  Design and Experimental Evaluation of a Multilayer AC Winding Configuration for Sinusoidal MMF with Shorter End-turn Length [#888]
Md Ashfanoor Kabir, Mohamed Jaffar, Zhao Wan and Iqbal Husain, North Carolina State University, United States

2:25PM  Impact of Machine Magnetization State on Permanent Magnet Losses in Permanent Magnet Synchronous Machines [#1395]
Daniel Fernandez, David Reigosa, Juan Guerrero, Carlos Suarez and Fernando Briz, University of Oviedo, Spain

PM and IPM Motor Drives III
Thursday, October 5, 2:00PM-3:40PM, Room: 262, Chair: Bilal Akin, Annette Muetze

2:00PM  Online Stator Resistance Tracking for Reluctance and Interior Permanent Magnet Synchronous Motors [#820]
Riccardo Antonello, Ludovico Ortombina, Fabio Tinazzi and Mauro Zigiotto, University of Padova, Italy

2:25PM  On-Line Stator Resistance and Permanent Magnet Flux Linkage Identification on Open-end Winding PMSM Drives [#866]
Mario Pulvirenti, Giuseppe Scarcella, Giacomo Scelba, Antonio Testa and Mark Harbaugh, University of catania, Italy; University of Catania, Italy; University of Messina, Italy; Rockwell Automation, United States

3:15PM  A Novel Flux-Reversal Hybrid Magnet Memory Machine [#1163]
Hui Yang, Heyun Lin, Z. Q. Zhu, Haitao Wang, Shuhua Fang and Yunkai Huang, Southeast University, China; University of Sheffield, United Kingdom

Device Self Sensing Techniques
Thursday, October 5, 2:00PM-3:40PM, Room: 207/208, Chair: Adam Skorek, Jing Xu

2:00PM  Elimination of Bus Voltage Impact on thermo-Sensitive Electrical Parameter during Turn-on Transition for Junction Temperature Estimation of High-power IGBT Modules [#13]
Haoze Luo, Xiang Wang, Francesco Iannuzzo, Frede Blaabjerg, Wuhua Li and Xiangning He, Aalborg University, Denmark; Zhejiang University, China

2:25PM  IGBT Junction Temperature Estimation via Gate Voltage Plateau Sensing [#1087]
Christoph van der Broeck, Alexander Gospodinov and Rik De Doncker, RWTH Aachen University, ISEA, Germany
2:50PM  On-line Temperature Estimation of SiC Power MOSFET Modules through On-state Resistance Mapping [#1102]
Fausto Stella, Gianmario Pellegrino, Eric Armando and Davide Dapra, Politecnico di Torino, Italy; Vishay Semiconductor Italiana, Italy

3:15PM  Characterization of SenseGaN Current-Mirroring for PowerGaN with the Virtual Grounding in a Boost Converter [#1215]
Mehrdad Biglarbegian and Babak Parkhideh, University of North Carolina at Charlotte, United States