

Tutorials | Technical Sessions | Exhibits | Rap Sessions



September 12-16, 2010 | Atlanta, Georgia | Hilton Atlanta Hotel

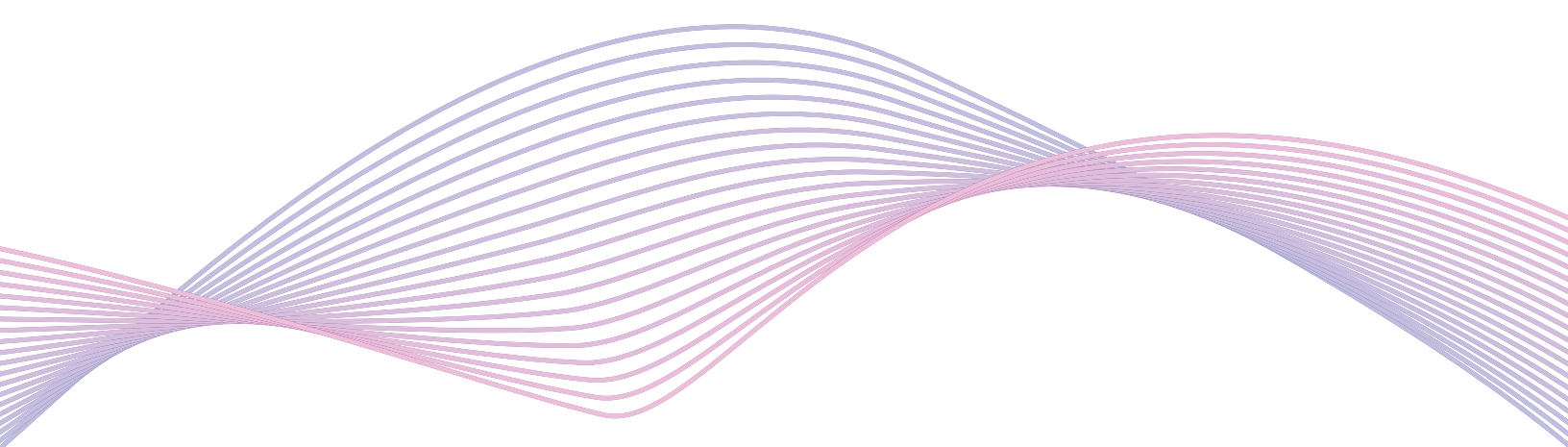
IEEE ENERGY CONVERSION CONGRESS & EXPO



Sponsored by the IEEE Power Electronics and Industry Applications Societies

ECCE 2010 would like to express our gratitude for the generous support received from the following media partners:





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It gives me great pleasure to be able to welcome you to Atlanta for the 2nd Annual IEEE Energy Conversion Conference and Exhibition. As we hope this is now widely known, this conference is the merging of the PELS Power Electronics Specialist Conference and the Industrial Power Conversion Systems Department sessions of the IAS Annual Meetings. The broad size, appeal and quality of ECCE are a testament to the cooperation and strategic planning of both organizations. Since this is only the second year for ECCE, the conference is still in its “transient” state. We are making every attempt to give ECCE its own “look and feel” that will continue to attract attendees to the very important event for years to come. It is hoped that year’s technical program of around 675 papers from around the world and from many varying organizations will stimulate technical interactions and learning. We are very pleased to have a full program of a large number of oral papers, a much smaller number of poster papers, tutorials, rap sessions, meetings, and an exhibition. The plenary session has been planned to give members the view of industrial and thought leaders in our technology. It is my hope that we can all be proud of ECCE, as it strives to be the preeminent conference in energy conversion technologies.

This year’s ECCE 2010 will also incorporate the programs previously featured at the IEEE Energy 2030 conference. Held in 2008, the IEEE Energy 2030 conference provided a forum for experts from a broad range of disciplines to discuss the technology, policy and economic framework required for the creation of a global sustainable energy. The incorporation of IEEE Energy 2030 has led to a new Energy Public Policy and Economics Track at ECCE (*Sessions 5,15,25,125,139*). The track will explore the intersection of technology, policy and economics. Presenters include some familiar faces to ECCE as well as public policy experts and systems engineers. Also, an Industry Panel (*Session 62, Wednesday 8:00 - 9:40 am*) has been created, providing

an opportunity for business leaders in the sustainable energy space to discuss the latest challenges and opportunities in this sector. Given the dynamics of policies and technology in this sector, we think this will be especially useful to attendees.

I would also like to welcome everyone to Atlanta, Georgia, USA, the so-called “Capital of the South.” Atlanta is home to companies such as Coca-Cola, CNN, United Parcel, and AT&T. In addition to industry, Atlanta is also a high tech center with the Georgia Institute of Technology, Emory University, and the US Centers for Disease Control and Prevention. Visitors to Atlanta can experience a diverse and thriving cultural scene at the city’s many theaters, museums, galleries, concert halls and family attractions. To enjoy Atlanta’s present, one must experience the city’s past. From Atlanta’s role in the Civil War, to the Civil Rights movement, to the 1996 Centennial Olympic Games, Atlanta’s historical attractions promise both education and entertainment.

Finally, I would like to thank all the members of the organizing committee, the program chairs and vice chairs, the program committee (over 1000 reviewers), the authors and the professionals at Courtesy Associates for their efforts in putting together this event. I hope that you enjoy this important technical meeting in a most timely and exciting field!



**Tom Habetler**  
2010 IEEE ECCE General Chair



## Organizing Committee

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**Zhe Chen**, Aalborg University, Denmark  
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**William Peterson** (Vice Chair), E & M Power, USA  
**Stefan Schröder**, GE Global Research, Germany  
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**Jo Olsen**, Sylvania, USA  
**Tsornng-Juu (Peter) Liang**, National Cheng Kung University, Taiwan  
**Annabelle Pratt**, Intel Corporation, USA  
**Richard Wallace**, Whirlpool Corporation, USA

### Transportation Applications

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**Gui-Jia Su**, Oak Ridge National Laboratories, USA  
**Anand Sathyan**, Chrysler LLC, USA  
**Srdjan Lukic**, North Carolina State University, USA  
**Sewan Choi**, Seoul National University of Technology, Korea  
**Suresh Gopalakrishnan**, General Motor, USA  
**Zareh Soghomonian**, BMT Syntek Technologies, USA  
**Mahesh Krishnamurthy**, Illinois Institute of Technology, USA

### Energy Public Policy, Economics, and Business Perspectives

**Deepak Divan** (Vice Chair), Georgia Institute of Technology, USA  
**Frank Kreikebaum**, Georgia Institute of Technology, USA  
**Adam Skorek**, University of Quebec, Canada  
**Ahmed Zobaa**, University of Exeter, UK

### DC-DC Converters

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**Yanfei Liu** (Vice Chair), Queen's University, Canada  
**Javier Sebastián**, Universidad de Oviedo, Spain  
**Jaber Abu-Qahouq**, University of Alabama, USA  
**Zhiliang Zhang**, Nanjing University of Aero and Astronautics, China  
**Oscar García Suárez**, UPM, Spain  
**Tsornng-Juu (Peter) Liang**, National Cheng Kung University, Taiwan  
**Gerry Moschopoulos**, University of Western Ontario, Canada  
**Regan Zane**, University of Colorado, USA  
**Matthew Wilkowski**, Enpirion, USA

### AC-DC Rectifiers

**Jian Sun** (Vice Chair), Rensselaer Polytechnic Institute, USA  
**Rolando Burgos**, ABB, USA  
**Min Chen**, National Semiconductor, USA  
**Mohamed Orabi**, South Valley University, Egypt  
**Xiong Du**, Chongqing University, China  
**Yongsug Suh**, Chonbuk National University, South Korea  
**Thomas Nussbaumer**, Levitronix, Switzerland

### DC-AC Inverters

**Fang Peng** (Vice Chair), Michigan State University, USA  
**Edison Da Silva**, Federal University of Campina Grande, Brazil  
**Bingsen Wang**, Michigan State University, USA  
**Hideaki Fujita**, Tokyo Institute of Technology, Japan  
**Gui-jia Su**, Oak Ridge National Laboratories, USA  
**Andrew Loh**, Nanyang Technological University, Singapore  
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**Madhav Manjrekar**, Siemens, USA  
**Toshihisa Shimizu**, Tokyo Metropolitan University, Japan

### AC-AC Converters

**Lixiang Wei** (Vice Chair), Rockwell Automation, USA  
**Pat Wheeler**, University of Nottingham, UK  
**Robert Balog**, Texas A&M University, USA  
**Rolando Burgos**, ABB, USA  
**Bingsen Wang**, Michigan State University, USA

### Electric Machines

**Aldo Boglietti** (Vice Chair), Politecnico di Torino, Italy  
**Mircea Popescu** (Vice Chair), Motor Design Ltd., UK  
**Emmanuel Agamloh**, Advanced Energy Corporation, USA  
**Andy Knight**, University of Alberta, Canada  
**Dan Ionel**, VESTAS, USA  
**Ayman El-Refaie**, GE Global Research Center, USA  
**Francesco Cupertino**, Politecnico di Bari, Italy  
**Yoshiaki Kano**, Nagoya Toyota National College of Technology, Japan  
**Akira Chiba**, Tokyo University of Science, Japan  
**David Dorrell**, University of Technology Sydney, Australia  
**Andrea Cavagnino**, Politecnico di Torino, Italy  
**Lee Sang Bin**, Korea University, South Korea

### Electric Drives

**Alfio Consoli** (Vice Chair), University of Catania, Italy  
**Yen-Shin Lai** (Vice Chair), National Taipei Institute of Technology, Taiwan  
**Michael Harke** (Vice Chair), Danfoss Power Electronics, USA  
**Nicola Bianchi**, University of Padova, Italy  
**Radu Bojoi**, Politecnico di Torino, Italy  
**Ranga Tallam**, Rockwell Automation, USA  
**Fernando Briz**, University of Oviedo, Spain  
**Gianmario Pellegrino**, Politecnico di Torino, Italy  
**Parag Kshirsagar**, United Technologies Research Center, USA  
**Mario Pacas**, University of Siegen, Germany

### Components, Materials, Packaging, and Other Enabling Technologies

**Adam Konopka** (Vice Chair), Hamilton Sundstrand, USA  
**Angus Bryant** (Vice Chair), University of Warwick, UK  
**Charlie Sullivan**, Dartmouth College, USA  
**J. Braham Ferreira**, Delft University of Technology, Netherlands  
**Jean-Luc Schanen**, G2E Lab, France  
**Adam Skorek**, University of Quebec, Canada  
**Z. John Shen**, University of Central Florida, USA

### Other Energy Conversion Related Topics

**Z. Qiang Zhu** (Vice Chair), University of Sheffield, UK  
**Ayman El-Refaie** (Vice Chair), General Electric, USA  
**Chunbo Zhu** (Vice Chair), Harbin Institute of Technology, China



**SATURDAY, SEPTEMBER 11, 2010**

3:00 pm – 5:00 pm Registration Open..... Prefunction South

**SUNDAY, SEPTEMBER 12, 2010**

7:00 am – 7:00 pm Registration Open..... Prefunction South

Tutorials Group 1 • 8:30 am – 12:00 pm			
	Room 201	Room 202	Room 203
	T1-1 Medium Voltage Drives	T1-2 Photovoltaic Microinverters: Topologies, Control Aspects, Reliability Issues, and Applicable Standards	T1-3 Understanding IGBT Modules Used in Energy Conversion
			T1-4 Advanced Thermal Management Materials for Energy Conversion

Tutorials Group 2 • 1:00 pm – 5:00 pm			
	Room 201	Room 202	Room 203
12:00 pm – 1:00 pm	Lunch on Own		
	T2-1 Design and Control of Permanent Magnet Machines for Geared and Gearless Applications	T2-2 Introduction to LED Lighting Systems and Their Power Electronic Drivers	T2-3 Digital PWM for DC to AC Conversion
			T2-4 Grid Converters for PV and Wind Turbine Systems

4:30 pm – 5:00 pm New to ECCE/PELS/IAS Reception (for those new to the organizations)..... Grand Ballroom West (C/D)

5:00 pm – 7:00 pm Opening Reception..... Grand Ballroom West (C/D)

**MONDAY, SEPTEMBER 13, 2010**

7:00 am – 7:00 pm Registration Open..... Prefunction South

8:00 am – 10:00 am Plenary Session..... Grand Ballroom East (A/B)

10:00 am – 10:20 am AM Break..... Grand Salon Prefunction Area

Breakout Sessions • 10:20 am – 12:00 pm										
	Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom East
	S1 Electric Machines: Induction Machines	S2 DC-AC Inverters: Grid Connected Inverters I	S3 Energy Efficiency and Industrial Applications: Power System Fault Isolation	S4 Enabling Technologies: Power Semiconductors I	S5 Energy Public Policy and Economics: Intersection of Technology and Policy	S6 Sustainable Energy Applications: Active Power Filters	S7 Energy Efficiency and Industrial Applications: LED Lighting I	S8 Electric Drives: Direct Torque Control	S9 DC-DC Converters: Digital Control I	S10 DC-DC Converters: Synchronous Rectifier Converters
10:20 am – 10:45 am	A Frequency Demodulation Approach to Induction Motor Speed Detection	Modularized Grid-tied Inverter with Asynchronous Sigma-delta Modulation	Inverter-based versus Synchronous-based Distributed Generation; Fault Current Limitation and Protection Issues	Electromechanical Characterization of "Flying" Planar Gate Punch through IGBT Bare Die	Power Electronics for Sustainable Energy Future — Quantifying the Value of Power Electronics	Reactive Power Compensation and Harmonics Elimination at Medium-voltage Using Hexagram Converter	Resonant Assisted Buck Converter for Offline Driving of High Brightness LED Replacement Lamps	A Novel Control Scheme for Wide Speed Range Operation of Direct Torque Controlled Synchronous Reluctance Motor	An Adaptive Digital PID Controller Scheme for Power Converters	Design Considerations of a Self-biased Current Driven SR in DCM Flyback DC-DC Converter
10:45 am – 11:10 am	Optimal Split Ratio for High Speed Induction Machines	Predictive Digital Controlled Three Phase Bidirectional Inverter with Wide Inductance Variation	Protection of Meshed Microgrids with Communication Overlay	Robustness Evaluation of High Voltage Press Pack IGBT Modules in Enhanced Short Circuit Test	Supporting Schemes for Renewable Energies the Italian Way	Study of Closed-loop Control Scheme for Source Current Detection Type Active Power Filter	LED Lighting Flicker and Potential Health Hazards: IEEE Standard, PAR1789 Update	Model Predictive Direct Torque Control of Permanent Magnet Synchronous Motors	Digital Controller for Rapid Cycling Synchrontron Magnet Power Supply with Very High Tracking Precision	A New Driving Method for Synchronous Rectifiers of LLC Resonant Converter with Zero-crossing Noise Filter

MONDAY, SEPTEMBER 13, 2010 (Continued)

Breakout Sessions • 10:20 am – 12:00 pm (Continued)										
	Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom East
11:10 am – 11:35 am	<b>S1 Electric Machines: Induction Machines</b>	<b>S2 DC-AC Inverters: Grid Connected Inverters I</b>	<b>S3 Energy Efficiency and Industrial Applications: Power System Fault Isolation</b>	<b>S4 Enabling Technologies: Power Semiconductors I</b>	<b>S5 Energy Public Policy and Economics: Intersection of Technology and Policy</b>	<b>S6 Sustainable Energy Applications: Active Power Filters</b>	<b>S7 Energy Efficiency and Industrial Applications: LED Lighting I</b>	<b>S8 Electric Drives: Direct Torque Control</b>	<b>S9 DC-DC Converters: Digital Control I</b>	<b>S10 DC-DC Converters: Synchronous Rectifier Converters</b>
	Effect of Winding Asymmetries and Winding Connection on Small Synchronous Machines	Design and Implementation of a 5 kW Single Phase Bidirectional Inverter with Wide Inductance Variation	Power Sequencing Approach to Fault Isolation in DC Systems: Influence of System Parameters	Comparisons of 6.5kV 25A Si IGBT and 10-kV SiC MOSFET in Solid-state Transformer Applications	Lowest Cost Path to Meeting Electricity Demand at the State Level: Implications of Carbon Cap-and-trade	DC-side Shunt Active Power Filter for Line Commutated Rectifiers to Mitigate the Output Voltage Harmonics	Estimation of Internal Junction Temperature and Thermal Resistance of Light-emitting Diodes Using External Luminous Flux Measurements	Computationally Efficient Model Predictive Direct Torque Control	Digital Power Controller with Sensorless DCM Operation	Digital Implementation of Driving Scheme for Synchronous Rectification in LLC Resonant Converter
11:35 am – 12:00 pm	New Method for Current and Voltage Measuring Offset Correction in and Induction Motor Sensorless Drive	A Novel Control Method for Dual Mode Time-sharing Grid-connected Inverter	Research on Current Control Strategy for Grid-connected Inverter Using LCL Filter Based on Passivity Based Control	Modeling of the Impact of Diode Junction Capacitance on High Voltage Rectifiers Based on 10kV SiC JBS Diodes	Grid Stability Battery Systems for Renewable Energy Success	Scaling the Dynamic Capacitor (D-CAP) to Medium Voltages	A General Photo-electro-thermo-temporal Theory for Light-emitting Diode Systems	Implementation of Deadbeat Direct Torque and Flux Control for AC Induction Machine Control	Asymmetrical Leading-triangle Modulation Technique for Improved Digital Valley Current Controlled DC-DC Converters	Synchronous Rectification Technique for High-voltage Single-ended Power Converters
12:00 pm – 1:20 pm	Lunch on Own									
Breakout Sessions • 1:20 pm – 3:00 pm										
	Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom East
1:20 pm – 1:45 pm	<b>S11 Electric Machines: Machine Design I</b>	<b>S12 DC-AC Inverters: Grid Connected Inverters II</b>	<b>S13 Sustainable Energy Applications: Photovoltaics I</b>	<b>S14 Enabling Technologies: Power Semiconductors II</b>	<b>S15 Energy Public Policy and Economics: Renewable Energy Generation</b>	<b>S16 Sustainable Energy Applications: Sensing and Measurement</b>	<b>S17 Energy Efficiency and Industrial Applications: LED Lighting II</b>	<b>S18 Electric Drives: Drive Control</b>	<b>S19 DC-DC Converters: Digital Control II</b>	<b>S20 DC-DC Converters: Isolated Converters I</b>
	Development of a Totally Enclosed Fan Cooled Traction Motor	An Operating Scheme for DFIG-based Wind Generation System at Low Speeds	Coordinated Real and Reactive Power Management Implementation Based on Dual-stage PLL Method for PV System with ESS	Characterization of a High Gain BJT Used in Power Conversion on AC Mains	Quantifying State-policy Incentives for the Renewable Energy Investor	A Novel Frequency-adaptive PLL for Single-phase Grid-connected Converters	A Driving Technology for LED Retrofit Lamp for Fluorescent Lighting Fixtures with Electronic Ballasts	Efficiency Improvement Evaluation of Non-sinusoidal Back-EMF PMSM Machines Using Field Oriented Current Harmonic Injection Strategy	A Novel Parameter-independent Digital Optimal Control Algorithm for DC-DC Buck Converters Based on Parabolic Curve Fitting	Efficiency Characterization and Optimization in Flyback DC-DC Converters
1:45 pm – 2:10 pm	Winding Design for Pole-phase Modulation of Induction Machines	A Three-phase Programmable Voltage Sag Generator for Low Voltage Ride-through Capability Test of Wind Turbines	Control of Hybrid Battery/Ultracapacitor Energy Storage for Stand-alone Photovoltaic System	An Investigation into the Effects of the Gate Drive Resistance on the Losses of the MOSFET-snubber-diode Configuration	LCOE Reduction for Megawatts PV System Using Efficient 500 kW Transformerless Inverter	Grid Synchronization PLL Based on Cascaded Delayed Signal Cancellation	Power-transfer of Isolated Converter with Integrated Power Sharing for LED Lighting System Dependent on Transformer Coupling	Output DC Voltage and Power Control of a Flux Strengthening IPM Generator and a High Speed Motor	Digital Enhanced V2-Type Constant On-time Control Using Inductor Current Ramp Estimation for a Buck Converter with Small ESR Capacitors	Analysis of a High Step-up Ratio Flyback Converter with Active Clamp and Voltage Multiplier

MONDAY, SEPTEMBER 13, 2010 (Continued)

Breakout Sessions • 1:20 pm – 3:00 pm (Continued)

	Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom East
2:10 pm – 2:35 pm	<b>S11 Electric Machines: Machine Design I</b> A Novel Method for Multi-objective Design and Optimization of Three-phase Induction Machines	<b>S12 DC-AC Inverters: Grid Connected Inverters II</b> Exploring Inherent Damping Characteristics of LCL-filters for Three-phase Grid-connected Voltage Source Inverters	<b>S13 Sustainable Energy Applications: Photovoltaics I</b> Model Construction of Single Crystalline Photovoltaic Panels for Real-time Simulation	<b>S14 Enabling Technologies: Power Semiconductors II</b> Modeling the Inter-electrode Capacitances of Si CoolMOS™ Transistors for Circuit Simulation in High Efficiency Power Systems	<b>S15 Energy Public Policy and Economics: Renewable Energy Generation</b> Control of Receiver Temperature and Shaft Speed in Dish-stirling Solar Power Plants to Meet Grid Integration Requirements	<b>S16 Sustainable Energy Applications: Sensing and Measurement</b> Real-time Measurement of Power Quantities Under Sinusoidal and Non-sinusoidal Conditions for Single-phase Systems	<b>S17 Energy Efficiency and Industrial Applications: LED Lighting II</b> High Efficiency DC-DC Converter with Twin-bus for Dimmable LED Lighting	<b>S18 Electric Drives: Drive Control</b> A Time-varying Sliding Surface for Robust Position Control of Six Phase Induction Machine (6PIM)	<b>S19 DC-DC Converters: Digital Control II</b> A Novel Digital Capacitor Charge Balance Control Algorithm with a Practical Extreme Voltage Detector	<b>S20 DC-DC Converters: Isolated Converters I</b> An Isolated High Step-up Forward/Flyback Active Clamp Converter with Output Voltage Lift
2:35 pm – 3:00 pm	Optimal Design of an In-wheel BLDC Motor for a Kick Scooter	A Current Source Converter Based Active Power Filter for Mitigation of Harmonics at the Interface of Distribution and Transmission Systems	Compact Integrated Solar Energy Generation Systems	FITMOS Modeling and Dynamic On-state Characteristic Evaluation	Estimates of the Cost of New Electricity Generation in the South	A New Fast Peak Detector for Single or Three-phase Unsymmetrical Voltage Sags	One-stage High-brightness LED Driver with Power Factor Correction Using Standard Peak-current Mode Integrated Controllers	A Novel Technique for Sensorless Control of High Power Induction Motors Using Multilevel Converters	A New Digital Control.DC-DC Converter with Neural Network Predictor	Self-oscillating Flyback Converter with Lossless Snubber for Contactless Power Supply Applications

Breakout Sessions • 3:20 pm – 5:00 pm

	Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom East
3:20 pm – 3:45 pm	<b>S21 Electric Machines: Machine Design II</b> Novel Design of Flux-intensifying Interior Permanent Magnet Synchronous Machine Suitable for Power Conversion and Self-sensing Control at Very Low Speed	Grid-connected Inverter with Inner Output Impedance and Governor-free Characteristics	Maximum Power Limiting with Average Current Mode Control for Photovoltaic System	LCL Pick-up Circulating Current Controller for Inductive Power Transfer Systems	A Methodology for Quantifying Variability of Renewable Energy Sources by Reserve Requirement Calculation	On Power-sharing of Solar-based Hybrid Motor-drive Systems	A Comparative Study on the Circuit Topologies for High-efficient Passive Light-emitting Diode (LED) Drivers	<b>S28 Electric Drives: Performance Improvement</b> DC Bus Voltage Clamp Method to Prevent Over-voltage Fault in Adjustable-speed Drives	<b>S29 DC-DC Converters: Digital Control III</b> Digital Load Share Controller Design of Paralleled Phase-shifted Full-bridge Converters Referencing the Highest Current	High Step-up Boost Converter Integrated with Voltage-doubler
3:45 pm – 4:10 pm	Slot Design for Iron Loss AC Rotating Electrical Machine Reduction	Real Time Selective Harmonic Minimization for Multilevel Inverters Connected to Solar Panels Using Artificial Neural Network Angle Generation	Switching Loss Analysis of a Three-phase Solar Power Conditioner Using a Single-phase PWM Control Method	High Performance Inductive Power Transfer System with Narrow Rail Width for On-line Electric Vehicles	A Methodology to Consider Electrical Infrastructure and Real-time Power-flow Impact Costs Together in Planning Large-scale Renewable Energy Farms	A New Droop Control Method for the Autonomous Operation of Distributed Energy Resource Interface Converters	LED Spectral and Power Characteristics Under Hybrid PWM/AM Dimming Strategy	Active Motor Terminal Overvoltage Mitigation Method for Parallel Two-level Voltage Source Inverters	Average Inductor Current Sensor for Digitally-controlled Switched-mode Power Supplies	An Investigation of the Natural Balancing Mechanisms of Modular Input-series-output-series DC-DC Converters

WITRON



MONDAY, SEPTEMBER 13, 2010 (Continued)

Breakout Sessions • 3:20 pm – 5:00 pm (Continued)									
Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom East
<b>S21 Electric Machines: Machine Design II</b>	<b>S22 DC-AC Inverters: Grid Connected Inverters III</b>	<b>S23 Sustainable Energy Applications: Photovoltaics II</b>	<b>S24 Enabling Technologies: Contactless Power Transfer</b>	<b>S25 Energy Public Policy and Economics: Renewable Energy Integration</b>	<b>S26 Sustainable Energy Applications: Distributed Resources</b>	<b>S27 Energy Efficiency And Industrial Applications: LED Lighting III</b>	<b>S28 Electric Drives: Performance Improvement</b>	<b>S29 DC-DC Converters: Digital Control III</b>	<b>S30 DC-DC Converters: Isolated Converters II</b>
Comparison of Different Winding Schemes of an Asynchronous Machine Driven by a Multi-functional Converter System	An Easy, Simple, and Flexible Control Scheme for a Three-phase Grid-tie Inverter System	A New Cost-effective Analog Maximum Power Point Tracker for Photovoltaic Systems	2-D Alignment Analysis of Capacitively Coupled Contactless Power Transfer Systems	Utilizing a STATCOM to Prevent the Flicker Propagation in a Wind Power System	Evaluation of the Voltage Support Strategies for Low Voltage Grid Connected PV Generators	Emergency Lamp Using High-brightness LEDs	Appropriate Tuning and Robust Design of a Generalized Predictive Speed Controller for Drive Systems with Resonant Loads	Multi-resolution Feedback to Minimize Communication Data and Improve Output Accuracy in Isolated Digital Power Supplies	Zero-voltage Switching Flyback-boost Converter with Voltage-doubler Rectifier for High Step-up Applications
4:10 pm – 4:35 pm									
4:35 pm – 5:00 pm									
<b>Modeling and Design Optimization of PM AC Machines Using Computationally Efficient - finite Element Analysis</b>	<b>Single-stage DC-AC Converter for Photovoltaic System</b>	<b>Performance of Photovoltaic Maximum Power Point Tracking Algorithms in the Presence of Noise</b>	<b>Analysis on a Single-layer Winding Array Structure for Contactless Battery Charging Systems with Localized Charging Feature</b>	<b>Overlaying a Parallel Market to Increase Renewable Penetration</b>	<b>Grid Side Cascade Inverter System as an Interface for Wind Energy Storage</b>	<b>Third Harmonic Filtered 13.56 MHz Push-pull Class-E Power Amplifier</b>	<b>A General Approach of Damping Torsional Resonance Modes in Multi-megawatt Applications</b>	<b>Implementation of Digitally Controlled Phase Shift Full Bridge Converter for Server Power Supply</b>	<b>Improvement of Light Load Efficiency of Dual Active Bridge DC-DC Converter by Using Dual Leakage Transformer and Variable Frequency</b>

5:00 pm – 7:00 pm Expo Reception/Expo Open

TUESDAY, SEPTEMBER 14, 2010

Breakout Sessions • 8:00 am – 9:40 am									
Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom A
<b>S31 Electric Drives: Modeling and Control of Overvoltage Transients</b>	<b>S32 Transportation Applications: PHEV</b>	<b>S33 AC-DC Converters: Analog Control of PFC</b>	<b>S34 Enabling Technologies: EMI Analysis and Suppression I</b>	<b>S35 Enabling Technologies: Reliability and Lifetime Estimation</b>	<b>S36 Electric Machines: Machine Losses and Material Issues</b>	<b>S37 Energy Efficiency And Industrial Applications: HID Lighting</b>	<b>S38 DC-AC Inverters: Inverter Control And Analysis I</b>	<b>S39 Electric Machines: Fractional Slot Machines I</b>	<b>S40 DC-DC Converters: Isolated Converters III</b>
Integrated Differential-mode and Common-mode Filter to Mitigate the Effects of Long Motor Leads on AC Drives	Effects of V2G Reactive Power Compensation on the Component Selection in an EV or PHEV Bidirectional Charger	An Improved Control Strategy Based on Multiplier for CRM Flyback PFC to Reduce Line Current Peak Distortion	Adaptive DV/DT and DI/DT Control for Isolated Gate Power Devices	Condition Monitoring of Solder Fatigue in a Power Module Using the Rise of Case-above-ambient Temperature	New Lines of Investigation on the Effects of Conditions on Soft Magnetic Composite Materials Behaviour for Electromagnetic Applications	Medium Power Ceramic HID Lamps; Problems and Opportunities Resulting from Low Lamp Power Factor	Comparison between Two Control Strategies for performance Input-series-output-series Inverters System	Design, Analysis, and Fabrication of a High-Fractional Slot Concentrated Winding Surface PM Machine	Active Clamped Three-phase Isolated Boost Converter with Series Output Connection for High Step-up Applications
8:00 am – 8:25 am									
8:25 am – 8:50 am									
<b>High-frequency Cable and Motor Modeling of Long-cable-fed Induction Motor Drive Systems</b>	<b>Design Considerations for High-voltage DC Bus Architecture and Wire Mechanization for Electric/Hybrid Electric Vehicle Applications</b>	<b>A Novel SFVM Control Scheme for Two-phase Interleaved CCM/DCM Boundary Mode Boost Converter in Power Factor Correction Applications</b>	<b>Characterization of a Modified LISN for Effective Separated Measurements of Common Mode and Differential Mode EMI Noise</b>	<b>The Lifetime/Volume Ratio as an Index to Assess the Reliability of Power Converters</b>	<b>Prediction of Rotor Eddy Current Loss Due to Stator Slotting in PM Machines</b>	<b>A Timing Controllable and Polarity Tracked Igniter for high Intensity Discharge Lamp Electronic Ballast</b>	<b>Approaches to Enhance Discrete Control Algorithms Serving for Motor Drive System</b>	<b>Unsaturated and Saturated Saliency Trends in Fractional-slot Concentrated-winding Interior Permanent Magnet Machines</b>	<b>A Simple and Effective Control Strategy for Improved Operation of a Current-fed Push-pull Converter</b>

7:00 am – 7:00 pm Registration Open

TUESDAY, SEPTEMBER 14, 2010

Breakout Sessions • 8:00 am – 9:40 am									
Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom A
<b>S31 Electric Drives: Modeling and Control of Overvoltage Transients</b>	<b>S32 Transportation Applications: PHEV</b>	<b>S33 AC-DC Converters: Analog Control of PFC</b>	<b>S34 Enabling Technologies: EMI Analysis and Suppression I</b>	<b>S35 Enabling Technologies: Reliability and Lifetime Estimation</b>	<b>S36 Electric Machines: Machine Losses and Material Issues</b>	<b>S37 Energy Efficiency And Industrial Applications: HID Lighting</b>	<b>S38 DC-AC Inverters: Inverter Control And Analysis I</b>	<b>S39 Electric Machines: Fractional Slot Machines I</b>	<b>S40 DC-DC Converters: Isolated Converters III</b>
Integrated Differential-mode and Common-mode Filter to Mitigate the Effects of Long Motor Leads on AC Drives	Effects of V2G Reactive Power Compensation on the Component Selection in an EV or PHEV Bidirectional Charger	An Improved Control Strategy Based on Multiplier for CRM Flyback PFC to Reduce Line Current Peak Distortion	Adaptive DV/DT and DI/DT Control for Isolated Gate Power Devices	Condition Monitoring of Solder Fatigue in a Power Module Using the Rise of Case-above-ambient Temperature	New Lines of Investigation on the Effects of Conditions on Soft Magnetic Composite Materials Behaviour for Electromagnetic Applications	Medium Power Ceramic HID Lamps; Problems and Opportunities Resulting from Low Lamp Power Factor	Comparison between Two Control Strategies for performance Input-series-output-series Inverters System	Design, Analysis, and Fabrication of a High-Fractional Slot Concentrated Winding Surface PM Machine	Active Clamped Three-phase Isolated Boost Converter with Series Output Connection for High Step-up Applications
8:00 am – 8:25 am									
8:25 am – 8:50 am									
<b>High-frequency Cable and Motor Modeling of Long-cable-fed Induction Motor Drive Systems</b>	<b>Design Considerations for High-voltage DC Bus Architecture and Wire Mechanization for Electric/Hybrid Electric Vehicle Applications</b>	<b>A Novel SFVM Control Scheme for Two-phase Interleaved CCM/DCM Boundary Mode Boost Converter in Power Factor Correction Applications</b>	<b>Characterization of a Modified LISN for Effective Separated Measurements of Common Mode and Differential Mode EMI Noise</b>	<b>The Lifetime/Volume Ratio as an Index to Assess the Reliability of Power Converters</b>	<b>Prediction of Rotor Eddy Current Loss Due to Stator Slotting in PM Machines</b>	<b>A Timing Controllable and Polarity Tracked Igniter for high Intensity Discharge Lamp Electronic Ballast</b>	<b>Approaches to Enhance Discrete Control Algorithms Serving for Motor Drive System</b>	<b>Unsaturated and Saturated Saliency Trends in Fractional-slot Concentrated-winding Interior Permanent Magnet Machines</b>	<b>A Simple and Effective Control Strategy for Improved Operation of a Current-fed Push-pull Converter</b>

Grand Salon

Prefunction South

TUESDAY, SEPTEMBER 14, 2010 (Continued)

Breakout Sessions • 8:00 am – 9:40 am (Continued)

	Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom A	Grand Ballroom B
8:50 am – 9:15 am	<b>S31 Electric Drives: Modeling and Control of Overvoltage Transients</b> A Low-loss Motor Terminal Filter for Overvoltage Suppression	<b>S32 Transportation Applications: PHEV</b> Development and Validation of Models for 95% Efficiency, 220 W Wireless Power Transfer Over a 30 cm Air-gap	<b>S33 AC-DC Converters: Analog Control of PFC</b> Sliding Mode Current Control of Grid-connected Voltage Source Converter	<b>S34 Enabling Technologies: EMI Analysis and Suppression I</b> Meeting MIL-STD-461 for 2kW Military Tactic Generator Drive System	<b>S35 Enabling Technologies: Reliability and Lifetime Estimation</b> Real-time Life Consumption Power Modules Prognosis Using Online Rainflow Algorithm in Metro Applications	<b>S36 Electric Machines: Machine Losses and Material Issues</b> Analysis of Proximity Losses in High-speed Surface Permanent Magnet Machines with Concentrated Windings	<b>S37 Energy Efficiency And Industrial Applications: Hid Lighting</b> Design and Analysis of a Novel Two-stage Electronic Ballast for HID Lamp	<b>S38 DC-AC Inverters: Inverter Control And Analysis I</b> A Fast, Accurate and Robust Algorithm to Detect Fundamental and Harmonic Sequences	<b>S39 Electric Machines: Fractional Slot Machines I</b> Six-phase Supply Feasibility Using a PM Fractional-slot Dual Winding Machine	<b>S40 DC-DC Converters: Isolated Converters III</b> An Adaptive Blanking Time Control Scheme for Audible Noise Free Quasi Resonant Flyback Converter	<b>S41 DC-DC Converters: Bidirectional Converters I</b> An Overall Study of a Dual Active Bridge for Bidirectional DC-DC Conversion
9:15 am – 9:40 am	Overvoltage Mitigation of Inverter-driven Motors with Long Cables of Different Lengths	A Novel Thermal Model for HEV/EV Battery Modeling Based on CFD Calculation	A Hybrid Current Control for a Controlled Rectifier	Behavioral Modeling Methods for Motor Drive System EMI Design Optimization	Lifetime Estimation Models of Semiconductors	Core Loss Prediction Using Magnetic Circuit Model for Fractional-slot Concentrated-winding Interior Permanent Magnet Machines	An Energy-Recyclable Burn-in Technology for Electronic Ballast for HID Lamps	Switched Systems Model and Switching Rules of DC-AC Converter	Fractional-slot Concentrated-winding Axial-flux Permanent Magnet Machine with Core-wound Coils	A Novel Full-bridge Converter Achieving ZVS over Wide Load Range with a Passive Auxiliary Circuit	Bidirectional Isolated Dual Full-bridge DC-DC Converter with Active Clamp for EDLC

AM Break ..... Grand Salon Prefunction Area

Breakout Sessions • 10:00 am – 11:40 am

	Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom A	Grand Ballroom B
10:00 am – 10:25 am	<b>S42 Electric Drives: AC Machine Control</b> A New Deep Field-weakening Strategy of IPM Machines Based on Single Current Regulator and Voltage Angle Control	<b>S43 Transportation Application: Infrastructure</b> Control Strategy of a Multi-port, Grid Connected, Direct-DC-PV Charging Station for Plug-in Electric Vehicles	<b>S44 AC-DC Converters: Digital Control of PFC</b> A New Digital Control System for a Single-phase Half-bridge Rectifier with Fast Dynamic Response	<b>S45 Enabling Technologies: EMI Analysis And Suppression II</b> An Improved Design for Transmission Line Busbar EMI Filter	<b>S46 Enabling Technologies: Packaging And Integration</b> Integrating Giant Magneto-resistive (GMR) Field Detectors for High Bandwidth Current Sensing in Power Electronic Modules	<b>S47 Electric Machines: Machine Losses and Thermal Analysis</b> Thermal Analysis of a Segmented Stator Winding Design	<b>S48 Energy Efficiency and Industrial Applications: Fluorescent Ballast</b> A Single Eco-friendly Ultra-low-loss Magnetic Ballast Design for a Wide Range of T5 High-efficient Fluorescent Lamps	<b>S49 DC-AC Inverters: Inverter Control and Analysis II</b> A New Optimal PWM Strategy Applied to Single Phase Inverters with Variable DC Voltage	<b>S50 Electric Machines: Fractional Slot Machines II</b> Considerations on Selecting Fractional-slot Windings	<b>S51 DC-DC Converters: Isolated Converters IV</b> Using Adaptive Off-time Synchronous Rectification to Improve Efficiency in Low Output Voltage Converters	<b>S52 DC-DC Converters: Bidirectional Converters II</b> A New Resonant Active Clamping Technique for Bidirectional Converters in HEV's
10:25 am – 10:50 am	Unified Direct-flux Vector Control for AC Motor Drives	Optimum Design of an EV/PHEV Charging Station with DC Bus and Storage System	Accurate Mode Boundary Detection in Digitally Controlled Boost Power Factor Correction Rectifiers	On Factors Affecting EMI-performance of Conducted-noise-mitigating Digital Controllers in DC-DC Converters — An Experimental Investigation	3D Hybrid Integration and Functional Interconnection of a Power Transistor and its Gate Driver	Influence of Different End Region Cooling Arrangements on End-winding Heat Transfer Coefficients in Electrical Machines	A Dimming Module for Controlling Power Supply to a Fluorescent Lamp Ballasted by a Non-dimmable Electronic Ballast	Time Domain Models of the EMI Sources in the Variable Speed Drives	Investigation of Magnet Arrangements in Double Layer Interior Permanent Magnet Motors	A Comparison of the Series-parallel Compensation Type DC-DC Converters Using both a Fuel Cell and a Battery	Adaptive Dynamic Control of a Bidirectional DC-DC Converter

TUESDAY, SEPTEMBER 14, 2010 (Continued)

Breakout Sessions • 10:00 am – 11:40 am (Continued)

	Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom A	Grand Ballroom B
10:50 am – 11:15 am	<b>S42 Electric Drives: AC Machine Control</b>	<b>S43 Transporation Application: Infrastructure</b>	<b>S44 AC-DC Converters: Digital Control of PFC</b>	<b>S45 Enabling Technologies: EMI Analysis And Suppression II</b>	<b>S46 Enabling Technologies: Packaging And Integration</b>	<b>S47 Electric Machines: Machine Losses and Thermal Analysis</b>	<b>S48 Energy Efficiency and Industrial Applications: Fluorescent Ballast</b>	<b>S49 DC-AC Inverters: Inverter Control and Analysis II</b>	<b>S50 Electric Machines: Fractional Slot Machines II</b>	<b>S51 DC-DC Converters: Isolated Converters IV</b>	<b>S52 DC-DC Converters: Bidirectional Converters II</b>
	Direct Field-oriented Control of an Induction Machine Using an Adaptive Rotor Resistance Estimator	Dual Converter Active Filter and Balance Compensation on Electric Railway Systems Using the Open Delta Transformer Connection	A Simple Digital DCM Control Scheme for Boost PFC Operating in both CCM and DCM	Common Mode EMI Characteristics of Resonant Converters	Multilayer SMT High Power Density Packaging of Electronic Ballasts for HID Lamps	A Non-intrusive Winding Heating Method for Induction Motor Using Soft-starter for Preventing Moisture Condensation	Digital CCFL Drive System Using Individual Current Modulation for LCD-TV	Three Phase VSI with Reduced Output Voltage Distortion Using FPGA Based Multisampled Space Vector Modulation	Post-assembly Magnetization of Rare-earth Fractional-slot Permanent-magnet Machines Using a Two-shot Method	Forward-flyback Converter with Snubber-feedback Network for Contactless Power Supply Applications	Preventing Transformer Saturation in Bidirectional Dual Active Bridge Buck-boost DC-DC Converters
11:15 am – 11:40 am	Regulation of Permanent Magnet AC Generators Using Angle Control of Stator-connected Voltage Source Converters	Power Quality Solutions for Light Rail Public Transportation Systems Fed by Medium Voltage Underground Cables	Unified Predictive Transition Current Mode Control for Digital-controlled Power Factor Corrector	Novel Techniques to Suppress the Common Mode EMI Noise Caused by Transformer Parasitic Capacitances in DC-DC Converters	Design of High Temperature SiC Three-phase AC-DC Converter for >100°C Ambient Temperature	Rotor End Losses in Multi-phase Fractional-slot Concentrated-winding Permanent Magnet Synchronous Machines	Analysis and Design Method for High Frequency Self-oscillating Electronic Ballasts	A Method for Five-phase Carrier-based PWM Modulation for Balanced and Unbalanced Reference Voltages	Three Phase Tooth-concentrated Multiple-layer Fractional Windings with Low Space Harmonic Content	Optimization Design of an Isolated DC-DC Converter Using Series Compensation on the Secondary Side	A Comparative Efficiency Study of Silicon-based Solid State Transformers
11:30 am – 7:00 pm	Expo Open										Grand Salon
11:40 am – 1:20 pm	Lunch										Grand Salon
1:30 pm – 3:00 pm	Poster Session I										Grand Salon
3:00 pm – 3:30 pm	PM Break										Grand Salon
3:30 pm – 5:00 pm	Poster Session II										Grand Salon

Rap Sessions • 8:00 pm – 9:00 pm

	Room 201	Room 202
	<b>Rap Session 1</b> Electrical Systems for Future Transportation	<b>Rap Session 2</b> Update on Wind Energy Systems

WEDNESDAY, SEPTEMBER 15, 2010

Breakout Sessions • 8:00 am – 9:40 am											
7:00 am – 7:00 pm	Registration Open.....	Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom B
8:00 am – 8:25 am		<b>S53 DC-AC Inverters: Neutral Point Clamped Inverters</b> Multi-carrier Interleaved PWM Strategies for a New Five-level NPC Inverter Using a 3-phase Coupled Inductor	<b>S54 AC-DC Converters: Control of Three Phase PFC</b> Direct Power Control for Three-level Neutral Point Clamped PWM Rectifier Based on Virtual Flux	<b>S55 Sustainable Energy Applications: Ocean Wave Energy Systems</b> Analysis of Power Extraction from Irregular Waves by All Electric Power Take Off	<b>S56 Electric Machines: Wind Generators</b> Optimal Selection of Excitation Capacitor for 6/3-phase Dual Stator-winding Induction Generator with the Static Excitation Controller Applied in Wind Power	<b>S57 Enabling Technologies: Power Device Gate Drive Techniques</b> A New Inductorless Bipolar Gate Driver for Control FET of High Frequency Buck Converters	<b>S58 DC-DC Converters: Magnetic Designs</b> High Frequency Bus Converter with Integrated Matrix Transformers for CPU and Telecommunications Applications	<b>S59 Electric Machines: Condition Monitoring and Fault Analysis I</b> A Comparative Study of Permanent Magnet-synchronous and Permanent Magnet-flux Switching Machines for Fault Tolerant Drive Systems	<b>S60 Sustainable Energy Applications: Wind Energy Systems I</b> Design and Implementation of STATCOM Combined with Series Dynamic Breaking Resistor for Low Voltage Ride-through of Wind Farms	<b>S61 DC-AC Inverters: Special Topics I</b> Performance Evaluation of a New Hybrid-modulation Scheme for High-frequency-AC-link Inverter: Applications for PV, Wind, Fuel-cell, and DER/Storage Applications	<b>S63 Sustainable Energy Applications: Microgrid I</b> Stability Studies of a Mixed Islanded Power Network with Varspeed Units Using Simplified Models of the Converters
8:25 am – 8:50 am		Improvement of EMI Behavior of NPC Multilevel Inverter Without Balancing the Voltage Boundaries of DC Bank Capacitors	Full Discrete Sliding Mode Controller for Three-phase PWM Rectifier Based on Load Current Estimation	Grid Power Integration Technologies for Offshore Ocean Wave Energy	Design of New Concept Permanent Magnet Induction Wind Generator	An Integrated Segmented Gate Driver with Adjustable Driving Capability	High Power Density Interleaved DC-DC Converter Using a 3-phase Integrated Close-coupled Inductor Set Aimed for Electric Vehicles	Online Broken Rotor Bar Detection of Inverter-fed Induction Motors Operating Under Arbitrary Load Conditions	Low Voltage Ride-through of Wind Turbine Based on Interior Permanent Magnet Synchronous Generators Sensorless Vector Controlled	Performance Enhancement for Digital Implementations of Resonant Controllers	Composite Energy Storage System with Flexible Energy Management Capability for Micro-grid Applications
8:50 am – 9:15 am		Improving the Performance of Protection Schemes in Three Level IGCT-based Neutral Point Clamped Converters	A Novel Control Method Using Two DC Link Current Sensors in Two Parallel Three-phase Boost Converters	Self-synchronous Control of Doubly-fed Linear Generators for Ocean Wave Energy Applications	Design and Control of a High-efficiency Doubly-fed Brushless Machine for Wind Power Generator Application	Comparison of Continuous and Discontinuous Current Source Drivers for High Frequency Applications	Trans-linked Multi-phase Boost Converter for Electric Vehicle	Automated Monitoring of Airgap Eccentricity for Inverter-fed Induction Motors Under Standstill Conditions	Fault Ride-through Enhancements of Wind Turbine with Doubly-fed Induction Generator Using the Robust Variable Structure System Control	A Fast Space-vector Algorithm for Multilevel Converters without Coordinates Transformation	A New Half-bridge Based Inverter with the Reduced-capacity DC Capacitors for DC Micro-grid
9:15 am – 9:40 am		A Five/Nine-level Twelve-switch Neutral Point Clamped Inverter for High Speed Electric Drives	Voltage Sensorless Bidirectional Three-phase Unity Power Factor AC-DC Converter	Low-power Autonomous Wave Energy Harvesting Device for Remote Sensing and Communications Applications	Condition Monitoring of Wind Turbines Based on Amplitude Demodulation	A Special High-frequency Soft-switched High-voltage Isolated DC-DC Power Supply for Six GCT Gate Drivers	Core-less Multiphase Converter with Transformer Coupling	Evaluation of the Detectability of Broken Rotor Bars for Double Squirrel Cage Rotor Induction Motors	Control of an Unbalanced Stand-alone DFIG-based Wind System Using Predictive Current Control Method	Application of a Hybrid Discharge Reactor with D-A Mixed Control in Phenol Degradation	Integration of Battery Energy Storage Element in a CERTS Micro-grid
8:00 am – 9:40 am		<b>S62 Special Session: Industry Perspectives on Emerging Challenges and Opportunities in Renewable Energy and Electrified Transport .....</b>									
9:40 am – 10:00 am		<b>AM Break .....</b>									
		<b>Grand Ballroom A .....</b>									
		<b>Grand Salon Prefunction Area .....</b>									

Prefunction South



WEDNESDAY, SEPTEMBER 15, 2010 (Continued)

Breakout Sessions • 10:00 am – 11:40 am

	Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom A	Grand Ballroom B
10:00 am – 10:25 am	<b>S64 DC-AC Inverters: Motor Drive Inverters</b>	<b>S65 AC-DC Converters: PFC Modeling and Control</b>	<b>S66 Sustainable Energy Applications: Photovoltaics Converters I</b>	<b>S67 Electric Machines: Reluctance Machines</b>	<b>S68 Enabling Technologies: Package Impedance Issues</b>	<b>S69 DC-DC Converters: Integrated Power Converters</b>	<b>S70 Electric Machines: Condition Monitoring and Fault Analysis II</b>	<b>S71 Sustainable Energy Applications: Wind Energy Systems II</b>	<b>S72 DC-AC Inverters: Special Topics II</b>	<b>S73 Electric Drives: Control Techniques</b>	<b>S74 Sustainable Energy Applications: Microgrid II</b>
	Bidirectional Rectifier-inverter Multilevel Topology without DC-link Passive Components	A Unified Practical Approach to Analyze the Stability of the Pre-regulator and Complete Two-stage PFC Power Supplies Under Average-current-mode Control	Multiple-input Boost Converter to Minimize Power Losses Due to Partial Shading in Photovoltaic Modules	Torque Density and Efficiency Improvements of a Switched Reluctance Motor for Hybrid Vehicles without Rare Earth Material	Automatic Layout Optimization of an EMC Filter	A Multi-modes Charge-pump Based High Efficiency Wide Input Range DC-DC Converter	Investigation of Influence of Bearing Load and Bearing Temperature on EDM Bearing Currents	Improvement of Power Quality for PMSG Wind Turbine Systems	An Improved Soft-switching Inverter with an Unidirectional Auxiliary Switch	An Adaptive Predictive Current Control Technique for Permanent Magnet Synchronous Motors	Distribution Voltage Control for DC Microgrid by Converters of Energy Storages Considering the Stored Energy
10:25 am – 10:50 am	A Square-wave Controller for Induction Motor Drive Using a 3 Phase Floating Inverter Bridge	Small-signal Modeling of DCVM Cuk Converter Operating in both DC Input Voltage Source and PFC Applications	A High Efficiency Current Fed Multi-resonant Converter for High Step-up Power Conversion in Renewable Energy Harvesting	Position Estimation at Starting and Lower Speeds in Three-phase Switched Reluctance Machines Using Pulse Injection and Two Thresholds	Reduction of Stray Inductance in Power Electronic Modules Using Basic Switching Cells	A Monolithic Reconfigurable SC Power Converter with Adaptive Gain Control and On-chip Capacitor Sizing	Influence of Motor Operating Parameters on Discharge Bearing Current Activity	Fault Ride Through of DFIG Wind Turbines During Symmetrical Voltage Dip with Crowbar or Stator Current Feedback Solution	Control and Implementation of a High Voltage Series Resonant Power Supply for Industrial Electrostatic Precipitators	Comparative Study of Conventional PI-control, PI-based State Space Control and Model Based Predictive Control for Drive Systems with Elastic Coupling	Analysis and Design of Interfacing Inverter Output Virtual Impedance in a Low Voltage Microgrid
10:50 am – 11:15 am	Interaction Between the Filter and PWM Units in the Sine Filter Configuration Utilizing Three-phase AC Motor Drives Employing PWM Inverters	Energy-based Digital Control of a Ripple Correction Circuit of an Unity-power-factor AC-DC Converter	An Interleaving Double-switch Buck-boost Converter for PV Grid-connected Inverter	A New Excitation Scheme for Polyphase Segmented Switched Reluctance Motor	Power-CAD: A Novel Methodology for Design, Analysis and Optimization of Power Electronic Module Layouts	Switching Losses Analysis in MHz Integrated Synchronous Buck Converter to Support Optimal Power Stage Width Segmentation in CMOS Technology	New Concepts for Online Surge Testing for the Detection of Winding Insulation Deterioration	Converter Structure-based Power Loss and Static Thermal Modeling of the Press-pack IGBT-based Three-level ANPC and HB VSCs Applied to Multi-MW Wind Turbines	High-efficiency Inverter for Photovoltaic Applications	A Comparison of Control and Modulation Schemes for Medium-voltage Active Injection for Shipboard Power System Applications	A Medium-voltage DC (MVDC) System with Series Active Injection for Shipboard Power System Applications
11:15 am – 11:40 am	Loss Evaluation of a Two-stage Boost Converter Using the Neutral Point of a Motor	A Fourier Based PLL for Single Phase Grid Connected Systems	Improved MPPT Performance of a Grid Connected Photovoltaic Power Conditioning System under Partially Shaded Conditions	Design and Optimization of a Synchronous Reluctance Machine with Salient Poles and Flux Barriers	Separation Measurement of Parasitic Impedance on a Power Electronics Circuit Board Using TDR	Interleaved Switched-capacitor Converters with Adaptive Control	Forces and Vibrations Analysis in Industrial PM Motors Having Concentric Windings	Induction Generator Model for Unbalanced Distribution Power-flow Analysis	A Single-phase Photovoltaic Inverter Topology with a Series-connected Power Buffer	Control Method for IPMSM-based on PTC and PWM Hold Model in Overmodulation Range-study on Robustness and Comparison with Anti-windup Control	An Adaptive Controller for Inverter-interfaced DGs Connected to Wide Range Impedances

11:40 am – 1:30 pm Lunch on Own

WEDNESDAY, SEPTEMBER 15, 2010 (Continued)

Breakout Sessions • 1:30 pm – 3:10 pm

	Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom A	Grand Ballroom B
1:30 pm – 1:55 pm	<b>S75 DC-AC Inverters: Z-Source Topology I</b> Optimal Design of the Inductor in Z-source Inverter with Single Phase Shoot-through SVPWM Strategy	<b>S76 AC-DC Converters: PFC Converters</b> Bridgeless Single-stage Full-bridge Converter with One Cycle Control in the Output Voltage	<b>S77 Sustainable Energy Applications: Photovoltaics Converters II</b> Digital Controller Development for Grid-tied Photovoltaic Inverter with Model-based Technique	<b>S78 Electric Machines: Special Machines I</b> Different Arrangements for Dual-rotor Dual-output Radial-flux Motors	<b>S79 Enabling Technologies: Thermal Management</b> Seawater Based Cold Plate for Power Electronics Cooling	<b>S80 DC-DC Converters: Non-Isolated Converters</b> A Comprehensive Multi-mode Performance Analysis of Interleaved Boost Converters	<b>S81 Transportation Applications: Diagnostics and Fault Tolerance</b> Real-time Fault Diagnostics for a Permanent Magnet Synchronous Motor Drive for Aerospace Applications	<b>S82 Sustainable Energy Applications: Wind Energy Systems III</b> Balance and Unbalance Voltage Dips Impacts on Full Scale Converter Wind Turbines	<b>S83 DC-DC Converters: Control Techniques I</b> Self-tuning Mixed-signal Optimal Controller with Improved Load Transient Response Detection and Smooth Mode Transition for DC-DC Converters	<b>S84 Electric Drives: Sensorless Drives I</b> Temperature Issues in Saliency-tracking Based Sensorless Methods for PM Synchronous Machines	<b>S85 Sustainable Energy Applications: Microgrid III</b> DC Micro-grid Operational Analysis with Detailed Simulation Model for Distributed Generations
1:55 pm – 2:20 pm	Power Loss Analysis of Current-fed Quasi-Z-Source Inverter	A Magnetically Coupled Passive Lossless Snubber with Low Voltage Stress for Continuous Current Mode (CCM) Boost Converter	A New Wide Input Range High Efficiency Photovoltaic Inverter	New Concept Motor that Uses Compound Magnet Motive Forces for EV Application	Dynamic Electro-thermal Modeling in PEBB Applications	Current Sharing in Multiphase ZVT Boost Converter	Fault Location in a Zonal DC Marine Power System Using Active Impedance Estimation	Analysis of IGBT Power Cycling Capabilities Used in Doubly Fed Induction Generator Wind Power System	Comparison between Ramp Pulse Modulation (RPM) and Constant Frequency Modulation for the Beat Frequency Oscillation in Voltage Regulators	HF Injection-based Sensorless Technique for Fault-tolerant IPMSM Drives	A Hybrid Control Architecture for Low Voltage Microgrid
2:20 pm – 2:45 pm	Hybrid Pulse Width Modulation for Z-source Inverters	An AC-DC Power Conversion Based on Series-connected Universal Link Converter	Design and Implementation of a 5 kW Photovoltaic System with Li-ion Battery and Additional DC-converter	Improvement of a Non-contact Elevator Guiding System by Implementation of an Additional Torsion Controller	High Power Density Design of High-current DC-DC Converter with High Transient Power	Fixed Frequency Controlled Piezoelectric 10W DC-DC Converter	Robust Absolute Position Sensing for Maglev	Novel Rotor Side Control Scheme for Doubly Fed Induction Generator to Ride through Grid Faults	Investigation of the Steady-state and Dynamic Characteristics of a Buck Converter with Nonlinear Output Capacitor Current Programming	Model-based Design of a Sensorless Control Scheme for Permanent Magnet Motors Using Signal Injection	Voltage Quality Improvement of Microgrids Under Islanding Mode
2:45 pm – 3:10 pm	A Z-source Sparse Matrix Converter Under Voltage Sag Quasi-Z-source Condition	Three-phase Single-switch Boost PFC Converter with High Input Power Factor	Transformerless Split-inductor Neutral Point Clamped Three-level PV Grid-connected Inverter	Analysis of a Concentric Planetary Magnetic Gear with Strengthened Stator and Interior Permanent Magnet (IPM) Inner Rotor	Thermal Modeling and Management of the Integrated HID Ballast	Improving the Light-load Efficiency of VRMs Using Parallel Inductors	Characteristic Analysis of IPM Type BLDC Motor Considering the Demagnetization of PM by Stator Turn Fault	Flexible Control of DC-link Voltage for Doubly Fed Induction Generator During Grid Voltage Swell	Design Oriented Model for V2 Constant On-time Control	Sensorless Control for Induction Machines Using Square-wave Voltage Injection	Decentralized LQG Control with Online Set-point Adaptation for Parallel Power Converter Systems

3:10 pm – 3:30 pm

PM Break

Grand Salon Prefunction Area

WEDNESDAY, SEPTEMBER 15, 2010 (Continued)

Breakout Sessions • 3:30 pm – 5:10 pm

	Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom A	Grand Ballroom B
3:30 pm – 3:55 pm	<b>S86 DC-AC Inverters: Z-Source Topology II</b>	<b>S87 AC-DC Converters: Single Phase PFC</b>	<b>S88 Sustainable Energy Applications: Photovoltaics Converters III</b>	<b>S89 Electric Machines: Special Machines II</b>	<b>S90 Enabling Technologies: Wide Bandgap Power Semiconductors</b>	<b>S91 DC-DC Converters: Resonant Converters</b>	<b>S92 Transportation Applications: Drivetrains</b>	<b>S93 Sustainable Energy Applications: Wind Energy Systems IV</b>	<b>S94 DC-DC Converters: Control Techniques II</b>	<b>S95 Electric Drives: Sensorless Drives II</b>	<b>S96 Sustainable Energy Applications: Microgrid IV</b>
	Bidirectional AC-AC Z-source Inverter with Active Rectifier and Feedforward Control	Inductive Idling Boost Converter with Low Inductor Current-ripple and Improved Dynamic Response for Power Factor Correction	Power Decoupling Techniques for Micro-inverters in PV Systems	Modelling of Linear Motor End-effects for Saliency-based Sensorless Control	Comparison of 10-kV SiC Power Devices in Solid-state Transformer	Multiple Output Class E Isolated DC-DC Converter	Application of PM Type DMPM in Hybrid Electric Vehicle	Advanced Power Conditioning System for Grid Integration of Direct-driven PMSG Wind Turbines	Fast Control Technique-based on Peak Current Mode Control of the Output Capacitor Current	Impact of Saturation and Current Command Selection on the Performance of Sensorless Controlled Three-pole Active Magnetic Bearings	On the Choice of Voltage Regulators for Droop-controlled Voltage Source Converters in Microgrids to Ensure Stability
3:55 pm – 4:20 pm	Controller Design for Quasi-Z-source Inverter in Photovoltaic Systems	A Front-end Converter with High Reliability and High Efficiency	PV Fed Boost Type Switched Capacitor Power Supply for a Nano Satellite	A Multi-motor Drive-based on Five-phase Tubular PM Actuators	An Investigation of SiC-SiC DC Circuit Breakers for Higher Voltage Direct Current Distribution Systems	PWM Positive Buck-boost Converter with Reduced Switching Loss Employing Quasi-resonant Operation	Comparative Evaluation of Machines for Electric and Hybrid Vehicles Based on Dynamic Operation and Loss Minimization	Development of Grid-connected Wind Energy System Employing Interior PM Synchronous Generator and Multi-pulse Rectifier	A Low Ripple Series-parallel Resonant Converter Based on Robust H-infinity Control Approach	Optimal Design and Sensorless Position Control of a Piezoelectric Motor Integrated into a Mechatronic Cylinder Lock	Design of D-STATCOM for Voltage Regulation in Microgrids
4:20 pm – 4:45 pm	Modulation of Three-level Z-source Indirect Matrix Converter	High-efficiency Bidirectional AC-DC Converter for Energy Storage Systems	Ground Current Suppression for Grid Connected Transformerless PV Inverter with Unbalanced Output Filter Inductors	Design and Electromagnetic Analysis of a Prototype HTS Linear Induction Motor	A High-efficiency, High-frequency Boost Converter Using Mode GaN DHFETs on Silicon	Analysis of Asymmetrical Duty Controlled LLC Converter with Voltage Triple Rectifier for High Voltage Power Supply	Comparison of Different Motor Design Drives for Hybrid Electric Vehicles	Comparison of SMES and SFCL for Transient Stability Enhancement of Wind Generator System	Active Stabilization of DC-DC Converters with Input LC Filters Via Current-mode Control and Input Voltage Feedback	Modeling and Compensation of Inverter Nonlinearity Effects in Carrier Signal Injection-based Sensorless Control Methods from Positive Sequence Carrier Current Distortion	Fast Architecture Generation and Evaluation Techniques for the Design of Large Power Systems
4:45 pm – 5:10 pm	A Matrix Converter Utility Interface for Grid Resources with a High-frequency Bus	A New Bridgeless Single-stage Three-level PFC AC-DC Converter	Multiple-input Modified Inverse Watkins-Johnson Converter without Coupled Inductors	Fast Optimization of a Linear Actuator by Space Mapping Using Unique Finite Element Model	Performance of a Dual, 1200 V, 400 A, Silicon-carbide Power MOSFET Module	Analysis and Design of a Resonant LLC Converter for Low-profile Applications	Comparison of SiC Inverters for IPM Traction Drive	A Low Voltage Ride-through Technique for Grid-connected Converters of Distributed Energy Resources	An Active Current Reconstruction and Balancing Strategy with DC Link Current Sensing for a Multi-phase Coupled-inductor Converter	Spectral Overlap of Saliency Signal Components in Injection Based Sensorless Controlled Induction Machines	A Hybrid Synchronous/ Fixed Reference Frame PLL for Phase Synchronization with Unbalanced Three-phase Grid Conditions

ECCE Banquet

7:00 pm – 9:30 pm

Grand Salon

THURSDAY, SEPTEMBER 16, 2010

7:00 am – 3:00 pm		Breakout Sessions • 8:00 am – 9:40 am										8:00 am – 9:40 am		Registration Open		Prefunction South	
		Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom A	Grand Ballroom B					
8:00 am – 8:25 am		<b>S97 Electric Machines: Permanent Magnet Machines I</b> Influence of Slot Opening on Optimal Stator and Rotor Pole Combination and Electromagnetic Performance of Flux-switching PM Brushless AC Machines	<b>S98 DC-DC Converters: Special Topics I</b> An Accurate Loss Model for Current-source Gate Driver with Interleaving BUCK Converter	<b>S99 Sustainable Energy Applications: Flexible Renewable/Alternative Energy System I</b> A Novel Five-level Single-phase Grid-connected Converter for Renewable Distributed Systems	<b>S100 Electric Machines: Turbine Generators</b> Structural Mass Minimization of Large Direct-drive Wind Generators Using a Buoyant Rotor Structure	<b>S101 Transportation Applications: EV/PEV Battery Chargers</b> A High-performance Single-phase AC-DC Power Factor Corrected Boost Converter for Plug-in Hybrid Electric Vehicle Battery Chargers	<b>S102 Sustainable Energy Applications: Smart Grid Interface</b> Increasing Inter-area Available Transfer Capacity Using Controllable Network Transformers	<b>S103 Electric Machines: Design Optimization</b> An Electromagnetic-thermo-mechanical Integrated Design and Optimization Method for Permanent Magnet Machines Considering Load Profiles	<b>S104 DC-AC Inverters: Multi-Level Inverters I</b> An Investigation of Voltage Balancing Circuit for DC Capacitors in Diode-clamped Multilevel Inverters to Realize High Output Power Density Converters	<b>S105 DC-DC Converters: Soft Switching Techniques I</b> Soft-switching Self-driven Buck Converter with Three-switch Cell Structure	<b>S106 Sustainable Energy Applications: Power Quality I</b> AC Fault Ride-through Capability of VSC-HVDC Transmission Systems	<b>S107 Sustainable Energy Applications: Wind Turbine Control I</b> Growing Neural Gas Based MPPT of Variable Pitch Wind Generators with Induction Machines					
8:25 am – 8:50 am		Impact of the Rotor Yoke Geometry on Rotor Losses in Permanent Magnet Machines	An Integrated SIDO Boost Power Converter with Adaptive Freewheel Switching Technique	A High Frequency Link Multiport Converter Utility Interface for Renewable Energy Resources with Integrated Energy Storage	A Generic Synchronous Machine Model for Real Time Training Simulators	The Issue of Plug-in Hybrid Electric Vehicles' Grid Integration and Its Control Solution	Active Smart Wires: An Inverter-less Static Series Compensator	Maximum Torque Control for Optimal Design to Reduce Core Torque Ripple Typing Error in Permanent Magnet Synchronous Motor	Regenerative Asymmetrical Multi-level Converter for Multi-megawatt Variable Speed Drives	A New Concept of High Input Voltage to Low Load Voltage (1500 V-48 V) DC-DC Conversion with Hybrid ZVS-ZCS and Asymmetrical Voltage Distribution	Three-level Converters with Selective Harmonic Elimination PWM for HVDC Application	Grid-connected Wind Farm Power Control Using VRB-based Energy Storage System					
8:50 am – 9:15 am		Surface Permanent Magnet Synchronous Machine Design for Self-sensing Position Estimation at Zero and Low Speeds	Novel Zero-current Switching Current-fed Half-bridge Isolated DC-DC Converter for Fuel Cell Based Applications	Control of a Modular Multilevel Cascade BTB System Using Bidirectional Isolated DC-DC Converters	Advanced Signal Processing Techniques for Fault Detection and Diagnosis of a Wind Turbine Induction Generator Drive Train: A Comparative Study	Control Scheme Optimization for a Low-cost, Digitally-controlled Charger for Plug-in Hybrid Electric Vehicles	Islanding Detection in Smart Grids	FEA-based Multi-objective Optimization of IPM Motor Design Including Rotor Losses	Voltage Balancing Control and Experiments of a Novel Modular Multilevel Converter	Novel DC-DC Architecture for High Efficiency SMPS with Multiple Outputs	Input Impedance Modeling of Multipulse Rectifiers by Double-Fourier Series Method	Control of Variable Pitch, Variable Speed Wind Turbine in Weak Grid Systems					
9:15 am – 9:40 am		Study of Iron Saturation in Brushless Doubly-fed Induction Machines	General Law of Non-isolated Interleaved High Step-up Topologies with Winding-cross-coupled Inductors Deduced from Isolation Counterparts	Seamless Transfer Strategy with Outer Current Loop for Three-phase Inverter in Distributed Generation	The Magneto Motive Force of a Novel Dual Stator-winding Induction Generator	A High Power, Current Sensorless, Bidirectional, 16 Phase Interleaved, DC-DC Converter for Hybrid Vehicle Application	Real-time Dynamic Thermal Rating Evaluation of Overhead Power Lines Based on Online Adaptation of Echo State Networks	Investigation of Torque and Iron Loss Characteristics of Optimized Spoke Type IPMSM Considering Motor Modeling and Motor Drive Circuit	A Modulation Technique for High Power AC-DC Multilevel Converters for Power System Integration	Zero-voltage-switching Interleaved Two-switch Forward Converter with Phase-shift Control	Scheduling Demand Response Events with Constraints on Total Number of Events per Year	A Battery Energy Storage Interface for Wind Power Systems with the Use of Grid Side Inverter					



THURSDAY, SEPTEMBER 16, 2010 (Continued)

9:40 am – 10:00 am		Breakout Sessions • 10:00 am – 11:40 am										Grand Salon Prefunction Area	
AM Break		Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom A	Grand Ballroom B	
10:00 am – 10:25 am	S108 Electric Machines: Permanent Magnet Machines II	S109 DC-DC Converters: Special Topics II	S110 Sustainable Energy Applications: Flexible Renewable/Alternative Energy System II	S111 Electric Drives: N-Phase Drives	S112 Transportation Applications: Energy Storage	S113 Sustainable Energy Applications: VAR Compensators	S114 Electric Machines: High Speed Machines	S115 DC-AC Inverters: Multi-Level Inverters II	S116 DC-DC Converters: Soft Switching Techniques II	S117 Sustainable Energy Applications: Power Quality II	S118 Sustainable Energy Applications: Wind Turbine Control II		
10:25 am – 10:50 am	Analysis and Measurement of 3D Torque and Forces for Permanent Magnet Motors with Slotless Windings	Sawtooth Burst Mode with Minimum On-time in Stand-by Operation of Power Supply	Predictive Control for Universal and Flexible Power Management	Two-phase Motor Drive Systems with Z-source Inverter and Hybrid PWM	System Identification-based Lead-acid Battery Online Monitoring System	Safe Current Injection Strategies for a STATCOM under Asymmetrical Grid Faults	Harmonic Loss Analysis and Air-gap Optimization of High Speed Induction Motors	Low Output Frequency Operation of the Modular Multi-level Converter	A ZVS Technique for Single-switch PWM Converters Implemented with Paralleled MOSFETS	A Simple Sag Generator Using SSRs	Review and Critical Analysis of the Research Papers Published Till Date on Maximum Power Point Tracking in Wind Energy Conversion System		
10:50 am – 11:15 am	Sensorless Drive of Brushless DC Motors with Estimating Torque Constant for Home Appliance	A Linear Assisted DC-DC Converter for Envelope Tracking and Envelope Elimination and Restoration Applications	Instantaneous Active and Nonactive Power Control of Distributed Energy Resources with a Current Limiter	Six-phase Machine Drive System with Reversible Parallel AC-DC-AC Converters	Automatic Charge Equalization Circuit Based on Regulated Voltage Source for Lithium-ion Batteries	Design and Implementation of a 154 kV, +/- 50 MVAR Transmission STATCOM Based on 21-level Cascaded Multilevel Converter	Novel High-speed, Lorentz-type, Slotless Self-bearing Motor	A Hybrid Cascaded Multilevel Inverter Application for Renewable Energy Resources Including a Reconfiguration Technique	Zeroing Transformer's DC Current in Resonant Converters with No Series Capacitors	Comparison between Conventional, GA and PSO with Respect to Optimal Capacitor Placement in Agricultural Distribution System	Network Damping Capability of DFIG-based Wind Farm		
11:15 am – 11:40 am	Cogging Torque Minimization in PM Motors Using Robust Design Approach	High Efficiency Power Amplifier Based on Envelope Elimination and Restoration Technique	A Two-stage High Power Density Single-phase AC-DC Bidirectional PWM Converter for Renewable Energy Systems	A Separate Double-winding 12-phase Brushless DC Motor Drive Fed from Individual H-bridge Inverters	Power Electronics Enabled Energy Management for Energy Storage with Extended Cycle Life and Improved Fuel Economy in a PHEV	Negative-sequence Reactive-power Control by the Modular Multilevel Cascade Converter Based on Double-star Chopper-cells (MMCC-DSCC)	Rotor Design of a High-speed Permanent Magnet Synchronous Machine Rating 100,000 RPM at 10kW	Review of Novel Multilevel Current-source Inverters with H-bridge and Common-emitter Based Topologies	Design and Implementation of a ZCS Two-switch DC-DC Forward Converter with Variable Inductor	Direct Power Control for Unified Power Flow Controller Series Converter for Direct-drive PMSG Wind Turbines	Mechanical Sensorless Maximum Power Tracking Control for Direct-drive PMSG Wind Turbines		
11:45 am – 1:40 pm	A Novel E-core Flux-switching PM Brushless AC Machine	A New Family of Marx Generator Based on Resonant Converter	A Novel Phase-shift Bidirectional DC-DC Converter with an Extended High-efficiency Range for 20 kVA Solid State Transformer	Torque Maximization in High-torque Density Multiphase Drives Based on Induction Motors	A Modularized Charge Equalizer Using Battery Monitoring IC for Series Connected Li-ion Battery Strings in an Electric Vehicle	Four-branch Star Neutral Current Filter and Var Compensator	Design of a 750,000 RPM Switched Reluctance Motor for Micro Machining	Symmetrical Hybrid Multilevel DC-AC Converter in Cascade	Rapid Simulation of Multi-resonant LLC Converters with Capacitive Output Filter Based on an Extended First Harmonic Approximation	Harmonic Identification in a Power System Using an Echo State Network for Adaptive Power Filter Applications	Determination of Steady State Control Laws of Doubly-fed Induction Generator Using Natural and Power Variables		

Grand Salon

Awards Luncheon

THURSDAY, SEPTEMBER 16, 2010 (Continued)

Breakout Sessions • 1:40 pm – 3:20 pm

	Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom A	Grand Ballroom B
1:40 pm – 2:05 pm	<b>S119 Electric Machines: IPM Machines</b> Design Tradeoffs between Constant Power Speed Range, Uncontrolled Generator Operation and Rated Current of IPM Motor Drives	<b>S120 DC-DC Converters: Modeling and Analysis</b> Experimental Study of Chaotic Behaviour in Parallel Connected DC-DC Boost Converters with Unbalanced Inductors	<b>S121 Sustainable Energy Applications: Energy Harvesting I</b> Self-powered Wireless MEMS Sensor Modules for Measuring Electrical Quantities in Residential, Commercial, and Distribution, and Transmission Power Systems	<b>S122 Electric Drives: Control and Testing</b> Closed Loop Control of Active Damped Small DC-link Capacitor Based Drive	<b>S123 Transportation Applications: Power Converters</b> The Electromagnetic Compatibility Design Considerations of the Input Filter of a 3-phase Inverter in a Railway Traction System	<b>S124 Sustainable Energy Applications: Battery Concepts AMD Modeling</b> A Transient-based Approach to Estimation of the Electrical Parameters of a Lead-acid Battery Model	<b>S125 Energy Public Policy and Economics: Electrified Transport and Hydrogen Economy</b> On-site Electrolysis Sodium Metal Production by Offshore Wind or Solar Energy for Hydrogen Storage and Hydrogen Fuel Cycle	<b>S126 Electric Drives: Multi-Level Drives</b> On Interaction between Internal Converter Dynamics and Current Control of High-performance High-power AC Motor Drives with Modular Multilevel Converters	<b>S127 DC-AC Inverters: Advanced Inverter System I</b> Advanced Energy Conversion System Using Sinusoidal Voltage Tracking Buck-boost Converter Cascaded Polarity Changing Inverter	<b>S128 Sustainable Energy Applications: Power Quality III</b> Research on Active Harmonic Resistor to Damping Resonance in Distribution System	<b>S129 Enabling Technologies: Magnetic Design and Optimization I</b> Single-phase vs. Three-phase High Density Power Transformers
2:05 pm – 2:30 pm	<b>Multi Objective Design Improvement of IPM Motor-drive Using Physics-based Motor Model</b>	<b>Large-signal Linearization of Boost Converter</b>	<b>Human Powered Axial Flux Permanent Magnet Machines: Review and Comparison</b>	<b>DC-link Voltage Control for Switched Reluctance Drives with Reduced DC-link Capacitance</b>	<b>Design of Power Electronic Building Blocks (PEBB) for MultiMW Modular Traction Converters</b>	<b>Improvement of Electrical Modeling of NiMH Battery for Application of Microgrid System</b>	<b>Flexible Electric Vehicle (EV) Charging to Meet Renewable Portfolio Standard (RPS) Mandates and Minimize Green House Gas Emissions</b>	<b>Power Quality Enhancement in High Power Multi-level Drives</b>	<b>A New Approach for Real-time Multiple Open-circuit Fault Diagnosis in Voltage Source Inverters</b>	<b>Novel Current Limitation Technique without Current Feedback for Digital-controlled Battery Charger in UPS Applications</b>	<b>Inductor Design Methods with Low-permeability RF Core Materials</b>
2:30 pm – 2:55 pm	<b>Unbalanced Operation of Current Regulated Sine-wave Interior Permanent Magnet Machines</b>	<b>Design of High Performance Point of Load Converters with Ultra-low Output Voltage Ripple</b>	<b>Wideband Energy Harvesting for Resonant Piezoelectric Devices</b>	<b>Three-phase Electric Drive with Modified Electronic Smoothing Inductor</b>	<b>Design and Implementation of Fully Digital-controlled 400 Hz Active Power Filter for Aircraft Applications</b>	<b>Analysis of an Electro-mechanical Battery for Rural Electrification in Sub-Saharan Africa</b>	<b>Financial Incentives to Encourage Demand Response Participation by Plug-in Hybrid Electric Vehicle Owners</b>	<b>Model Predictive Direct Current Control for Multi-level Inverters</b>	<b>Dynamic Voltage Balancing of Series Connected IGBTs Using Slope Regulating and Voltage Clamping</b>	<b>Elimination of Transfer Time Effects in Line-interactive and Passive Standby UPSs by Means of a Small-size Inverter</b>	<b>New Core Loss Measurement Method for High Frequency Magnetic Materials</b>
2:55 pm – 3:20 pm	<b>Implementation and Control of a PMSM Self-bearing Motor Drive</b>	<b>State Space Decoupling Control Design Methodology for Switching Converters</b>	<b>Wireless Power Transfer Using Weakly Coupled Magnetostatic Resonators</b>	<b>Parameter Identification of an Induction Motor at Standstill Using Vector Constructing Method</b>	<b>Multiphase Multilevel Modular DC-DC Converter for High Current High Gain TEG Application</b>	<b>Series-connected Reconfigurable Multicell Battery: A Novel Design Towards Smart Batteries</b>	<b>Investigations into the Minimization of Electrical Costs for Traction-type Elevators</b>	<b>Introduction of a Large Scale High Efficiency 5-level IEGT Inverter for Oil and Gas Industry</b>	<b>High-frequency DC Link Grid-connected Power Conversion with Improved Active Clamp</b>	<b>A Hybrid Multilevel Inverter with Both Staircase and PWM Switching Schemes</b>	<b>Optimal Design of a Pot Core Rotating Transformer</b>

PM Break

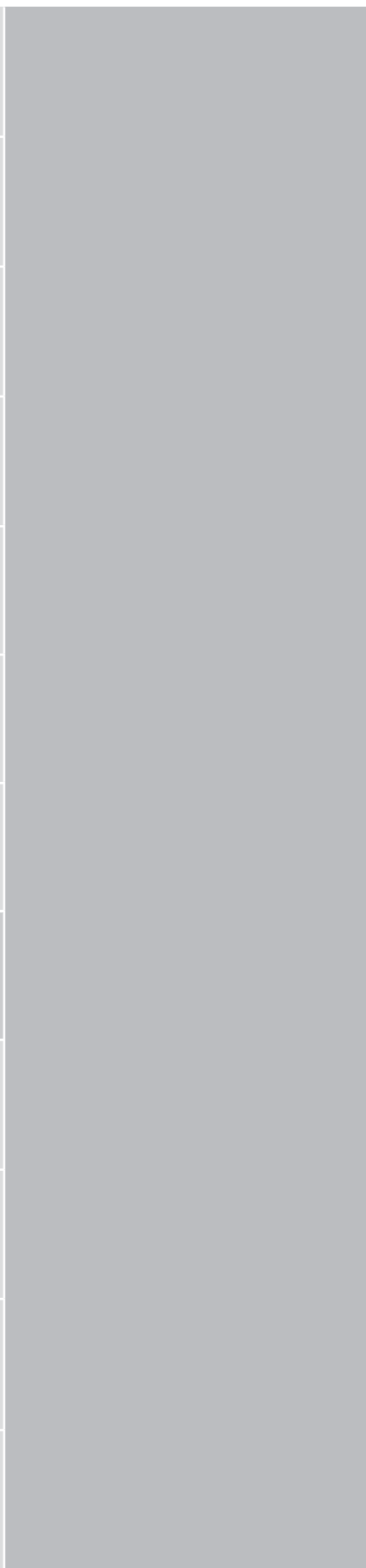
Grand Salon Prefunction Area

3:20 pm – 3:40 pm

THURSDAY, SEPTEMBER 16, 2010 (Continued)

Breakout Sessions • 3:40 pm – 4:55 pm

	Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom C	Grand Ballroom D	Grand Ballroom A	Grand Ballroom B
3:40 pm – 4:05 pm	<b>S130 Electric Drives: Improved PWM Methods</b>	<b>S131 DC-DC Converters: System Architectures</b>	<b>S132 Sustainable Energy Applications: Energy Harvesting II</b>	<b>S133 Electric Drives: Sensing Techniques</b>	<b>S134 Sustainable Energy Applications: Fuel Cell Power Systems</b>	<b>S135 Enabling Technologies: Power Electronics Modeling and Simulation Tools</b>	<b>S136 Energy Efficiency and Industrial Applications: Special Topics</b>	<b>S137 Enabling Technologies: Power Semiconductors III</b>	<b>S138 DC-AC Inverters: Advanced Inverter System II</b>	<b>S139 Energy Policy and Economics: Reducing Renewable Energy Cost with Power Electronics and Carbon Trading</b>	<b>S140 Enabling Technologies: Magnetic Design and Optimization II</b>
	Pulse-width Modulation Technique for BLDCM Drives to Reduce Commutation Torque Ripple without Calculation of Commutation Time	Modeling and Simulation of a Distributed Power System for Avionic	An Input-powered Active AC-DC Converter with Zero Standby Power for Energy Harvesting Applications	Compensation of Analog Rotor Position Errors Due to Nonideal Sinusoidal Encoder Output Signals	Design and Experimental Validation of a Robust Control Method for a Hybrid Fuel Cell Power Generation System	Efficient CAD Tool for Power Electronics Compensator Design	A Review of Monitoring and Identification Methods for Electric Loads in Commercial and Residential Buildings	Analysis of Static Voltage Balance of Series Connected Self-powered ETOs	Analysis and Suppression of a Common Mode Resonance in the Cascaded H-bridge Multilevel Inverter	An Alternative Mechanism for Carbon Emission Permit Price Volatility Mitigation	Selection of the Appropriate Winding Setup in Planar Inductors with Parallel Windings
4:05 pm – 4:30 pm	Vector Quantized Spread Spectrum Modulation Scheme for Three Level Inverters	The Analysis of DC-DC Converter Topologies Based on Stackable Voltage Elements	A New Single Stage AC-DC Converter for Low Voltage Electromagnetic Energy Harvesting	Using the Motor Drive as a Sensor to Extract Spatially Dependent Information During Servo Operation	Techniques for Efficiency Gains in Soft Switching Full-bridge Fuel Cell Power Conversion	Modeling and Evaluation of Diode Reverse Recovery in Discrete-transition Simulators	Design of a Supercapacitor Based Storage System for Improved Elevator Applications	The Integrated Emitter Turn-off Thyristor (IETO) — An Innovative Thyristor Based High Power Semiconductor Device Using MOS Assisted Turn-off	Optimal Pulsewidth Modulation of Multilevel Inverters for Low Switching Frequency Control of Medium Voltage High Power Industrial AC Drives	Reduction of Green House Gas Emission by Clean Power Trading	A High Efficient Integrated Planar Transformer for Primary-parallel Isolated Boost Converters
4:30 pm – 4:55 pm	Single Current Sensor Operation with Fixed Sampling Points Based on TSPWM	Observer-based Fault Diagnosis of Power Electronics Systems	Design of a Low Cost Self-powered “Stick-on” Current and Temperature Wireless Sensor for Utility Assets	<b>POSTER SESSION II</b> A Method for Sensorless Position Control of a Permanent Magnet Synchronous Motor	Grid-interfaced Fuel Cell Energy System Based on a Boost-inverter with a Bidirectional Back-up Battery Storage	Digital Flickermeter Design and Implementation based on IEC Standard	Applying a Novel Power Management Unit (PMU) to Replace the Large DC Bus Electrolytic Capacitors in Fuel Cell Power Generation System	High Frequency Switching High-power Converter with SiC-PiN Diodes and Si-IGBTs	Seven-level Cascaded ANPC-based Multilevel Converter	Transportation Applications Using Practical Hydrogen-on-demand Systems	Planar Integrated Magnetics Design in Wide Input Range DC-DC Converter for Fuel Cell Application



All activities related to ECCE 2010 will be held on the 2nd floor of the Hilton Atlanta.



Ballroom A.....	Breakout Sessions .....	September 14-16
Ballroom B.....	Breakout Sessions .....	September 14-16
Ballroom C.....	Breakout Sessions .....	September 13-16
Ballroom D.....	Breakout Sessions .....	September 13-16
Ballroom East.....	General Session .....	September 13
Ballroom West.....	ECCE Opening Reception .....	September 12
Breakout Rooms 201-204 .....	Tutorials.....	September 12
Grand Salon .....	Expo .....	September 13-14
	Poster Sessions .....	September 14
	ECCE Banquet .....	September 15
	Awards Lunch .....	September 16



**Registration Services**

Saturday through Thursday  
*Prefunction South*

On-site registration will be open during the following hours:  
 Saturday, September 11.....3:00 pm – 5:00 pm  
 Sunday, September 12.....7:00 am – 7:00 pm  
 Monday, September 13.....7:00 am – 7:00 pm  
 Tuesday, September 14.....7:00 am – 7:00 pm  
 Wednesday, September 15.....7:00 am – 7:00 pm  
 Thursday, September 16.....7:00 am – 3:00 pm

**Full Conference Registration**

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

**Full Conference Registration Rates**

IEEE Member .....	\$675.00
Student IEEE Member .....	\$225.00
Society Member.....	\$625.00
Life Member.....	\$300.00
Non-Member .....	\$900.00
Student Non-Member .....	\$225.00

**One-Day Registration**

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

**One-day Registration Rates**

Society Members.....	\$325.00
IEEE Members .....	\$375.00
Non-Member .....	\$425.00

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

**Certificate of Attendance**

Certificates of Attendance will not be provided for ECCE 2010.

**Tutorial Registration\***

Tutorials will take place on Sunday, September 12, 2010. You may select one morning session and one afternoon session. The rates are outlined below. The registration rate is the same if you choose to attend either one or two tutorials. The registration fee includes materials for all 8 tutorials.

Society Member.....	\$275.00
IEEE Member .....	\$300.00
Non-Member .....	\$325.00

**Expo Only**

Expo Only Registration allows access to the Expo only on Tuesday, September 14 after 1:30 pm. Attendees may register for the complimentary Expo Hall Only pass while onsite. Please register at the Registration Desk.

**Guest Tickets**

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

Opening Reception Ticket.....	\$60 per person
ECCE Banquet Ticket.....	\$75 per person
Awards Luncheon Ticket.....	\$60 per person
Lunch Ticket.....	\$30 per person

**Receipts**

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

**Badges**

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



**Message and Information Center**

Saturday through Thursday  
*Prefunction South*

If you need to reach a fellow attendee, messages and notices may be placed on the Message Board. Please plan to check these boards regularly in case other attendees are trying to reach you. Outside of registration hours it is recommended that messages be left at the attendee's hotel. Attendees will not be paged.

### Accessibility for Registrants with Disabilities

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

### Business Center

The Hilton Atlanta is equipped with a 24 hour self service Business Center. Hotel guests must use their key card to access the Business Center. Here you'll be able to fax, print, copy, and access the internet. Also available onsite is a FedEx Office. The hours of operation are as follows: Monday through Friday, 8:00 am – 7:00 pm, Saturday, 9:00 am – 5:00 pm, Sunday, 11:00 am – 5:00 pm.

### Cameras and Recording Devices

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

### First Aid

The Hilton Atlanta a small gift shop equipped with basic first aid supplies. If you are in need of emergency services or hospital care, the nearest hospitals are as follows:

#### Emory University Hospital Midtown

550 Peachtree Street NE  
Atlanta, GA 30308  
Phone: (404) 686-4411  
0.5 miles from hotel

#### Atlanta Medical Center

303 Parkway Drive NE  
Atlanta, GA 30312  
Phone: (404) 265-4000  
0.6 miles from hotel

### Hotels

ECCE 2010 has one participating hotel, the Hilton Atlanta.

#### Hilton Atlanta

255 Courtland Street NE  
Atlanta, Georgia, 30303  
Phone: (404) 659-2000  
Fax: (404) 221-6368

### Internet Access

Complimentary wireless internet access will be available for ECCE 2010 attendees in the designated hot spot area of the Grand Salon on Tuesday. An internet hotspot will be available in the registration area Monday through Thursday.

### Local Transportation

The Atlanta International Airport is located approximately 12 miles from the hotel, or about a 15 minute drive. A taxi fare will run about \$30 USD, one way. There are a number of transportation options to and from the airport as well as in and around the city of Atlanta. Listed below are just a few options.

#### MARTA (Metropolitan Atlanta Rapid Transit Authority)

Please visit <http://www.itsmarta.com/> for transit maps and schedules.

#### AAA Taxi Service

Phone: (404) 252-3838

#### All Express Cab & Limo Company

Phone: (404) 758-8299

#### Check Cab Company

Phone: (404) 351-8255

### Parking

Self park and valet parking services are available at the Hilton Atlanta. Self parking is \$21.00 per day, while valet parking is \$28.00 per day. Please check with the hotel directly for current parking rates.

### Meals & Refreshments

Full conference registration includes all meals, refreshments, and social functions provided by ECCE 2010.

#### Morning Refreshments

Monday through Thursday  
*Salon Prefunction Area*

Monday, September 13 ..... 10:00 am – 10:20 am  
Tuesday, September 14 ..... 9:40 am – 10:00 am  
Wednesday, September 15 ..... 9:40 am – 10:00 am  
Thursday, September 16 ..... 9:40 am – 10:00 am

#### Lunch

Tuesday  
*Grand Salon*

Tuesday, September 14 ..... 11:40 pm – 1:20 pm

*\*On Tuesday, the afternoon break will be located in the Grand Salon.*

#### Awards Lunch

Thursday  
*Grand Salon*

Thursday, September 16 ..... 11:45 am – 1:40 pm

#### Afternoon Refreshments

Monday through Thursday  
*Salon Prefunction Area*

Monday, September 13 ..... 3:00 pm – 3:20 pm  
Tuesday, September 14\* ..... 3:00 pm – 3:30 pm  
Wednesday, September 15 ..... 3:10 pm – 3:30 pm  
Thursday, September 16 ..... 3:20 pm – 3:40 pm

### New to ECCE/PELS/IAS Reception

Sunday • 4:30 pm - 5:00 pm  
Grand Ballroom West (C/D)

Are you new to ECCE and have not previously been involved with PELs or IAS? Then attend this reception to meet other new attendees and the organization's leaders to enhance your ECCE experience.

### Opening Reception

Sunday • 5:00 pm – 7:00 pm  
Grand Ballroom West (C & D)

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

### Spouse Breakfast

Monday • 9:00 am – 10:00 am  
Murphy King Room on the 4th Floor

ECCE guest ticket holders are invited to attend the ECCE Guest Breakfast. The hotel concierge will join you at 9:30 am to discuss things to do while you are in Atlanta and to answer any specific questions about the city.

### Expo Reception

Monday • 5:00 pm – 7:00 pm  
Grand Salon

Enjoy a drink and light snacks while you mingle with industry partners and friends and explore the latest advances in products and services to meet the needs of current and future challenges facing the energy conversion industry.

### ECCE Gala Dinner

Wednesday • 7:00 pm – 9:30 pm  
Grand Salon

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

### Meet & Greet the Fellows Reception

Sunday • 5:00 pm – 7:00 pm • Grand Ballroom West (C & D)

Join us for a Meet and Greet the Fellows Reception within the Sunday evening Opening Reception of ECCE 2010. A chance to chat, take photos and congratulate the 2010 IEEE Power Electronics Society Class of Fellows that have chosen to receive their award at ECCE.



#### Shmuel (Sam) Ben-Yaakov

Ben-Gurion University of the Negev  
Department of Electrical and Computer Engineering

Honored for development of modeling and simulation methodologies for pulse width modulated and resonant converters.



#### Xiangning He

Zhejiang University  
College of Electrical Engineering

Honored for leadership in establishing a power electronics research institute in China.



#### Johann Kolar

Swiss Federal Institute of Technology (ETH) Zurich  
Power Electronic Systems Lab

Honored for contributions to three-phase pulsed width modulation converter systems.



#### Seth Sanders

University of California, Berkeley  
Electrical Engineering & Computer Sciences Department

Honored for contributions to integrated passive component technology and digital control of power electronic systems.



#### Fei (Fred) Wang

Virginia Tech  
Center for Power Electronics Systems

Honored for contributions to design and control of high-power high-density converters and drives



#### Robert White

Vu1- PSMA (Power Source Manufacturing Association)

Honored for contributions to digital power management in power systems for computing and telecommunications equipment

## Oral Presenters

### Speaker Ready Room

Saturday through Thursday

*Prefunction South (next to Registration Services)*

**ALL Oral Presenters** must check in at the Speaker Ready Room at least 4 hours prior to their scheduled presentation. Even if you have submitted your presentation in advance and have no changes, you must check and confirm that the presentation is correct.

The hours of operation of the Speaker Ready Room are as follows:

Saturday, September 11.....	3:00 pm – 5:00 pm
Sunday, September 12.....	7:00 am – 3:30 pm
Monday, September 13.....	7:00 am – 3:30 pm
Tuesday, September 14.....	7:00 am – 3:30 pm
Wednesday, September 15.....	7:00 am – 3:30 pm
Thursday, September 16.....	7:00 am – 3:00 pm

You may also edit your presentation at this time. When you are finished reviewing your presentation and verify it is ready, the AV personnel will queue your presentation onto the networked conference computers. The file will then be transferred to the computer network for presentation in the scheduled room.

### Presenters' Orientation & Breakfast

A Presenters' orientation will held for all presenters and session chairs from 7:00 am – 8:00 am, Monday through Thursday, in the hotel's restaurant, Trader Vic's. A section of the restaurant will be reserved specifically for our presenters and session chairs. Oral presenters should meet with their respective session chairs to review the format and timing of their session and alert conference management of any changes. Oral presenters should attend the orientation each day that they are scheduled to provide an oral presentation (or chair a session); you may only attend breakfast on days on which you are scheduled to speak. Poster presenters should attend the breakfast the morning of Tuesday, September 14, 2010.

## Poster Presenters

### Poster Presentation Schedule

Tuesday

*Grand Salon*

Poster Session I.....	1:30 pm – 3:00 pm
Poster Session II.....	3:30 pm – 5:00 pm

Over 125 posters will be on display on Tuesday in the Grand Salon. The poster presenters should be available for questions at their display boards during their scheduled poster presentation time. If you are unsure in which session your poster should be presented, please review the complete Technical Session schedule starting on page 39.

### Poster Session I Setup

Presenters will have access to the exhibit hall, Grand Salon, starting at 11:30 am. Presenters for Poster Session I must have their posters set-up no later than 1:30 pm. Poster presenters must then take their posters down promptly at 3:00 pm. Any posters that remain on the poster boards at 3:30 pm, and do not belong in Poster Session II will be removed and kept at the Registration Desk.

### Poster Session II Setup

Presenters for Poster Session II will only have between 3:00 pm – 3:30 pm to set-up their posters. Posters for Poster Session II must then be removed no later than 5:30 pm.

Do not leave your presentation on the poster board. Posters remaining after 6:00 pm on Tuesday, September 14th will be removed and kept at the Registration Desk. Uncollected posters will be discarded.

### Poster Boards & Push-pins

4'x6' poster boards will be provided, so please keep these dimensions in mind when printing your posters. Push pins will be provided for all poster presenters.



**IAS Committee Meetings**

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**Industrial Power Conversion Systems Department Meeting**

Sunday, September 12, 2010

7:00 pm - 9:00 pm

*Room 206***Industrial Drive Committee** (*Joint meeting with PELS Technical Committee on Motor Drives*)

Monday, September 13, 2010

6:00 pm - 8:00 pm

*Room 201***Power Electronics Devices & Components Committee**

Monday, September 13, 2010

6:00 pm - 8:00 pm

*Room 202***Electric Machines Committee**

Tuesday, September 14, 2010

5:00 pm - 7:00 pm

*Room 202***Industrial Power Converter Committee**

Tuesday, September 14, 2010

5:00 pm - 7:00 pm

*Room 203***Industrial Lighting and Displays Committee**

Tuesday, September 14, 2010

3:30 pm - 5:00 pm

*Room 206***ECCE Committee Meetings**

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**ECCE Technical Program Committee**

Monday, September 13, 2010

5:00 pm - 8:00 pm

*Room 203***ECCE 2011 Organizing Committee Meeting**

Tuesday, September 14, 2010

1:30 pm - 5:00 pm

*Room 204***ECCE 2012 Organizing Committee Meeting**

Tuesday, September 14, 2010

5:00 pm - 7:00 pm

*Room 204***ECCE Steering Committee Meeting**

Wednesday, September 15, 2010

1:30 pm - 3:30 pm

*Room 204***PELS Committee Meetings**

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**PELS Meetings Committee**

Saturday, September 11, 2010

11:30 am - 4:30 pm

*Room 206***IEEE Power Electronics Society Standards Committee (PELSC)**

Saturday, September 11, 2010

4:00 pm - 6:00 pm

*Room 202***PELS Operations & Products Meetings Committee**

Sunday, September 12, 2010

7:30 am - 11:30 am

*Room 206***PELS Administrative Committee Meeting**

Sunday, September 12, 2010

11:30 am - 5:00 pm

*Room 206***PELS Technical Committee on Motor Drives***(Joint meeting with IAS Industrial Drives)*

Monday, September 13, 2010

6:00 pm - 8:00 pm

*Room 201***PELS Sustainable Energy Technical Committee**

Tuesday, September 14, 2010

12:00 pm - 1:00 pm

*Room 201***PELS Modeling, Simulation and Control TC Meeting**

Tuesday, September 14, 2010

12:00 pm - 1:00 pm

*Lobby Level Training Room***IEEE Power Electronics Society DC Systems Committee (PELSDC)**

Tuesday, September 14, 2010

2:00 pm - 3:00 pm

*Room 201***PELS Transactions Editorial Board Meeting**

Tuesday, September 14, 2010

2:00 pm - 4:00 pm

*Room 202***Meeting of TC on Distributed Generation and Renewable Energy Systems**

Tuesday, September 14, 2010

4:00 pm - 7:00 pm

*Room 201***Power Electronics Devices and Components Committee (PEDCC)**

Tuesday, September 14, 2010

5:00 pm - 7:00 pm

*Room 205*

**Monday, September 13, 2010**

8:00 am – 10:10 am

Grand Ballroom East (A/B)

Speaker: **Paul Hamilton**, *Energy Efficiency Program, Strategy, Customers, Innovation & Technology, Schneider Electric*



Energy Efficiency was established as a core business initiative for Schneider Electric in early 2006. In September 2006, Paul Hamilton was selected to lead the Energy Efficiency Company Program. In this role he is responsible for promoting and developing the global business of Schneider Electric in the areas of energy efficiency and sustainability. Today,

Paul is actively engaged in the global communities of energy efficiency and sustainability. He has represented Schneider Electric in a variety of public events and organizations around the world on the topic. His main message revolves around the impact energy efficiency can have on people, business and the planet and the opportunities we have to manage and impact change. He is active in lobbying and standards, internal energy action programs, and education programs on energy efficiency. Since 1998, Paul has managed various aspects of the services and automation businesses for Schneider Electric. Prior to this he was involved in two successful venture startups for industrial control software and the safety control systems business. Paul started his career at GE in the electrical equipment business before moving into the automation business. Paul resides in the Boston area, graduated from the University of Pittsburgh with a BSEE and is a Certified Energy Manager.

Speaker: **Richard K. Williams**, *President and CEO, Chief Technical Officer, Advanced Analogic Technologies, Inc.*



An acknowledged device physics expert in power management and IC technology, Richard has invented many landmark products. Prior to AnalogicTech, Richard spent 18 years at Siliconix where he was senior director of device concept and design. He invented and developed several milestone devices, including an airbag controller IC for Mercedes-Benz, a Lilon

battery disconnect switch for Sony and Apple Computer, and the first production Trench Power MOSFET. Williams holds a BSEE from the University of Illinois at Urbana-Champaign and an MSEE from Santa Clara University.

Speaker: **Lennart Jonsson**, *Executive Vice President and Chief Technology Officer, Eaton Corporation*



Lennart Jonsson is Sr. Vice President and Chief Technology Officer at Eaton Corporation, Electrical Sector. Lennart Jonsson was born in Lidköping Sweden. He received an M.S. degree in Electrical Engineering from Chalmers University of Technology in 1974. After completing his studies Lennart started an international carrier by joining Nea- Lindberg AS, Copenhagen Denmark, as a project leader with responsibility for development of electrical equipment and power converters. In 1977, he joined Ulveco Power Systems, Stockholm Sweden as a Design Engineer and was later promoted to Product Development Manager. The product development activity included 48 V DC Power Systems, Power Supplies for Telecommunication applications, and UPS product lines. In 1987, Lennart joined Fiskars Power Systems OY/AB in Stockholm and Helsinki as Director of Product Development. In 1994, he moved from Sweden to the United States to take a position as Vice President of Engineering at Powerware Corporation, in San Diego, CA and Raleigh, NC. In 2004 he became Director of Engineering at Eaton Power Quality Corporation, responsible for development of all Power Quality products globally. This includes Uninterruptible Power Systems, Power Factor Correction, Power Distribution, TVSS, and other products and services to improve the Power Quality in critical applications. In 2007, Lennart was appointed Vice President and Chief Technology Officer for Eaton Electrical Sector.

Speaker: **Pedro Ray**, *2010 IEEE President and CEO, President, Ray Architects Engineers*



Pedro Ray successfully completed the Harvard Business School OPM program, class of 2001. He received his BSEE and MSEE degrees from Georgia Tech. He is a licensed professional engineer. He is President of Ray Engineers, a professional services corporation with over 90 employees. He is also owner and president of various corporations dedicated to the

development of commercial and residential real estate projects. He was Chief Examiner in charge of revision to the Puerto Rico Electricity Pricing Structure (2000), and was named Puerto Rico's Electrical Engineer of the Year 2000. He was awarded 2005 IEEE PES Chapter Outstanding Engineer Award. Mr. Ray is also a member of the Young Presidents Organization (YPO), a group of 10,000 young leaders from around the world. IEEE Activities – (S'83-M'83-SM'95) OFFICES: Board of Directors, 2009-10, 2006-07, 2003-04, 2000-01; ExCom, 2006-07, 2003-04; IEEE President, 2010; IEEE President-Elect, 2009; Treasurer, 2003-04; Regional Activities Board (RAB), Vice President, 2006-07.

*Note: All tutorials are held on September 12, 2009. Pre-registration for each tutorial is required. Please visit the Registration Desk for space availability.*

**SUNDAY, SEPTEMBER 12**

**8:30 am – 12:00 pm**

**MORNING SESSIONS**

### **T1-1 Medium Voltage Drives**

*Room 201*

*Instructor: Joachim Holtz, University of Wuppertal*

Semiconductor devices and their suitability for medium voltage applications are discussed. Operation at low switching frequency is preferred to restrain the switching losses. AC drives require appropriate inverter circuit topologies that withstand high voltages on one hand and generate low-harmonic output voltages on the other. Multilevel inverter topologies are mostly preferred. Various options exist: diode clamped inverters, capacitor clamped inverters, inverters or half-bridges in series connection, topologies using additional h-bridges per phase that add or subtract the constant voltage of a storage capacitor to the respective phase voltage, and the modular multilevel topology, suitable for very high voltages and for any number of voltage levels. Designing an ac drive system for low switching frequency operation requires particular care. Control signal delays are then substantial and increase undesired cross-coupling effects in vector controlled schemes. The effects are not sufficiently compensated by established methods like feedforward compensation. Improvements are achieved by more accurate modelling of the machine and the inverter. A controller then results having complex-valued parameters. Closed loop control based on synchronous optimal pulsewidth modulation operates parameter independent. The method reduces the switching frequency and also decreases the inverter harmonics. High dynamic performance is obtained by forcing the stator flux vector on a precalculated optimal trajectory. Deadbeat behavior and complete decoupling is achieved. Optimal modulation algorithms do not include a means of accessing the load current fundamental, important for dynamic torque control. Fast dynamic control at very low switching frequency is achieved using a hybrid observer to generate a fundamental component feedback signal.

### **T1-2 Photovoltaic Microinverters: Topologies, Control Aspects, Reliability Issues, and Applicable Standards**

*Room 202*

*Instructors: Nasser Kutkut and Haibing Hu, Florida Energy Systems Consortium, University of Central Florida*

The rapid growth of PV power installations over the past few years has fueled many new technological innovations. On the energy conversion front, micro inverters have made their debut into the market place. Micro-inverters are small grid-tie DC/AC inverters, with power levels in the range of 100-300W, that convert the output of a single PV panel into grid quality AC. A single micro-inverter inverter is typically connected to a single PV panel and incorporates a single MPPT process thereby maximizing the energy harvest from every PV panel and allowing each PV panel to operate at its maximum power production capacity. Micro-inverters allow for greater system flexibility by offering modular and

scalable solar power system architecture. This eliminates single point failures while allowing the use of panels from different vendors and with different power ratings in a single PV power system installation. Finally, micro inverters improve the safety of PV power systems by eliminating the unsafe high DC voltages of string based systems while minimizing installation and BOS costs. To realize a commercially viable micro inverter design, many challenges need to be addressed. These include cost (on a per watt basis), conversion efficiency, reliability (life expectancy), and compliance with relevant standards. This tutorial will offer a comprehensive review of micro-inverter technology and will cover topics such as topologies, control aspects, reliability issues and relevant standards.

### **T1-3 Understanding IGBT Modules Used in Energy Conversion**

*Room 203*

*Instructor: John F. Donlon, Powerex, Inc.*

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

### **T1-4 Advanced Thermal Management Materials for Energy Conversion**

*Room 204*

*Instructor: Carl Zweben, Advanced Thermal Materials Consultant*

Al/SiC, first used in electronics by the author in the 1980s, has replaced copper in many IGBT modules, extending lifetimes from 10 to 30 years, and "eliminating solder fatigue failure". An increasing number of advanced thermal management materials address key packaging problems: heat dissipation, and thermal stresses and warping, which arise from coefficient of thermal expansion (CTE) differences. There are now many low-CTE, low-density materials with thermal conductivities as high as 1700 W/m-K (four times that of copper). Thermally conductive materials allow heat removal through printed circuit boards (PCBs), and can tailor PCB CTE, potentially eliminating the need for underfill. Various graphitic materials can greatly increase

thermal interface material (TIM) thermal conductivity. Low-CTE solders are under development. Advanced thermal materials are used in an increasing number of commercial and aerospace microelectronic and optoelectronic applications. For example, low-CTE composites having a thermal conductivity of 600 W/m-K have been used in IBM servers. This course, intended for all levels of engineers and scientists, covers the many advanced materials that are now commercially available and under development. Topics include material properties, manufacturing processes, applications, cost, lessons learned, and future directions, including carbon nanotubes. Traditional materials are included for reference.

**SUNDAY, SEPTEMBER 12**  
**AFTERNOON SESSIONS**

1:00 pm – 5:00 pm

### T2-1 Design and Control of Permanent Magnet Machines for Geared and Gearless Applications

Room 201

Instructors: Mehdi Abolhassani, *TECO-Westinghouse Motor Company* and Hamid Toliyat, *Texas A&M University*

Depletion of fossil energy resources and growing energy costs and demand motivate research on high efficiency motor drive technologies. Replacing direct current (DC) machines and alternating current (AC) induction machines with permanent magnet (PM) machines has gained interest in appliance, automotive, wind energy, medical, aerospace and military industries. PM motors and generators are gaining popularity for variety of reasons. Because the excitation of a PM machine is provided by permanent magnets, brushes and slip rings are eliminated, resulting in a simple and rugged structure. Permanent magnet excitation is current-free and lossless, enabling PM machines with high efficiency and power density. The advent of high coercivity, high energy product, and high temperature grade (180 °C) NdFeB PM material is the driving force behind the widespread use of PM motors in servo drives and traction drives where harsh operating conditions and space limitations put a premium on performance and reliability. The IPM (interior-mount PM) motor in particular is arguably simpler and more reliable than the induction motor, and the absence of any major heat source on the rotor definitely contributes to a lower possibility of rotor structure deformation and bearing failure. The IPM motor is capable of field-weakening operation to achieve a wide constant power speed range similar to that of the series-DC motor, a desirable feature for traction drive systems. PM motors in industry applications need special design rules and analysis tools that are far less well developed and limited in their availability compared to those for DC and AC induction motors. This tutorial addresses the state-of-the-art of application-oriented industrial issues in the areas of design, analysis, and control of PM machines. Specification requirements, design steps, and analysis approaches of combined motor and drive system in a wide variety of applications in hybrid electric vehicles, traction, wind turbines, home appliances, aerospace, and industry use have been developed, and practical and manufacturing issues are discussed. Practical implementation of digital sensed and sensorless variable speed PM motor drives are described. The tutorial provides an opportunity for engineers in industry and academia to learn application oriented design rules and control methods of PM machines and drive systems.

### T2-2 Introduction to LED Lighting Systems and Their Power Electronic Drivers

Room 202

Instructor: Brad Lehman, *Department of Electrical and Computer Engineering, Northeastern University*

This tutorial is meant to introduce a power electronic engineer to the revolutionary advancements that have taken place over the past years in LED lighting and also introduce the engineer to the fundamental aspects to designing an LED lighting system. The tutorial will present an introduction to color mixing (for a non-expert) and simple optical performance characteristics necessary to designing an LED lamp. Examples of how to compute the CIE color coordinate, Color Rendering Index (CRI), Correlated Color Temperature (CCT) will be presented. The physical semiconductor advancements in light extraction of high brightness LEDs over the past 10 years will also be surveyed. Next, details on how to design an LED driver will be presented and topics will include: proper modeling of LEDs and their binning uncertainties, different power electronic topologies used to drive LEDs for various applications, and benefits and drawbacks of various LED driving strategies. A major emphasis will be placed on dimming of LEDs and their difficulty to work with standard residential phase modulated dimmer switches. An important aspect of all these topics is the understanding of the biological effects possibly associated with driving LEDs at lower flicker frequencies.

### T2-3 Digital PWM for DC to AC Conversion

Room 203

Instructor: Pallab Midya and Bill Roeckner, *ADX Research, Inc.*

As digital logic speed and density continues to grow digitally generated PWM is becoming the method of choice for for many AC to DC conversion applications. The main focus of this tutorial is audio but will also address motor drive applications. Some of the key challenges for digital PWM include compensation of the mathematical nonlinearity associated with digital PWM, handling the quantization noise associated with digital PWM. Due to power supply noise and power stage nonlinearity there is need for a closed loop feedback control around the power stage. Solutions to this feedback problem will be discussed in detail. For EMI mitigation spread spectrum digital PWM techniques will also be discussed. Simulation results for motor control applications and measured results for audio applications will be presented.

### T2-4 Grid Converters for PV and Wind Turbine Systems

Room 204

Instructor: Remus Teodorescu, *Aalborg University*, Rik deDoncker, *RWTH Aachen University*, Marco Liserre, *Polytechnic of Bari, Electrotechnical and Electronic Engineering Department*, and Pedro Rodriguez, *Technical University of Catalonia, Department of Electrical Engineering*

Distributed power generation systems (DPGS) based on renewable energy sources (RES), like photovoltaics (PV) and wind turbines (WT),



have experienced rapid development in recent years. This tutorial will offer a comprehensive review of converter structures and control structures for both PV and WT systems. After a review of converter topologies and control structures in low and medium power DPGS, the attention is focused on grid converters, their synchronization and their control. Current and voltage control techniques are covered with attention paid to microgrid operation, ancillary services and future functions. The design of the grid filter is considered as well as its influence on the control. Finally, grid synchronization and monitoring in both single-phase and three-phase systems is reviewed as well as the advanced control methods able to cope with distorted grid or grid faults. There will be increased focus on the requirements stated in the grid codes for DGPS in terms of ride-through, grid support and power quality. This tutorial is intended for electrical and control engineers and researchers dealing with grid power converters and interested in go deeply into essential issues related to the integration of WT and PV energy into electricity networks.

IEEE ECCE 2010 will host 2 exciting rap sessions on Tuesday, September 14<sup>th</sup> from 8:00 pm – 9:00 pm.

## RS 1 Electrical Systems for Future Transportation

Room 201

### Rap Session Panel:

Kaushik (Raja) Rajashekara (Session Chair), *Rolls Royce*  
 V. Anand Sankaran, *Ford*  
 John Miller, *Maxwell*  
 Tom Jahns, *University Wisconsin-Madison*  
 Ali Emadi, *Illinois Institute of Technology*

Industry and academic leaders in transportation systems will discuss the looming technology that will likely be embedded in future public and private transportation vehicles. This includes auxiliary equipment and control systems as well as hybrid and electric drive-trains.

## RS 2 Current Status and Future in Wind Energy Systems

Room 202

### Rap Session Panel:

Mahesh Morjaria (Session Chair), *GE Energy*  
 Johan Enslin, *Quanta Technology*  
 Frede Blaabjerg, *Aalborg University*  
 Bob Zavadil, *Enernex*

An update on the current state of wind energy systems for electrical energy production and a look ahead at what can be expected to be on the grid. Experts discuss the relevant current and upcoming issues for large-scale wind energy.

## Special Industry Session (S62): Industry Perspectives on Emerging Challenges and Opportunities in Renewable Energy and Electrified Transport

Tuesday, September 14 • 8:00 am - 9:40 am • Grand Ballroom A

As part of the incorporation of IEEE Energy 2030 into ECCE, a Special Industrial Session will be held titled Industry Perspectives on Emerging Challenges and Opportunities in Renewable Energy and Electrified Transport. Special focus will be paid to recent policy and technology developments which could influence the direction taken by ECCE attendees and their organizations. Each presenter will provide their outlook on the dynamic landscapes of renewable energy and electrification, followed by a panel discussion. Our presenters are:

### Dr. Satish Rajagopalan

*Sr. Project Engineer/Scientist*  
*Electric Power Research Institute (EPRI)*

Dr. Satish Rajagopalan is a Senior Engineer in the Power Delivery & Utilization Sector at EPRI. His present research includes the development and testing of grid-tied converters for distributed resource integration, and impact analysis of electric vehicle charging on the electrical grid. He has also been responsible for power conversion and energy storage research, testing, and development.

### Don Francis

*Executive Director*  
*Clean Cities-Atlanta*

Don Francis is the Executive Director of Clean Cities-Atlanta, a public-private partnership started by the DOE to reduce oil imports through electrification, alternative fuels, and increased fuel economy. He is also leading the Metro Atlanta EV Readiness Task Force, preparing Atlanta for the 2011 launch of the Nissan Leaf. Previously, he served as the Business Unit Manager for Southern EV, an unregulated business unit set up by Southern Company to sell, install and service electric vehicle infrastructure in the southeast.

### Dr. Pat Chapman

*Chief Technology Officer*  
*SolarBridge Technologies*

Patrick Chapman is a co-founder and CTO of SolarBridge Technologies, focusing on integrated microinverters for the solar power industry. Prior to joining SolarBridge full-time, Dr. Chapman was a tenured faculty member at the University of Illinois at Urbana-Champaign.

### Dr. Mahesh Morjaria

*Manager, Renewables Controls,*  
*GE Energy*

Mahesh Morjaria leads a team responsible for controls systems for wind and solar plants at GE Energy, which includes grid and power management controls, SCADA, intermittency systems, wind plant optimization capability as well as turbine controls. Mahesh has led development of products and technologies for a diverse set of GE products including locomotives, gas turbines, appliances and power electronics for over 20 years at GE.

MONDAY, SEPTEMBER 13

10:20 am – 12:00 pm

**S1 Electric Machines: Induction Machines**

Room 201

Chairs: Andrea Cavagnino and Aldo Boglietti, *Politecnico di Torino, Italy*

**10:20 am • A Frequency Demodulation Approach to Induction Motor Speed Detection**

Zhi Gao, Larry Turner, Roy Colby and Benoit Leprettre, *Schneider Electric, United States; Schneider Electric, France*

**10:45 am • Optimal Split Ratio for High Speed Induction Machines**

David Gerada, Abdeslam Mebarki, Neil Brown and Chris Gerada, *Cummins Generator Technologies, United Kingdom; University of Nottingham, United Kingdom*

**11:10 am • Effect of Winding Asymmetries and Winding Connection on Small Synchronous Machines**

David Dorrell and Mircea Popescu, *University of Technology Sydney, Australia; Motor Design Ltd., United Kingdom*

**11:35 am • New Method for Current and Voltage Measuring Offset Correction in an Induction Motor Sensorless Drive**

Zeljko Pantic, Srdjan Lukic and Siddharth Ballal, *North Carolina State University, United States*

**S2 DC-AC Inverters: Grid Connected Inverters I**

Room 202

Chairs: Fang Peng, *Michigan State University, United States* and Alexis Kwasinski, *University of Texas, United States*

**10:20 am • Modularized Bidirectional Grid-tied Inverter with Asynchronous Sigma-delta Modulation**

Yaow-Ming Chen and Chia-Hsi Chang, *National Taiwan University, Department of Electrical Engineering, Taiwan*

**10:45 am • Predictive Digital Controlled Three Phase Bidirectional Inverter with Wide Inductance Variation**

Tsai-Fu Wu, Chih-Hao Chang, Hsu-Chin Wu, Jian-Rong Ciou and Ting-Shih Lin, *EPARC, National Chung Cheng University, Taiwan*

**11:10 am • Design and Implementation of a 5 kW Single Phase Bidirectional Inverter with Wide Inductance Variation**

Tsai-Fu Wu, Kun-Han Sun, Chia-Ling Kuo, Meng-Shiun Yang and Ruei-Chi Chang, *EPARC, National Chung Cheng University, Taiwan*

**11:35 am • A Novel Control Method for Dual Mode Time-sharing Grid-connected Inverter**

Weimin Wu, Houlai Geng, Pan Geng, Yinzhong Ye and Min Chen, *Shanghai Maritime University, China; Shanghai Institute of Technology, China; College of Electrical Engineering, Zhejiang University, China*

**S3 Energy Efficiency and Industrial Applications: Power System Fault Isolation**

Room 203

Chairs: Ronald Harley, *Georgia Tech, United States* and Lucian Asiminoaei, *Danfoss, Denmark*

**10:20 am • Inverter-based versus Synchronous-based Distributed Generation; Fault Current Limitation and Protection Issues**

Ahmed Massoud, Shehab Ahmed, Steve Finney and Barry Williams, *University, Qatar, Qatar; Texas A&M at Qatar, Qatar; Strathclyde University, United Kingdom; Strathclyde University, United Kingdom*

**10:45 am • Protection of Meshed Microgrids with Communication Overlay**

Anish Prasai, Yi Du, Andrew Paquette, Edward Buck, Deepak Divan and Ronald Harley, *Georgia Institute of Technology, United States; Eaton Corporation, United States*

**11:10 am • Power Sequencing Approach to Fault Isolation in DC Systems: Influence of System Parameters**

Pietro Cairoli, Igor Kondratiev, Ugo Ghisla and Roger Dougal, *University of South Carolina, United States*

**11:35 am • Research on Current Control Strategy for Grid-connected Inverter Using LCL Filter Based on Passivity Based Control**

Zongxiang Chen and Lusheng Ge, *Anhui University of Technology, China*

**S4 Enabling Technologies: Power Semiconductors I**

Room 204

Chairs: Jerry Hudgins, *University of Nebraska-Lincoln, United States*

**10:20 am • Electromechanical Characterization of "Flying" Planar Gate Punch Through IGBT Bare Die**

Yassine Belmehdi, Stephane Azzopardi, Jean-Yves Deletage, Florence Capy and Eric Woirgard, *Laboratory IMS - University of Bordeaux, France*

**10:45 am • Robustness Evaluation of High Voltage Press Pack IGBT Modules in Enhanced Short Circuit Test**

Filippo Chimento, Willy Hermansson and Tomas Jonsson, *ABB Corporate Research, Sweden; ABB, Sweden*

**11:10 am • Comparisons of 6.5kV 25A Si IGBT and 10-kV SiC MOSFET in Solid-state Transformer Application**

Gangyao Wang, Xing Huang, Jun Wang, Tiefu Zhao, Subhashish Bhattacharya and Alex Huang, *North Carolina State University, United States*

**11:35 am • Modeling of the Impact of Diode Junction Capacitance on High Voltage High Frequency Rectifiers Based on 10kV SiC JBS Diodes**

Yu Du, Gangyao Wang, Jun Wang, Subhashish Bhattacharya and Alex Huang, *North Carolina State University, United States*

**S5 Energy Public Policy and Economics: Intersection of Technology and Policy**

Room 205

Chairs: Valerie Thomas, *Georgia Institute of Technology, United States* and Grahame Holmes, *RMIT University, Australia*

**10:20 am • Power Electronics for Sustainable Energy Future — Quantifying the Value of Power Electronics**

Jelena Popovic-Gerber and Jan Abraham Ferreira, *Delft University of Technology, Netherlands*

**10:45 am • Supporting Schemes for Renewable Energies the Italian Way**

Giancarlo Scorsoni, *GSE, Italy*

**11:10 am • Lowest Cost Path to Meeting Electricity Demand at the State Level: Implications of Carbon Cap-and-trade**

Todd Levin, Valerie Thomas and Audrey Lee, *Georgia Institute of Technology, United States; US Department of Energy, United States*

**11:35 am • Grid Stability Battery Systems for Renewable Energy Success**

Charles Vartanian, *A123 Systems, United States*

## S6 Sustainable Energy Applications: Active Power Filters

Room 206

Chairs: Hirofumi Akagi, *Tokyo Institute of Technology* and Dehong (Mark) Xu, *Zhejiang University, China*

### 10:20 am • Reactive Power Compensation and Harmonics Elimination at Medium-voltage Using Hexagram Converter

Jun Wen, Liang Zhou and Keyue Smedley, *University of California-Irvine, United States*

### 10:45 am • Study of Closed-loop Control Scheme for Source Current Detection Type Active Power Filter

Hao Yi, Fang Zhuo, Xian'wei Wang, Jin'jun Liu and Yan'hui Qiu,, *Xi'an Jiaotong University, China*

### 11:10 am • DC-side Shunt Active Power Filter for Line Commutated Rectifiers to Mitigate the Output Voltage Harmonics

K.H. Ahmed, M.S. Hamad, S.J. Finney and B.W. Williams, *Strathclyde University, United Kingdom*

### 11:35 am • Scaling the Dynamic Capacitor (D-CAP) to Medium Voltages

Anish Prasai and Deepak Divan, *Georgia Institute of Technology, United States*

## S7 Energy Efficiency and Industrial Applications: LED Lighting I

Room 207

Chair: Jo Olsen, *Sylvania, United States*

### 10:20 am • Resonant Assisted Buck Converter for Offline Driving of High Brightness LED Replacement Lamps

Xiaohui Qu, Siu-chung Wong and Chi K. Tse *Southeast University, Nanjing, China; The Hong Kong Polytechnic University, Hong Kong*

### 10:45 am • LED Lighting Flicker and Potential Health Hazards: IEEE Standard. PAR1789 Update

Arnold Wilkins, Jennifer Veitch and Brad Lehman *University of Essex, United Kingdom; National Research Council Canada, Canada; Northeastern University, United States*

### 11:10 am • Estimation of Internal Junction Temperature and Thermal Resistance of Light-emitting Diodes Using External Luminous Flux Measurements

X.H. Tao, S.N. Li and S.Y.R. Hui, *City University of Hong Kong, Hong Kong*

### 11:35 am • A General Photo-electro-thermo-temporal Theory for Light-emitting Diode Systems

X.H. Tao and S.Y.R. Hui, *City University of Hong Kong, Hong Kong*

## S8 Electric Drives: Direct Torque Control

Grand Ballroom C

Chairs: Yen-Shin Lai, *National Taipei Institute of Technology, Taiwan* and Joachim Böcker, *University of Paderborn, Germany*

### 10:20 am • A Novel Control Scheme for Wide Speed Range Operation of Direct Torque Controlled Synchronous Reluctance Motor

Yukinori Inoue, Shigeo Morimoto and Masayuki Sanada, *Osaka Prefecture University, Japan*

### 10:45 am • Model Predictive Direct Torque Control of Permanent Magnet Synchronous Motors

Tobias Geyer, Giovanni Beccuti, Georgios Papafotiou and Manfred Morari, *The University of Auckland, New Zealand; ABB Corporate Research, Switzerland; ETH Zurich, Switzerland*

### 11:10 am • Computationally Efficient Model Predictive Direct Torque Control

Tobias Geyer, *The University of Auckland, New Zealand*

### 11:35 am • Implementation of Deadbeat Direct Torque and Flux Control for AC Induction Machine Control

Timothy R. Obermann, Zachary D. Hurst and Robert, D. Lorenz, *ABB, Inc., United States; University of Wisconsin - Madison, United States*

## S9 DC-DC Converters: Digital Control I

Grand Ballroom D

Chairs: Dragan Maksimovic, *University of Colorado, United States* and Jose Cobos, *Technical University of Madrid, Spain*

### 10:20 am • An Adaptive Digital PID Controller Scheme for Power Converters

VaraPrasad Arikatla and Jaber Abu Qahouq, *The University of Alabama, United States*

### 10:45 am • Digital Controller for Rapid Cycling Synchrotron Magnet Power Supply with Very High Tracking Precision

Jin Ye, Xu Yang, Haizhong Ye, Xiaoming Kong and Bo Liu, *Xi'an Jiaotong University, China*

### 11:10 am • Digital Power Controller with Sensorless DCM Operation

Jaber Abu Qahouq, *The University of Alabama, United States*

### 11:35 am • Asymmetrical Leading-triangle Modulation Technique for Improved Digital Valley Current Controlled Switching DC-DC Converters

Guohua Zhou, Jianping Xu, Fei Zhang, Ming Qin and Yanyan Jin, *Southwest Jiaotong University, China*

## S10 DC-DC Converters: Synchronous Rectifier Converters

Grand Ballroom East

Chair: Yanfei Liu, *Queen's University, Canada*

### 10:20 am • Design Considerations of a Self-biased Current Driven SR in DCM Flyback DC-DC Converter

Shuai Shao, Xinke Wu, Min Chen and F. Z. Peng *Zhejiang University, China; Michigan State University, United States*

### 10:45 am • A New Driving Method for Synchronous Rectifiers of LLC Resonant Converter with Zero-crossing Noise Filter

Dong Wang, Liang Jia, Jizhen Fu, Yan-Fei Liu and Paresch Sen, *Queen's University, Canada*

### 11:10 am • Digital Implementation of Driving Scheme for Synchronous Rectification in LLC Resonant Converter

Weiyi Feng, Daocheng Huang, Paolo Mattavelli, Fu Dianbo and Fred C. Lee, *Virginia Tech, United States*

### 11:35 am • Synchronous Rectification Technique for High-voltage Single-ended Power Converters

Neville McNeill, Rafal Wrobel and Philip Mellor, *University of Bristol, United Kingdom*



MONDAY, SEPTEMBER 13

1:20 pm – 3:00 pm

**S11 Electric Machines: Machine Design I**

Room 201

Chairs: David Dorrell, *University of Technology Sydney, Australia* and Richard Wallace, *Whirlpool, United States*

**1:20 pm • Development of a Totally Enclosed Fan Cooled Traction Motor**

*Shinichi Noda, Sueyoshi Mizuno, Taihei Koyama and Shugetomo Shiraishi, Toshiba Corporation, Japan*

**1:45 pm • Winding Design for Pole-phase Modulation of Induction Machines**

*Dongsen Sun, Baoming Ge and Daqiang Bi, Beijing Jiaotong University, China; Tsinghua University, China*

**2:10 pm • A Novel Method for Multi-objective Design and Optimization of Three Phase Induction Machines**

*Yao Duan, Ronald Harley and Thomas Habetler Georgia Institute of Technology, United States*

**2:35 pm • Optimal Design of an In-wheel BLDC Motor for a Kick Scooter**

*Miroslav Markovic, Vincent Muller, Andre Hodder and Yves Perriard, Switzerland*

**S12 DC-AC Inverters: Grid Connected Inverters II**

Room 202

Chairs: Fang Peng, *Michigan State University, United States* and Alexis Kwasinski, *University of Texas, United States*

**1:20 pm • An Operating Scheme for DFIG-based Wind Generation System at Low Speeds**

*Osama S. Ebrahim Bayoumy, Mohamed A. Badr and Praveen K. Jain, Ain Shams University, Egypt; Queen's University, Canada*

**1:45 pm • A Three-phase Programmable Voltage Sag Generator for Low Voltage Ride-through Capability Test of Wind Turbines**

*Rong Zeng, Heng Nian and Peng Zhou, Zhejiang University, China*

**2:10 pm • Exploring Inherent Damping Characteristic of LCL-filters for Three-phase Grid-connected Voltage Source Inverters**

*Yi Tang, Poh Chiang Loh, Peng Wang, Fook Hoong Choo and Feng Gao, Nanyang Technological University, Singapore; Shandong University, China*

**2:35 pm • A Current Source Converter Based Active Power Filter for Mitigation of Harmonics at the Interface of Distribution and Transmission Systems**

*Alper Terciyani, Tulay Avci, Ilker Yilmaz, Cezmi Ermis and Nadir Kose, TUBITAK-UZAY Power Electronics Group, Turkey*

**S13 Sustainable Energy Applications: Photovoltaics I**

Room 203

Chair: Sudip Mazumder, *University of Illinois-Chicago, United States*

**1:20 pm • Coordinated Real and Reactive Power Management Implementation Based on Dual-stage PLL Method for PV System with ESS**

*Liming Liu, Yan Zhou and Hui Li, Florida State University, United States*

**1:45 pm • Control of Hybrid Battery/Ultracapacitor Energy Storage for Stand-alone Photovoltaic System**

*Xiong Liu, Peng Wang, Poh Chiang Loh, Feng Gao and Fook Hoong Choo, Division of Power Engineering, School of EEE, NTU, Singapore; School of Electrical Engineering, Shandong University, China*

**2:10 pm • Model Construction of Single Crystalline Photovoltaic Panels for Real-time Simulation**

*Jeehoon Jung and Shehab Ahmed, Texas AM University at Qatar, Qatar*

**2:35 pm • Compact Integrated Solar Energy Generation Systems**

*Poh Chiang Loh, Lei Zhang, Shun He and Feng Gao Nanyang Technological University, Singapore; Shandong University, China*

**S14 Enabling Technologies: Power Semiconductors II**

Room 204

Chairs: Angus Bryant, *University of Warwick, United Kingdom* and Alan Mantooh, *University of Arkansas, United States*

**1:20 pm • Characterization of a High Gain BJT Used in Power Conversion on AC Mains**

*Chawki Benboujema, Sebastien Jacques, Nathalie Batut, Ambroise Schellmanns, Jean-Baptiste Quoirin and Laurent Ventura, Laboratoire de Microelectronique de Puissance, France*

**1:45 pm • An Investigation into the Effects of the Gate Drive Resistance on the Losses of the MOSFET-snubber-diode Configuration**

*River Li, Joyce Wang and Henry Chung, City University of Hong Kong, Hong Kong*

**2:10 pm • Modeling the Inter-electrode Capacitances of Si CoolMOSTM Transistors for Circuit Simulation in High Efficiency Power Systems**

*Nanying Yang, Jose Ortiz, Tam Duong, Allen Hefner and Kathleen Meehan, Virginia Tech, United States; National Institute of Standards Technology, United States*

**2:35 pm • FITMOS Modeling and Dynamic On-state Characteristic Evaluation**

*Wei Li and David Perreault, Massachusetts Institute of Technology, United States*

**S15 Energy Public Policy and Economics: Renewable Energy Generation**

Room 205

Chairs: Liu Jinjun, *Xi'an Jiaotong University, China* and Vassilios Agelidis, *The University of New South Wales, Australia*

**1:20 pm • Quantifying State-policy Incentives for the Renewable Energy Investor**

*Sreenivas Sukumar, Mallikarjun Shankar, Mohammed Olama, Stanton Hadley, Vladimir Protopopescu, Sergey Malinchik and Barry Ives, Oak Ridge National Laboratory, United States; Lockheed Martin Corporation, United States*

**1:45 pm • LCOE Reduction for Megawatts PV System Using Efficient 500 kW Transformerless Inverter**

*Jeng-Yue Chen, Chia-Han Hung, Jack Gilmore, Jeff Roesch and Wei Zhu, National Formosa University, Taiwan; Advanced Energy Industries, Inc., Taiwan; Advanced Energy Industries, Inc., United States; Shanghai Guandong Electric Group, China*

**2:10 pm • Control of Receiver Temperature and Shaft Speed in Dish-stirling Solar Power Plants to Meet Grid Integration Requirements**

*Dustin F. Howard, Jiaqi Liang and Ronald G. Harley, Georgia Institute of Technology, United States*

**2:35 pm • Estimates of the Cost of New Electricity Generation in the South**

*Seth Borin, Todd Levin and Valerie Thomas, Georgia Institute of Technology, United States*

**S16 Sustainable Energy Applications: Sensing and Measurement**

*Room 206*

Chairs: Francisco Canales, *ABB, Switzerland* and Ronald Harley, *Georgia Tech, United States*

**1:20 pm • A Novel Frequency-adaptive PLL for Single-phase Grid-connected Converters**

*Xiong Fang, Ming Li, Jinjun Liu and Yue Wang, Xi'an Jiaotong University, China*

**1:45 pm • Grid Synchronization PLL Based on Cascaded Delayed Signal Cancellation**

*Yi Fei Wang and Yun Wei Li, University of Alberta, Canada*

**2:10 pm • Real-time Measurement of Power Quantities Under Sinusoidal and Nonsinusoidal Conditions for Single-phase Systems**

*Hedayatollah Dalvand and Vassilios G. Agelidis, The University of New South Wales, Australia*

**2:35 pm • A New Fast Peak Detector for Single or Three-phase Unsymmetrical Voltage Sags**

*Sanghoey Lee, Hanju Cha and Vu Trung-Kien, Department of Electrical Engineering, Chungnam National University, Republic of Korea*

**S17 Energy Efficiency and Industrial Applications: LED Lighting II**

*Room 207*

Chairs: Jo Olsen, *Sylvania, United States* and Tsorng-Juu (Peter) Liang, *National Cheng Kung University, Taiwan*

**1:20 pm • A Driving Technology for LED Retrofit Lamp for Fluorescent Lighting Fixtures with Electronic Ballasts**

*Nan Chen and Henry Chung, City University of Hong Kong, Hong Kong*

**1:45 pm • Power-transfer of Isolated Converter with Integrated Power Sharing for LED Lighting System Dependent on Transformer Coupling**

*Werner Thomas and Johannes Pforr, University of Applied Sciences Ingolstadt, Germany*

**2:10 pm • High Efficiency DC-DC Converter with Twin-bus for Dimmable LED Lighting**

*Wensong Yu, Jih-Sheng Lai, Gianpaolo Lisi, Ali Djabbari and Evan Reutzel, Virginia Tech, United States; National Semiconductor Corporation, United States*

**2:35 pm • One-stage High-brightness LED Driver with Power Factor Correction Using Standard Peak-current Mode Integrated Controllers**

*Diego G. Lamar, Javier Sebastian, Manuel Arias and Marta Hernando, Universidad de Oviedo, Spain*

**S18 Electric Drives: Drive Control**

*Grand Ballroom C*

Chairs: Alfio Consoli, *University of Catania, Italy* and Seung Ki Sul, *Seoul National University, Republic of Korea*

**1:20 pm • Efficiency Improvement Evaluation of Non-sinusoidal Back-EMF PMSM Machines Using Field Oriented Current Harmonic Injection Strategy**

*Parag Kshirsagar and Ramu Krishnan, United Technologies Research Center, United States; Virginia Tech, United States*

**1:45 pm • Output DC Voltage and Power Control of a Flux Strengthening IPM Generator and a High Speed Motor**

*Yuta Iwai, Akihiro Ogawa and Akira Chiba, Tokyo University of Science, Japan; Tokyo Institute of Technology, Japan*

**2:10 pm • A Time-varying Sliding Surface for Robust Position Control of Six Phase Induction Machine (6PIM)**

*Franck Betin, Amine Yazidi and Gerard Andre Capolino, University of Picardie, France*

**2:35 pm • A Novel Technique for Sensorless Control of High Power Induction Motors Using Multilevel Converters**

*Kamel Saleh, Mark Sumner, Greg Asher and Qiang Gao, University of Nottingham, United Kingdom*

**S19 DC-DC Converters: Digital Control II**

*Grand Ballroom D*

Chairs: Regan Zane, *University of Colorado, United States* and Harish Krishnamurthy, *Intel, United States*

**1:20 pm • A Novel Parameter-independent Digital Optimal Control Algorithm for DC-DC Buck Converters Based on Parabolic Curve Fitting**

*Liang Jia, Dong Wang, Jizhen Fu, Yan-Fei Liu and Paresh Sen, Queen's University, Canada*

**1:45 pm • Digital Enhanced V2-type Constant On-time Control Using Inductor Current Ramp Estimation for a Buck Converter with Small ESR Capacitors**

*Kuang-Yao Cheng, Feng Yu, Paolo Mattavelli and Fred C. Lee, Virginia Tech, United States*

**2:10 pm • A Novel Digital Capacitor Charge Balance Control Algorithm with a Practical Extreme Voltage Detector**

*Liang Jia, Dong Wang, Eric Meyer, Yan-Fei Liu and Paresh Sen, Queen's University, Canada; Advanced Micro Devices, Canada*

**2:35 pm • A New Digital Control DC-DC Converter with Neural Network Predictor**

*Fujio Kurokawa, Hidenori Maruta, Ueno Kimitoshi, Tomoyuki Mizoguchi, Akihiro Nakamura and Hiroyuki Osuga, Nagasaki University, Japan; Mitsubishi Electronic Corporation, Japan*

**S20 DC-DC Converters: Isolated Converters I**

*Grand Ballroom East*

Chairs: Oscar García Suárez, *UPM, Spain* and Liangbin Yao, *Maxim Integrated Products, United States*

**1:20 pm • Efficiency Characterization and Optimization in Flyback DC-DC Converters**

*Sang Hee Kang, Hien Nguyen, Dragan Maksimovic and Isaac Cohen, University of Colorado at Boulder, United States; Texas Instruments, United States*

**1:45 pm • Analysis of a High Step-up Ratio Flyback Converter with Active Clamp and Voltage Multiplier**

*Giorgio Spiazzi, Paolo Mattavelli and Alessandro Costabeber, University of Padova, Italy; CPES-Virginia Tech, United States; University of Padovar, Italy*

**2:10 pm • An Isolated High Step-up Forward/Flyback Active Clamp Converter with Output Voltage Lift**

*Pai-Hsiang Kuo, Tsorng-Juu Liang, Kuo-Ching Tseng, Jiann-Fuh Chen and Shih-Ming Chen, National Cheng-Kung University, Taiwan; National Kaohsiung First University of Science a, Taiwan*

**2:35 pm • Self-oscillating Flyback Converter with Lossless Snubber for Contactless Power Supply Applications**

*Lin Ray-Lee and Haung Zhi-yu, National Cheng Kung University, Taiwan*

**MONDAY, SEPTEMBER 13**

**3:20 pm – 5:00 pm**

**S21 Electric Machines: Machine Design II**

*Room 201*

*Chairs: Keld Folsach Rasmussen, Grundfos, Denmark and Dave Dorrell, University of Technology Sydney, Australia*

**3:20 pm • Novel Design of Flux-intensifying Interior Permanent Magnet Synchronous Machine Suitable for Power Conversion and Self-sensing Control at Very Low Speed**

*Natee Limsuwan, Yuichi Shibukawa, David Reigosa, Robert Lorenz and Michael Leetmaa, University of Wisconsin - Madison, United States; Nissan Motor Co., Ltd., Japan; University of Oviedo, Spain*

**3:45 pm • Slot Design for Iron Loss AC Rotating Electrical Machine Reduction**

*Sana Jelassi, Raphael Romary and Jean Francois Brudny, Universite d'Artois Bethune, France*

**4:10 pm • Comparison of Different Winding Schemes of an Asynchronous Machine Driven by a Multi-functional Converter System**

*Thomas Hackner and Johannes Pforr, University of Applied Sciences Ingostadt, Germany*

**4:35 pm • Modeling and Design Optimization of PM AC Machines Using Computationally Efficient-finite Element Analysis**

*Gennadi Sizov, Dan Ionel and Nabeel Demerdash, Marquette University, United States; A. O. Smith Corporate Technology Center, United States*

**S22 DC-AC Inverters: Grid Connected Inverters III**

*Room 202*

*Chairs: Edison Da Silva, Federal University of Campina Grande, Brazil and Stefan Schröder, GE Global Research, Germany*

**3:20 pm • Grid-connected Inverter with Inner Output Impedance and Governor-free Characteristics**

*Masaaki Ohshima, Shuuichi Ushiki and Jinbin Zhao, Origin Electric Co., Ltd., Japan*

**3:45 pm • Real Time Selective Harmonic Minimization for Multilevel Inverters Connected to Solar Panels Using Artificial Neural Network Angle Generation**

*Faete Filho, Leon Tolbert, Yue Cao and Burak Ozpineci, The University of Tennessee, United States; Oak Ridge National Laboratory, United States*

**4:10 pm • An Easy, Simple, and Flexible Control Scheme for a Three-phase Grid-tie Inverter System**

*Sung-Yeul Park, Jih-Sheng Lai and Woo-Cheol Lee, University of Connecticut, United States; Virginia Tech, United States; Hankyong National University, Republic of Korea*

**4:35 pm • Single-stage DC-AC Converter for Photovoltaic System**

*Hugo Ribeiro, Andre Pinto and Beatriz Borges, IST - IPT Instituto de Telecomunicacoes, Portugal; IST - Instituto de Telecomunicacoes, Portugal*

**S23 Sustainable Energy Applications: Photovoltaics II**

*Room 203*

*Chair: Naaser Kutkut, University of Central Florida, United States*

**3:20 pm • Maximum Power Limiting with Average Current Mode Control for Photovoltaic System**

*Lin Ray-Lee and Yen Li-Wei, National Cheng Kung University, Taiwan*

**3:45 pm • Switching Loss Analysis of a Three-phase Solar Power Conditioner Using a Single-phase PWM Control Method**

*Hideaki Fujita, Tokyo Institute of Technology, Japan*

**4:10 pm • A New Cost-effective Analog Maximum Power Point Tracker for Photovoltaic Systems**

*Zhigang Liang, Rong Guo and Alex Huang, North Carolina State University, United States*

**4:35 pm • Performance of Photovoltaic Maximum Power Point Tracking Algorithms in the Presence of Noise**

*Alexander Latham, Charles Sullivan and Kofi Odame, Thayer School of Engineering at Dartmouth, United States*

**S24 Enabling Technologies: Contactless Power Transfer**

*Room 204*

*Chairs: Ron Hui, City University of Hong Kong, Hong Kong and Charlie Sullivan, Dartmouth College, United States*

**3:20 pm • LCL Pick-up Circulating Current Controller for Inductive Power Transfer Systems**

*Chang-Yu Huang, John T. Boys, Grant A. Covic and Saining Ren, The University of Auckland, New Zealand*

**3:45 pm • High Performance Inductive Power Transfer System with Narrow Rail Width for Online Electric Vehicles**

*Jin Huh, Sungwoo Lee, Changbyung Park, Gyu-Hyeong Cho and Chun-Taek Rim, Department of EE, KAIST, Republic of Korea; Department of Nuclear and Quantum Engineering, KAIST, Republic of Korea*

**4:10 pm • 2-D Alignment Analysis of Capacitively Coupled Contactless Power Transfer Systems**

*Liu Chao, Aiguo Hu Patrick, C. Nair Nirmal-Kumar and A. Covic Grant, The University of Auckland, New Zealand*

**4:35 pm • Analysis on a Single-layer Winding Array Structure for Contactless Battery Charging Systems with Localized Charging Feature**

*Wenxing Zhong, Xun Liu and S.Y.R. Hui, City University of Hong Kong, Hong Kong; Convenientpower HK Ltd., Hong Kong*

**S25 Energy Public Policy and Economics: Renewable Energy Integration**

Room 205

Chairs: Charlie Vartanian, *IEEE Member* and Braham Ferreira, *Delft University of Technology, Netherlands***3:20 pm • A Methodology for Quantifying Variability of Renewable Energy Sources by Reserve Requirement Calculation**Doug Halamay, Ted Brekken, Asher Simmons and Shaun McArthur, *Oregon State University, United States***3:45 pm • A Methodology to Consider Electrical Infrastructure and Real-time Power-flow Impact Costs Together in Planning Large-scale Renewable Energy Farms**Sreenivas Sukumar, Mohammed Olama, Jim Nutaro, Mallikarjun Shankar, Sergey Malinchik and Barry Ives, *Oak Ridge National Laboratory, United States; Oak Ridge National Laboratory, United States; Lockheed Martin Corporation, United States***4:10 pm • Utilizing a STATCOM to Prevent the Flicker Propagation in a Wind Power System**Roohollah Fadaeinedjad, Gerry Moschopoulos and Aliakbar Gharaveisi, *Kerman Graduate University of Technology, Iran; University of Western Ontario, Canada; Shahid Bahonar University of Kerman, Iran***4:35 pm • Overlaying a Parallel Market to Increase Renewable Penetration**Frank Kreikebaum and Deepak Divan, *Georgia Institute of Technology, United States***S26 Sustainable Energy Applications: Distributed Resources**

Room 206

Chairs: Bimal Bose, *University of Tennessee, United States* and Dehong (Mark) Xu, *Zhejiang University, China***3:20 pm • On Power-sharing of Solar-based Hybrid Motor-drive Systems**Brian Hadley, Behrooz Mirafzal and Dan Ionel, *Florida International University, United States; A.O. Smith Corporate Technology, United States***3:45 pm • A New Droop Control Method for the Autonomous Operation of Distributed Energy Resource Interface Converters**Chia-Tse Lee, Chia-Chi Chu and Po-Tai Cheng, *National Tsing Hua University, Taiwan, Taiwan***4:10 pm • Evaluation of the Voltage Support Strategies for Low Voltage Grid Connected PV Generators**Erhan Demirok, Dezso Sera, Remus Teodorescu, Pedro Rodriguez and Uffe Borup, *Student Member, Denmark; Member, Denmark; Senior Member, Denmark; Member, Spain***4:35 pm • Grid Side Cascade Inverter System as an Interface for Wind Energy Storage**Shantha D Gamini Jayasingha, Don Mahinda Vilathgamuwa and Udaya K. Madawala, *Nanyang Technological University, Singapore; The University of Auckland, New Zealand***S27 Energy Efficiency and Industrial Applications: LED Lighting III**

Room 207

Chair: Jo Olsen, *Sylvania, United States***3:20 pm • A Comparative Study on the Circuit Topologies for High-efficient Passive Light-emitting Diode (LED) Drivers**Wu Chen, Sinan Li and S.Y.R. Hui, *City University of Hong Kong, Hong Kong***3:45 pm • LED Spectral and Power Characteristics Under Hybrid PWM/AM Dimming Strategy**Szymon Beczkowski and Stig Munk-Nielsen, *Aalborg University, Denmark***4:10 pm • Emergency Lamp Using High-brightness LEDs**Rafael Adaime Pinto, Marcelo Rafael Cosetin, Murilo Cervi, Alexandre Campos, Alysso Ranieri Seidel and Ricardo Nederson do Prado, *Federal University of Santa Maria, Brazil***4:35 pm • Third Harmonic Filtered 13.56 MHz Push-pull Class-E Power Amplifier**Thomas Gerrits, Jorge L. Duarte and Marcel A.M. Hendrix, *Eindhoven University of Technology, Netherlands***S28 Electric Drives: Performance Improvement**

Grand Ballroom C

Chairs: Vassilios G. Angelidis, *The University of New South Wales, Australia* and Bin Lu, *Eaton Corporation, United States***3:20 pm • DC Bus Voltage Clamp Method to Prevent Over-voltage Failures in Adjustable Speed Drives**Lixiang Wei, Zhijun Liu and Gary L Skibinski, *Rockwell Automation - Allen Bradley, United States***3:45 pm • Active Motor Terminal Overvoltage Mitigation Method for Parallel Two-level Voltage Source Inverters**Juhamatti Korhonen, Toni Itkonen, Juha-Pekka Strom, Juho Tyster and Pertti Silventoinen, *Lappeenranta University of Technology, Finland***4:10 pm • Appropriate Tuning and Robust Design of a Generalized Predictive Speed Controller for Drive Systems with Resonant Loads**Nils Hoffmann, Soenke Thomsen and Friedrich W. Fuchs, *Christian-Albrechts-University of Kiel, Germany***4:35 pm • A General Approach of Damping Torsional Resonance Modes in Multi-megawatt Applications**Joseph Song-Manguelle, Christof Sihler and Simon Schramm, *GE Global Research, United States; GE Global Research, Germany***S29 DC-DC Converters: Digital Control III**

Grand Ballroom D

Chairs: Harish Krishnamurthy, *Intel, United States* and Liangbin Yao, *Maxim Integrated Products, United States***3:20 pm • Digital Load Share Controller Design of Paralleled Phase-shifted Full-bridge Converters Referencing the Highest Current**Hyun-Wook Seong, Je-Hyung Cho, Gun-Woo Moon and Myung-Joong Youn, *KAIST, Republic of Korea***3:45 pm • Average Inductor Current Sensor for Digitally-controlled Switched-mode Power Supplies**Miguel Rodriguez, Javier Sebastian and Dragan Maksimovic, *University of Oviedo, Spain; University of Colorado, United States*



**4:10 pm • Multi-resolution Feedback to Minimize Communication Data and Improve Output Accuracy in Isolated Digital Power Supplies**

Zhiyuan Hu, Tet Yeap and Yan-Fei Liu, Queen's University, Canada; University of Ottawa, Canada

**4:35 pm • Implementation of Digitally Controlled Phase Shift Full Bridge Converter for Server Power Supply**

Je-Hyung Cho, Hyun-Wook Seong, Shin-Myung Jung, Jin-Sik Park, Gun-Woo Moon and Myung-Joong Youn, KAIST, Republic of Korea

**S30 DC-DC Converters: Isolated Converters II**

Grand Ballroom East

Chairs: Jose Cobos, Technical University of Madrid, Spain and Dan Chen, Taiwan University, Taiwan

**3:20 pm • High Step-up Boost Converter Integrated with Voltage-doubler**

Ki-Bum Park, Gun-Woo Moon and Myung-Joong Youn, KAIST, Republic of Korea

**3:45 pm • An Investigation of the Natural Balancing Mechanisms of Modular Input-series-output-series DC-DC Converters**

Wim van der Merwe and Toit Mouton, Stellenbosch University, South Africa

**4:10 pm • Zero-voltage Switching Flyback-boost Converter with Voltage-doubler Rectifier for High Step-up Applications**

Hyun-Wook Seong, Hyoung-Suk Kim, Ki-Bum Park, Gun-Woo Moon and Myung-Joong Youn, KAIST, Republic of Korea

**4:35 pm • Improvement of Light Load Efficiency of Dual Active Bridge DC-DC Converter by Using Dual Leakage Transformer and Variable Frequency**

Giuseppe Guidi, Atsuo Kawamura, Martin Pavlovsky, Tomofumi Imakubo and Yuji Sasaki, Yokohama National University, Japan; IHI Corporation, Japan

**TUESDAY, SEPTEMBER 14**

**8:00 am – 9:40 am**

**S31 Electric Drives: Modeling and Control of Overvoltage Transients**

Room 201

Chair: Alfio Consoli, University of Catania, Italy

**8:00 am • Integrated Differential-mode and Common-mode Filter to Mitigate the Effects of Long Motor Leads on AC Drives**

Rangarajan Tallam, Gary Skibinski, Todd Shudarek and Richard Lukaszewski, Rockwell Automation, United States; Cramer Coil and Transformer Company, United States

**8:25 am • High-frequency Cable and Motor Modeling of Long-cabled Induction Motor Drive Systems**

Liwei Wang, Carl N.M. Ho, Francisco Canales and Juri Jatskevich, University of British Columbia, Canada; ABB Switzerland Ltd., Switzerland

**8:50 am • A Low-loss Motor Terminal Filter for Overvoltage Suppression**

Ken Yuen and Henry Chung, City University of Hong Kong, Hong Kong

**9:15 am • Overvoltage Mitigation of Inverter-driven Motors with Long Cables of Different Lengths**

Hirofumi Akagi and Itaru Matsumura, Tokyo Institute of Technology, Japan; Railway Technical Research Institute, Japan

**S32 Transportation Applications: PHEV**

Room 202

Chair: V. Anand Sankaran, Ford, United States

**8:00 am • Effects of V2G Reactive Power Compensation on the Component Selection in an EV or PHEV Bidirectional Charger**

Mithat Kisacikoglu, Burak Ozpineci and Leon Tolbert, The University of Tennessee, United States; Oak Ridge National Laboratory, United States

**8:25 am • Design Considerations for High-voltage DC Bus Architecture and Wire Mechanization for Electric/Hybrid Electric Vehicle Applications**

Mohammad Anwar, Sean Gleason and Tim Grewe, General Motors, United States

**8:50 am • Development and Validation of Models for 95% Efficiency, 220 W Wireless Power Transfer Over a 30 cm Air-gap**

Seung-Hwan Lee and Robert D. Lorenz, University of Wisconsin - Madison, United States

**9:15 am • A Novel Thermal Model for HEV/EV Battery Modeling Based on CFD Calculation**

Xiao Hu, Shaohua Lin, Scott Stanton and Wenyu Lian, Ansys Inc., United States; General Motors, United States

**S33 AC-DC Converters: Analog Control of PFC**

Room 203

Chair: Jian Sun, Rensselaer Polytechnic Institute, United States

**8:00 am • An Improved Control Strategy Based on Multiplier for CRM Flyback PFC to Reduce Line Current Peak Distortion**

Yuanyuan Wang, Ya Zhang, Qiong Mo, Min Chen and Zhaoming Qian, Zhejiang University, China

**8:25 am • A Novel SFVM Control Scheme for Two-phase Interleaved CCM/DCM Boundary Mode Boost Converter in Power Factor Correction Applications**

Chung Ping Ku, Dan Chen and Chih Yuan Liu, E.E. Department, National Taiwan University, Taiwan

**8:50 am • Sliding Mode Current Control of Grid-connected Voltage Source Converter**

Jiabing Hu, Ziqiang Zhu, Heng Nian, Lei Shang and Yikang He, Department of EEE, Sheffield University, United Kingdom; College of Electrical Engineering, Zhejiang Univ, China

**9:15 am • A Hybrid Current Control for a Controlled Rectifier**

Alberto Soto-Lock, Edison da Silva, Malik Elbuluk and Darlan Fernandes, Federal University of Campina Grande, Brazil; University of Akron, United States

**S34 Enabling Technologies: EMI Analysis and Suppression I**

Room 204

Chairs: Eckart Hoene, Fraunhofer, Germany and Jean-Luc Schanen, G2E Lab, France

**8:00 am • Adaptive DV/DT and DI/DT Control for Isolated Gate Power Devices**

Matthias Rose, Joerg Krupar and Heiko Hauswald, University of Applied Sciences Dresden, Germany; DMOS GmbH, Germany

**8:25 am • Characterization of a Modified LISN for Effective Separated Measurements of Common Mode and Differential Mode EMI Noise**

Juergen Stahl, Alexander Bucher, Thomas Duerbaum and Daniel Kuebrich, Friedrich-Alexander-University Erlangen, Germany

**8:50 am • Meeting MIL-STD-461 for 2kW Military Tactic Generator Drive System**

Yllmaz Sozer and David Torrey, The University of Akron, United States; Advanced Energy Conversion, United States

**9:15 am • Behavioral Modeling Methods for Motor Drive System EMI Design Optimization**

Lei Xing, Frank Feng and Jian Sun, Department of ECSE, Rensselaer Polytechnic Institute, United States; United Technology - Hamilton Sundstrand, United States

**S35 Enabling Technologies: Reliability and Lifetime Estimation**

Room 205

Chair: Richard Lukaszewski, Rockwell Automation - Allen Bradley, United States

**8:00 am • Condition Monitoring Solder Fatigue in a Power Module Using the Rise of Case-above-ambient Temperature**

Dawei Xiang, Li Ran, Peter Tavner, Shaoyong Yang and Angus Bryant, Durham University, United Kingdom; Warwick University, United Kingdom

**8:25 am • The Lifetime/Volume Ratio as an Index to Assess the Reliability of Power Converters**

Hugo Calleja, Humberto Jimenez and Abraham Claudio, Cenidet, Mexico; Instituto de Investigaciones Electricas, Mexico

**8:50 am • Real-time Life Consumption Power Modules Prognosis Using Online Rainflow Algorithm in Metro Applications**

Mahera Musallam, C. Mark Johnson, Chunyan Yin, Chris Bailey and Michel Mermet-Guyennet, University of Nottingham, United Kingdom; University of Greenwich, United Kingdom; ALSTOM Transport, France

**9:15 am • Lifetime Estimation with Thermal Models of Semiconductors**

Peter van Duijsen, Pavol Bauer and Jan Leuchter, Simulation Research, Netherlands; TU Delft, Netherlands; University of Defence, Czech Republic

**S36 Electric Machines: Machine Losses and Material Issues**

Room 206

Chairs: Mircea Popescu, Motor Design Ltd., United Kingdom and Emmanuel Agamloh, Advanced Energy Corporation, United Kingdom

**8:00 am • New Lines of Investigation on the Effects of Processing Conditions on Soft Magnetic Composite Materials Behaviour for Electromagnetic Applications**

Luca Ferraris, Marco Actis Grande, Robert Bidulsky, Andrea Cavagnino and Paolo Ferraris, Politecnico di Torino, Italy

**8:25 am • Analytical Prediction of Rotor Eddy Current Loss Due to Stator Slotting in PM Machines**

Dominic Wills and Maarten Kamper, University of Stellenbosch, South Africa

**8:50 am • Analysis of Proximity Losses in High-speed Surface Permanent Magnet Machines with Concentrated Windings**

Patel Reddy, Thomas Jahns and Bohn Theodore, University of Wisconsin-Madison, United States; Argonne National Laboratory, United States

**9:15 am • Core Loss Prediction Using Magnetic Circuit Model for Fractional-slot Concentrated-winding Interior Permanent Magnet Machines**

Jagadeesh Tangudu, Thomas Jahns and Ayman EL-Refaei, University of Wisconsin - Madison, United States; GE Global Research Center, United States

**S37 Energy Efficiency and Industrial Applications: HID Lighting**

Room 207

Chair: Jo Olsen, Sylvania, United States and William Petersen, E&W Power, United States

**8:00 am • Medium Power Ceramic HID lamps; Problems and Opportunities Resulting from Low Lamp Power Factor**

Ray Gibson, Philips Lighting, United States

**8:25 am • A Timing Controllable and Polarity Tracked Igniter for High Intensity Discharge Lamp Electronic Ballast**

Chongguang Ma, Biwen Xu, Zirui Jia, Min Chen and Zhaoming Qian, College of Electrical Engineering, Zhejiang Unive, China

**8:50 am • Design and Analysis of a Novel Two-stage Electronic Ballast for HID Lamp**

Wei-Chiang Kuo, Tsorng-Juu Liang, Hsueh-Ko Liao, Ming-Yang Cheng, Kai-Hui Chen and Chun-An Cheng, National Cheng Kung University, Taiwan; I-Shou University, Taiwan

**9:15 am • An Energy-recyclable Burn-in Technology for Electronic Ballast for HID Lamps**

Nan Chen and Henry Chung, City University of Hong Kong, Hong Kong

**S38 DC-AC Inverters: Inverter Control and Analysis I**

Grand Ballroom C

Chair: Bingsen Wang, Michigan State University, United States and Lixiang Wei, Rockwell Automation, United States

**8:00 am • Comparison between Two Control Strategies for Input-series-output-series Inverters System**

Tianzhi Fang and Xinbo Ruan, Nanjing University of Aeronautics and Astronautics, China

**8:25 am • Approaches to Enhance Discrete Control Algorithms Serving for Motor Drive System**

Sideng Hu, Zhengming Zhao, Liqiang Yuan, Ting Lu and Xuesong Wang, Department of Electrical Engineering, Tsinghua, China

**8:50 am • A Fast, Accurate and Robust Algorithm to Detect Fundamental and Harmonic Sequences**

Francisco D. Freijedo, Ana Vidal, Alejandro G. Yepes, Pablo Fernandez-Comesana, Jano Malvar, Oscar Lopez and Jesus Doval-Gandoy, University of Vigo, Electronic Technology Department, Spain

**9:15 am • Switched Systems Model and Switching Rules of DC-AC Converter**

Wenxun Xiao and Bo Zhang, South China University of Technology, China

**S39 Electric Machines: Fractional Slot Machines I**

Grand Ballroom D

Chairs: Z.Q. Zhu, University of Sheffield, United Kingdom and Dan Ionel, Vestas, United States

**8:00 am • Design, Analysis, and Fabrication of a High-performance Fractional Slot Concentrated Winding Surface PM Machine**

Patel Reddy, Thomas Jahns, Theodore Bohn and Pat McCleer, University of Wisconsin-Madison, United States; Argonne National Laboratory, United States; McCleer Power, United States

**8:25 am • Unsaturated and Saturated Saliency Trends in Fractional-slot Concentrated-winding Interior Permanent Magnet Machines**  
*Jagadeesh Tangudu, Thomas Jahns and Ayman EL-Refaie, University of Wisconsin - Madison, United States; GE Global Research Center, United States*

**8:50 am • Six-phase Supply Feasibility Using a PM Fractional-slot Dual Winding Machine**  
*Massimo Barcaro, Nicola Bianchi and Freddy Magnussen, University of Padova, Italy; ABB Corporate Research, Sweden*

**9:15 am • Fractional-slot Concentrated-winding Axial-flux Permanent Magnet Machine with Core-wound Coils**  
*Giulio De Donato, Fabio Giulio Capponi and Federico Caricchi, University of Rome "La Sapienza", Italy*

**S40 DC-DC Converters Isolated Converters III**

*Grand Ballroom A*  
 Chairs: Jaber Abu-Qahouq, *University of Alabama, United States* and Luca Corradini, *University of Colorado, United States*

**8:00 am • Active Clamped Three-phase Isolated Boost Converter with Series Output Connection for High Step-up Applications**  
*Se-Kyo Chung, Jeong-Gyu Lim and Yujin Song, Gyeongsang National University, Republic of Korea; Korea Institute of Energy Research, Republic of Korea*

**8:25 am • A Simple and Effective Control Strategy for Improved Operation of a Current-fed Push-pull Converter**  
*Lucas Hartmann, Mauricio Correa and Antonio Lima, Universidade Federal de Campina Grande, Brazil*

**8:50 am • An Adaptive Blanking Time Control Scheme for Audible Noise Free Quasi Resonant Flyback Converter**  
*Zeng Hulong, Zhang Junming, Huang Xiucheng, Yuan Wei, Wu Xinke and Chen Min, Zhejiang University, China*

**9:15 am • A Novel Full-bridge Converter Achieving ZVS over Wide Load Range with a Passive Auxiliary Circuit**  
*Wu Chen, Xinbo Ruan and Junji Ge, Nanjing University of Aeronautics and Astronautics., China*

**S41 DC-DC Converters: Bidirectional Converters I**

*Grand Ballroom B*  
 Chair: Tsorng-Juu (Peter) Liang, *National Cheng Kung University, Taiwan*

**8:00 am • Three-phase Bidirectional DC-DC Converter with Enhanced Current Sharing**  
*Zhan Wang and Hui Li, Florida State University, United States*

**8:25 am • Bidirectional High-voltage DC-DC Converter for Advanced Railway Locomotives**  
*Nikolay Lopatkin, Gennadiy Zinoviev and Leonid Zotov, Altai State Academy of Education, Russia; Novosibirsk State Technical University, Russia*

**8:50 am • An Overall Study of a Dual Active Bridge for Bidirectional DC-DC Conversion**  
*Alberto Rodriguez, Javier Sebastian, Diego G. Lamar, Marta M. Hernando and Aitor Vazquez, Universidad de Oviedo, Spain*

**9:15 am • Bidirectional Isolated Dual Full-bridge DC-DC Converter with Active Clamp for EDLC**  
*Yushi Miura, Masato Kaga, Yasuhisa Horita and Toshifumi Ise, Osaka University, Japan*

**TUESDAY, SEPTEMBER 14**

**10:00 am – 11:40 am**

**S42 Electric Drives: AC Machine Control**

*Room 201*  
 Chairs: Mario Pacas, *University of Siegen, Germany* and Rakib Islam, *Nexteer Automotive, United States*

**10:00 am • A New Deep Field-weakening Strategy of IPM Machines Based on Single Current Regulator and Voltage Angle Control**  
*Lei Zhu, Shan Xue, Xuhui Wen, Yaohua Li and Liang Kong, Institute of Electrical Engineering, CAS, China*

**10:25 am • Unified Direct-flux Vector Control for AC Motor Drives**  
*Gianmario Pellegrino, Radu Bojoi and Paolo Guglielmi, Politecnico di Torino, Italy*

**10:50 am • Direct Field-oriented Control of an Induction Machine Using an Adaptive Rotor Resistance Estimator**  
*David Reed and Heath Hofmann, MIT Lincoln Laboratory, United States; University of Michigan, United States*

**11:15 am • Regulation of Permanent Magnet AC Generators Using Angle Control of Stator-connected Voltage Source Converters**  
*Neal Clements, Giri Venkataramanan and Thomas Jahns, University of Wisconsin - Madison, United States*

**S43 Transportation Application: Infrastructure**

*Room 202*  
 Chairs: Zareh Soghomonian, *BMT Syntek Technologies, United States* and Srdjan Lukic, *North Carolina State University, United States*

**10:00 am • Control Strategy of a Multi-port, Grid Connected, Direct-DC PV Charging Station for Plug-in Electric Vehicles**  
*Gustavo Gamboa, Christopher Hamilton, John Elmes, Michael Pepper and John Shen, University of Central Florida, United States*

**10:25 am • Optimum Design of an EV/PHEV Charging Station with DC Bus and Storage System**  
*Sanzhong Bai, Srdjan Lukic and Du Yu, North Carolina State University, United States*

**10:50 am • Dual Converter Active Filter and Balance Compensation on Electric Railway Systems Using the Open Delta Transformer Connection**  
*Alexander Bueno, Jose Aller, Jose Restrepo and Thomas Habetler, Universidad Simon Bolivar, Venezuela; Universidad Simon Bolivar/ Georgia Tech., Venezuela; Georgia Tech., United States*

**11:15 am • Power Quality Solutions for Light Rail Public Transportation Systems Fed by Medium Voltage Underground Cables**  
*Alper Terciyanli, Adnan Acik, Alper Cetin, Muammer Ermis and Isik Cadirci, TUBITAK UZAY Power Electronics Group, Turkey; METU Electrical and Electronics Engineering Department, Turkey*

**S44 AC-DC Converters: Digital Control of PFC**

*Room 203*  
 Chairs: Rolando Burgos, *ABB, United States* and Robert Grino, *Universitat Politecnica de Catalunya, Spain*

**10:00 am • A New Digital Control System for a Single-phase Half-bridge Rectifier with Fast Dynamic Response**  
*Luis Nodari, Marcello Mezaroba, Leandro Michels and Cassiano Rech, Santa Catarina State University, Brazil; Federal University of Santa Maria, Brazil*



**10:25 am • Accurate Mode Boundary Detection in Digitally Controlled Boost Power Factor Correction Rectifiers**

*Sungwoo Moon, Luca Corradini and Dragan Maksimovic, University of Colorado at Boulder, United States*

**10:50 am • A Simple Digital DCM Control Scheme for Boost PFC Operating in both CCM and DCM**

*Shu Fan Lim and Ashwin M Khambadkone, National University of Singapore, Singapore*

**11:15 am • Unified Predictive Transition Current Mode Control for Digital-controlled Power Factor Corrector**

*Chia-An Yeh, Kung-Min Ho and Yen-Shin Lai, National Taipei University of Technology, Taipei, Taiwan*

**S45 Enabling Technologies: EMI Analysis and Suppression II**

*Room 204*

*Chair: Jean-Luc Schanen, G2E Lab, France*

**10:00 am • An Improved Design for Transmission Line Busbar EMI Filter**

*Fang Luo, A. Carson Baisden, Dushan Boroyevich, Luisa Coppola, Yong Kang, Paolo Mattavelli, Khai Ngo, Nicolas Gazel and Fred Wang, CPES-Virginia Tech, Huazhong University of SCI and Tech, United States; CPES-Virginia Tech, United States; ABB Group, Switzerland; Huazhong University of SCI and Tech, China; SAFRAN group, France; ECE,UTK at Knoxville, United States*

**10:25 am • On Factors Affecting EMI-performance of Conducted-noise-mitigating Digital Controllers in DC-DC Converters — An Experimental Investigation**

*Gamal Dousoky, Masahito Shoyama and Tamotsu Ninomiya, Kyushu University, Japan; Nagasaki University, Japan*

**10:50 am • Common Mode EMI Characteristics of Resonant Converters**

*Pengju Kong, Daocheng Huang, Dianbo Fu and Fred C. Lee, Virginia Tech, United States*

**11:15 am • Novel Techniques to Suppress the Common Mode EMI Noise Caused by Transformer Parasitic Capacitances in DC-DC Converters**

*Dianbo Fu, Pengju Kong, Fred C. Lee and Shuo Wang, Virginia Tech, United States*

**S46 Enabling Technologies: Packaging and Integration**

*Room 205*

*Chairs: Adam Skorek, University of Quebec, Canada and Braham Ferreira, Delft University of Technology, Netherlands*

**10:00 am • Integrating Giant Magneto-resistive (GMR) Field Detectors for High Bandwidth Current Sensing in Power Electronic Modules**

*Patrick Schneider, Masafumi Horio and Robert Lorenz, University of Wisconsin - Madison, United States; Fuji Electric Holdings Co. Ltd., Japan*

**10:25 am • 3D Hybrid Integration and Functional Interconnection of a Power Transistor and its Gate Driver**

*Timothe Simonot, Jean-Christophe Crebier, Nicolas Rouger and Gaude Victor, Grenoble Electrical Engineering Lab (G2Elab), France; Grejeannoble Electrical Engineering Lab (G2Elab), France*

**10:50 am • Multilayer SMT High Power Density Packaging of Electronic Ballasts for HID Lamps**

*Ivan Josifovic, Jelena Popovic-Gerber, Braham Ferreira and Dolf van Casteren, Delft University of Technology, Netherlands; Philips Lighting, Netherlands*

**11:15 am • Design of High Temperature SiC Three-phase AC-DC Converter for >100°C Ambient Temperature**

*Ruxi Wang, Puqi Ning, Dushan Boroyevich and Fred Wang, CPES-Virginia Tech, United States; The University of Tennessee and Oak Ridge National Laboratory, United States*

**S47 Electric Machines: Machine Losses and Thermal Analysis**

*Room 206*

*Chairs: Emmanuel Agamloh, Advanced Energy Corporation, United States and Mircea Popescu, Motor Design Ltd., United Kingdom*

**10:00 am • Thermal Analysis of a Segmented Stator Winding Design**  
*Rafal Wrobel, Phil Mellor and Derrick Holliday, University of Bristol, United Kingdom***10:25 am • Influence of Different End Region Cooling Arrangements on End-winding Heat Transfer Coefficients in Electric Machines**  
*Mircea Popescu, David Staton, Aldo Boglietti, Andrea Cavagnino and Douglas Hawkins, Motor Design Ltd., United Kingdom; Politecnico di Torino, Italy***10:50 am • A Non-intrusive Winding Heating Method for Induction Motor Using Soft-starter for Preventing Moisture Condensation**  
*Pinjia Zhang, Yi Du, Thomas Habetler and Bin Lu, GE Global Research, United States; Georgia Institute of Technology, United States; Eaton Corporation, United States***11:15 am • Rotor End Losses in Multi-phase Fractional-slot Concentrated-winding Permanent Magnet Synchronous Machines**  
*Ayman EL-Refaei, Manoj Shah, James Alexander, Steven Galimoto and Kum-Kang Huh, GE Global Research Center, United States***S48 Energy Efficiency and Industrial Applications: Fluorescent Ballast**

*Room 207*

*Chairs: Ron Hui, City University of Hong Kong, Hong Kong and Christian Branas, University of Cantabria, Spain*

**10:00 am • A Single Eco-friendly Ultra-low-loss Magnetic Ballast Design for a Wide Range of T5 High-efficient Fluorescent Lamps**  
*Wai Man Ng, Deyan Lin and S.Y.R. Hui, City University of Hong Kong, Hong Kong***10:25 am • A Dimming Module for Controlling Power Supply to a Fluorescent Lamp Ballasted by a Non-dimmable Electronic Ballast**  
*Nan Chen and Henry Chung, City University of Hong Kong, Hong Kong***10:50 am • Digital CCFL Drive System Using Individual Current Modulation for LCD-TV**  
*Je-Hyung Cho, Sang-Hyun Park, Hyun-Wook Seong, Hyoung-Suk Kim, Jin-Sik Park, Eun-Seok Choi and Myung-Joong Youn, KAIST, Republic of Korea***11:15 am • Analysis and Design Method for High Frequency Self-oscillating Electronic Ballasts**  
*Efren Flores, Mario Ponce, Luis Vela, Mario Juarez and Ismael Araujo, CENIDET, Mexico; ESIME, Mexico*



**S49 DC-AC Inverters: Inverter Control and Analysis II***Grand Ballroom C*Chairs: Hideaki Fujita, *Tokyo Institute of Technology, Japan* and Lixiang Wei, *Rockwell Automation, United States***10:00 am • A New Optimal PWM Strategy Applied to Single Phase Inverters with Variable DC Voltage**Mariethoz Sebastien, Almer Stefan and Morari Manfred, *ETH Zurich, Automatic Control Lab, Switzerland***10:25 am • Time Domain Models of the EMI Sources in the Variable Speed Drives**Jean-Luc Kotny and Nadir Idir, *University of Lille 1, France; University of Lille 1 - L2EP Lab, France***10:50 am • Three Phase VSI with Reduced Output Voltage Distortion Using FPGA Based Multisampled Space Vector Modulation**Alexander Julian and Giovanna Oriti, *Naval Postgraduate School, United States***11:15 am • A Method for Five-phase Carrier-based PWM Modulation for Balanced and Unbalanced Reference Voltages**Joseph Ojo and Sosthenes Karugaba, *Tennessee Tech University, United States***S50 Electric Machines: Fractional Slot Machines II***Grand Ballroom D*Chairs: Z. Qiang Zhu, *University of Sheffield, United Kingdom* and Dan Ionel, *Vestas, United States***10:00 am • Considerations on Selecting Fractional-slot Windings**Emanuele Fornasiero, Luigi Alberti, Nicola Bianchi and Silverio Bolognani, *University of Padova, Italy***10:25 am • Investigation of Magnet Arrangements in Double Layer Interior Permanent Magnet Motors**Katsumi Yamazaki and Kazuya Kitayuguchi, *Chiba Institute of Technology, Japan***10:50 am • Post-assembly Magnetization of Rare-earth Fractional-slot Permanent-magnet Machines Using a Two-shot Method**Min-Fu Hsieh, Yao-Min Lien and David Dorrell, *National Cheng Kung University, Taiwan; University of Technology Sydney, Australia***11:15 am • Three Phase Tooth-concentrated Multiple-layer Fractional Windings with Low Space Harmonic Content**Mihail V. Cistelecan, Fernando FJTE Ferreira and Mihail Popescu, *Research Institute for Electrical Machines Bucharest, Romania; ISEC Coimbra, Portugal***S51 DC-DC Converters: Isolated Converters IV***Grand Ballroom A*Chairs: Alan Elbanhawy, *Elbanhawy Consulting, United States* and Hui Li, *Florida State University, United States***10:00 am • Using Adaptive Off-time Synchronous Rectification to Improve Efficiency in Low Output Voltage Converters**Miguel Rodriguez, Diego Gonzalez, Manuel Arias, Javier Sebastian and Roberto Prieto, *University of Oviedo, Spain; UPM - Madrid, Spain***10:25 am • A Comparison of the Series-parallel Compensation Type DC-DC Converters Using both a Fuel Cell and a Battery**Koji Orikawa and Jun-ichi Itoh, *Nagaoka University of Technology, Japan***10:50 am • Forward-flyback Converter with Snubber-feedback Network for Contactless Power Supply Applications**Ray-Lee Lin and Yu-Hau Huang, *National Cheng Kung University, Taiwan***11:15 am • Optimization Design of an Isolated DC-DC Converter Using Series Compensation on the Secondary Side**Satoshi Miyawaki, Jun-ichi Itoh and Kazuki Iwaya, *Nagaoka University of Technology, Japan; TDK-Lambda, Japan***S52 DC-DC Converters: Bidirection Converters II***Grand Ballroom B*Chair: Leon Tolbert, *The University of Tennessee, United States***10:00 am • A New Resonant Active Clamping Technique for Bidirectional Converters in HEVs**Mario Cacciato, Alfio Consoli, Vittorio Crisafulli, Nunzio Abbate and Giovanni Vitale, *DIEES - University of Catania, Italy; STMicroelectronics - Catania, Italy***10:25 am • Adaptive Dynamic Control of a Bidirectional DC-DC Converter**Dinesh Segaran, Brendan Peter McGrath and Donald Grahame Holmes, *RMIT University, Australia***10:50 am • Preventing Transformer Saturation in Bidirectional Dual Active Bridge Buck-boost DC-DC Converters**Sangtaek Han, Imayavaramban Munuswamy and Deepak Divan, *Georgia Institute of Technology, United States***11:15 am • A Comparative Efficiency Study of Silicon-based Solid State Transformers**Hengsi Qin and Jonathan Kimball, *Missouri University of Science and Technology, United States*

TUESDAY, SEPTEMBER 14

1:30 pm – 3:00 pm

**Poster Session I***Grand Salon*Chair: Z. Qiang Zhu, *University of Sheffield, United Kingdom***P101 • A Medium Voltage Power Supply with Enhanced Ignition Characteristics for Plasma Torch in Waste Disposal System**Yongsug Suh and Kyungsub Jung, *Department of Elec. Engineering, Chonbuk National University, Republic of Korea***P102 • An Integrated Three-port Inverter for Stand-alone PV Applications**Zhijun Qian, Osama Abdel-Rahman, Haibing Hu and Issa Batarseh, *University of Central Florida, United States; Advanced Power Electronics Corporation, United States***P103 • Derivation of Boost-buck Converter Based High-efficiency Robust PV Inverter**Zheng Zhao, Ming Xu, Qiaoliang Chen, Jih-Sheng Lai and Younghoon Cho, *Future Energy Electronics Center, Virginia Tech, United States; FSP-Powerland Technology Inc., China***P104 • Advanced Lithium Ion Battery Modeling and Power Stage Integration Technique**Anand Ramamurthy, Subhashish Bhattacharya and Shailesh Notani, *North Carolina State University, United States***P105 • A Hybrid Diverter Design for Distribution Level On-load Tap Changers**Daniel Rogers and Tim Green, *Imperial College London, United Kingdom*

**P106 • Scheduling Demand Response Events with Constraints on Total Number of Events per Year – NOW PRESENTED IN S106**

Rajesh Tyagi, Jason Black and Jon Petersen, General Electric, United States

**P107 • A Double Fourier Analysis Development of THD for PWM Inverters: A Theoretical Method for Motor Loss Minimization**

Xi Lu, Craig Rogers and Fang Zheng Peng, Michigan State University, United States

**P108 • Dynamic Capacitor for HV Applications**

Frans Dijkhuizen and Markus Goedde, ABB Corporate Research, Sweden; RWTH Aachen, Germany

**P109 • A Novel Single Phase Synchronization Method for D-FACTS Controller Based on Symmetrical Components Synthesis**

Ming Li, Yue Wang, Xiong Fang, Ke Wang, Wanjun Lei, Zhaoan Wang and Jinjun Liu, Xi'an Jiaotong University, China

**P110 • Design of Single-phase Shunt Active Filter for Three-phase Four-wire Distribution Systems**

Chung-Chuan Hou and Yung-Fu Huang, Chung Hua University, Taiwan; Industrial Technology Research Institute, Taiwan

**P111 • Application of Electrical Variable Transmission in Wind Power Generation System**

Xikai Sun, Ming Cheng, Wei Hua and Longya Xu, Southeast University, China; The Ohio State University, United States

**P112 • The Design of an LCL-filter for the Three-parallel Operation of a Power Converter in a Wind Turbine**

Yoon Dong-Keun, Jeong Hea-Gwang and Lee Kyo-Beum, Ajou University, Republic of Korea

**P113 • Analysis and Specification of DC Side Voltage in Parallel Active Power Filter with SVM Control Regarding Compensation Characteristics**

Guopeng Zhao and Jinjun Liu, Xi'an Jiaotong University, China

**P114 • Design Considerations of High Voltage and High Frequency 3 Phase Transformer for Solid State Transformer Application**

Chun-kit Leung, Seunghun Baek, Sumit Dutta and Subhashish Bhattacharya, North Carolina State University, United States

**P115 • Simulation of Auxiliary Electrical System Working Conditions During Power Plant Transition to House Load Operation**

Janusz Buchta, Maciej Pawlik and Rafal Szubert, Technical University of Lodz, Poland

**P116 • Model for Optimal Balancing Single-phase Traction Load Based on Steinmetz's Method**

Wan Qingzhu, Chen Jianye, Wu Mingli and Zhu Guiping, School of Electrical Engineering, Beijing Jiaoto, China; State Key Lab of Power System, Department of Ele, China

**P117 • Integrated Dynamic Voltage Restorers with Reduced Semiconductor Count**

Lei Zhang, Poh Chiang Loh and Feng Gao, Nanyang Technological University, Singapore; Shandong University, China

**P118 • A Model-based Controller in Rotating Reference Frame for Hybrid HVDC**

Raymundo Torres-Olguin, Marta Molinas and Tore Undeland, Norwegian University of Science and Technology, Norway

**P119 • Efficiency Improvement in Soft-switching Three-level Converters for High Power UPS**

Corentin Rizet, Philippe Delarue, Philippe Le Moigne, Alain Lacarnoy and Jean-Paul Ferrieux, G2Elab/APC by Schneider electric, France; L2EP, France; APC by Schneider electric, France; G2Elab, France

**P120 • Design Consideration of Self-oscillating Full-bridge Electronic Ballast for Metal Halide Lamp at 2.65MHz Operating Frequency**

Lin Ray-Lee, Chen Yong-Fa and Chen Yan-Yu, National Cheng Kung University, Taiwan

**P121 • Online Electric Vehicle Using Inductive Power Transfer System**

Sungwoo Lee, Jin Huh, Changbyung Park, Nam-Sup Choi, Gyu-Hyeoung Cho and Chun-Taek Rim, Department of EE, KAIST, Republic of Korea; Department of Elect.and Semicon.Chonnam National University, Republic of Korea; Department of Nuclear and Quantum Engineering, KAIST, Republic of Korea

**P122 • Optimal Resonant Tank Design Considerations for Primary Track Compensation in Inductive Power Transfer Systems**

Zeljko Pantic, Subhashish Bhattacharya and Srdjan Lukic, North Carolina State University, United States

**P123 • PEM Fuel Cell System Model Predictive Control and Real Time Operation on a Power Emulator**

Angelo Accetta, Maurizio Cirrincione, Giuseppe Marsala, Marcello Pucci and Gianpaolo Vitale, DIEET - University of Palermo, Italy; University of Belfort Montbeliard, France; ISSIA - CNR, Italy

**P124 • Comprehensive Research on Compound-structure Permanent-magnet Synchronous Machine System Used for HEVs**

Yong Liu, Chengde Tong, Ranran Liu, Jing Zhao, Jingang Bai and Ping Zheng, Harbin Institute of Technology, China

**P125 • Particle Swarm Optimization for Efficient Selection of Hybrid Electric Vehicle Design Parameters**

Chirag Desai and Sheldon Williamson, Concordia University, Canada

**P126 • Flatness Based Control of a Hybrid Power Source with Fuel cell / Supercapacitor / Battery**

Majid Zandi, Alireza Payman, Jean-Philippe Martin, Serge Pierfederici and Bernard Davat, Nancy university-INPL, France

**P127 • State of Charge Modeling of Arbitrary Cell Connection**

Jiucui Zhang and Song Ci, University of Nebraska Lincoln, United States

**P128 • High Voltage Matrix Converter Topology for Multi-system Locomotives**

Pavel Drabek, Martin Pittermann and Marek Cedi, University of West Bohemia in Pilsen, Czech Republic

**P129 • Closed Loop AC Voltage Generation Using Harmonic Cancellation Technique**

Isabel Quesada, Carlos Lucena, Carlos Martinez, Antonio Lazaro and Andres Barrado, Carlos III University of Madrid, Spain

**P130 • Design of Low-voltage High-current Rectifier with High-efficiency Output Side for Electrolytic Disinfection of Ballast Water**

In-Dong Kim, Won-Woo Cho, Jin-Young Kim, Eui-Cheol Nho, Gang-Woo Goh, Sang-Bum Bae and Bu-Nyung Kang, Pukyong National University, Republic of Korea; Kwangsan Co., LTD, Republic of Korea

**P131 • Integrated Modelling of a Synchronous Generator and a Twelve Phase Transformer**

Alexander Julian and Giovanna Oriti, Naval Postgraduate School, United States

**P132 • Study of Heat Dissipation for HXD2 Locomotive's Auxiliary Converter**

Xianjin Huang, Liwei Zhang, Hu Sun, Xiaojie You and Trillion Zheng, Beijing Jiaotong University, China

**P133 • Radial Flux and Axial Flux PM Machines Analysis for More Electric Engine Aircraft Applications**

Radu Bojoi, Andrea Cavagnino, Alessio Miotto, Alberto Tenconi and Silvio Vaschetto, Politecnico di Torino, Italy

**P134 • The Estimation of the Induction Motor Parameters by the GeTLS EXIN Neuron**

*Maurizio Cirrincione, Giansalvo Cirrincione, Marcello Pucci and Alain Jaafari, University of Belfort, France, France; University of Amiens, France, France; ISSIA-CNR, Italy*

**P135 • Study of Various Slanted Air-gap Structures of Interior Permanent Magnet Synchronous Motor with Brushless Field Excitation**

*Seong Taek Lee and Leon Tolbert, Hyundai Ideal Electric Company, United States; The University of Tennessee, United States*

**P136 • A Novel Middle-point Current-injection Type Bearingless Motor for Vibration Suppression**

*Yuto Iiyama, Kazuki Soutome, Akira Chiba and Akira Chiba, Tokyo University of Science, Japan; Tokyo Institute of Technology, Japan*

**P137 • Torque Ripples and Estimation Performance of High-frequency Signal Injection based Sensorless PMSM Drive Strategies**

*Yi Wang, Zhu Jianguo, Guo Youguang, Li Yongjian and Xu Wei, University of Technology, Sydney, Australia; University of Technology Sydney, Australia; Hebei University of Technology, China*

**P138 • Comparison and Evaluation of Different Compound-structure Permanent-magnet Synchronous Machine Used for HEVs**

*Ping Zheng, Jing Zhao, Ranran Liu, Chengde Tong and Qian Wu, Harbin Institute of Technology, China*

**P139 • Permanent Magnet Flux Switching Integrated-starter-generator with Different Rotor Configurations for Cogging Torque and Torque Ripple Mitigations**

*Weizhong Fei, Patrick Luk, Bing Xia, Jianxin Shen and Yu Wang, Cranfield University, United Kingdom; Zhejiang University, China*

**P140 • Design and Performance Analysis of an Outer-rotor Flux-switching Permanent Magnet Machine for Traction Applications**

*Yu Wang, Meng-Jia Jin, Jianxin Shen, Weizhong Fei and Patrick Luk, Zhejiang university, China; Zhejiang University, China; Zhejiang University, United Kingdom; Cranfield University, United Kingdom*

**P141 • Experimental comparison between Wound Rotor and Permanent Magnet Synchronous Machine for Integrated Starter Generator Applications**

*Guy Friedrich, Universite de Compiegne (UTC), France*

**P142 • Analytical Prediction of Open-circuit Eddy-current Loss in Series Double Excitation Synchronous Machines**

*Adel Bellara, Habiba Bali, Yacine Aamara, Georges Barakat and Pascal Reghem, GREAH (University of Le Havre), France*

**P143 • Vibration Reduction of IPM type BLDC Motor Using Negative Third Harmonic Elimination Method of Air-gap Flux Density**

*Jin-Wook Reu, Jin Hur, Byeong-Woo Kim and Gyu-Hong Kang, University of Ulsan, Republic of Korea; Korea Marine Equipment Research Institute, Republic of Korea*

**P144 • Influence of Stator Slot Shape on Temperature in Surface Mounted Permanent Magnet Machines**

*Andy Knight, Yang Zhan, Dave Staton and Douglas Hawkins, University of Alberta, Canada; Motor Design Ltd, United Kingdom*

**P145 • Inter-turn Short Circuit Fault Detection of Wound Rotor Induction Machines Using Bispectral Analysis**

*Amine Yazidi, Humberto Henao, Gerard-Andre Capolino, Franck Betin and Laurent Capocchi, University of Picardie Jules Verne, France; University of Corsica, France*

**P146 • Direct Measuring Position Encoder for Axial Transversal Flux Machine**

*Philip Brockerhoff and Martin Schulz, Universitaet der Bundeswehr Muenchen, Germany*

**P147 • Sensorless Control of BLDC Motors at Low Speed Based on Differential BEMF Measurement**

*Carlo Concarì and Fabrizio Troni, University of Parma, Italy*

**P148 • A New Type Single Phase Switching Voltage Regulator**

*Ilknur Colak and Sukru Ertike, CERN, Turkey; Istanbul Technical University, Turkey*

**P149 • Coupled-inductor AC-to-AC Converters Having Improved Input Power Factor, Simple Control, and Variable Output Frequency**

*Edison da Silva, Euzeli Santos Jr., Antonio Lacerda, Frederico Azevedo and Cursino Jacobina, Federal University of Campina Grande, Brazil*

**P150 • A New Bidirectional Isolated Converter for Grid Connection**

*MyoungHo Kim, Anno Yoo and Seung-Ki Sul, Seoul National University, Republic of Korea*

**P151 • A Control Method for a Single-to-three-phase Power Converter with an Active Buffer and a Charge Circuit**

*Yoshiya Ohnuma and Jun-ichi Itoh, Nagaoka University of Technology, Japan*

**P152 • AC Chopper Topology with Multiple Steps Switching Capability**

*Julio C. Rosas-Caro, Fernando Mancilla-David, Juan M. Ramirez-Arredondo, Aaron Gonzalez-Rodriguez, Eduardo Nacu Salas-Cabrera and Pablo A. Rojas-Molina, Madero City Technological Institute, Mexico; Department of Electrical Engineering University, United States; Guadalajara Campus of CINVESTAV, Mexico*

**P153 • Two-switch AC-link Voltage Regulator**

*Julio C. Rosas-Caro, Fernando Mancilla-David, Juan M. Ramirez-Arredondo, Juan M. Gonzalez-Lopez, Ruben Salas-Cabrera and Samuel Mar-Baron, Madero City Technological Institute, Mexico; Department of Electrical Engineering, University, Mexico; Guadalajara Campus of CINVESTAV, Mexico; Manzanillo Technological University, Mexico*

**P154 • Novel Capacitor-isolated Power Converter**

*Jingpeng Zhu, Ming Xu, Julu Sun and Chuanyun Wang, FSP-Powerland technology Inc., China; FSP-Powerland Technology Inc., China*

**P155 • Voltage Transfer Ratio Improvement of an Indirect Matrix Converter by Single Pulse Modulation**

*Teck Chiang Goh and Itoh Jun-ichi, Nagaoka University of Technology, Japan*

**P156 • Current Fluctuation Analysis of a Quantum AC-AC Resonant Converter for Contactless Power Transfer**

*Hao L. Li, Patrick A. Hu and Grant A. Covic, ECE Department – The University of Auckland, New Zealand*

**P157 • A Practical Multiphase IPT System for AGV and Roadway Applications**

*Michael Kissin, Hao Hao and Grant Covic, The University of Auckland, New Zealand*

**P158 • Vector Control of Induction Motor based on Output Voltage Compensation of Matrix Converter**

*She Hongwu, Lin Hua, Wang Xingwei and Yue Limin, Huazhong University of Science and Technology, China*

**P159 • A New Combined Adaptive Flux Observer with HF Signal Injection for Sensorless Direct Torque and Flux Control of Matrix Converter Fed IPMSM over a Wide Speed Range**

*Dan Xiao, Gilbert Foo and Muhammed Fazlur Rahman, The University of New South Wales, Australia*

**P160 • A Novel Modulation Strategy to Minimize the Number of Commutation Processes in the Matrix Converter**

*Keyhan Kobrafi and Reza Iravani, University of Toronto, Canada*



**P161 • Space Vector PWM Technique for a Novel Three-to-five Phase Matrix Converter**

SK Moin Ahmed, Atif Iqbal, Haitham Abu-Rub and Mohammad Rizwan Khan, Texas A&M University at Qatar, Qatar; Texas A&M University at Qatar, Qatar; Texas A&M University at Qatar, Qatar; Aligarh Muslim University, India

**P162 • Output Voltage Harmonics Suppression of Matrix Converters Using Instantaneous Effective Values**

Takaharu Takeshita, Nagoya Institute of Technology, Japan

**P163 • Modulation Schemes for Five-phase to Three-phase AC-AC Matrix Converters**

Joseph Ojo, Mihret Melaku, Abreham Meharegi and Karugaba Sosthenes, Tennessee Tech University, United States

**P164 • Single-switch Charge Equalizer Using Multi-stacked SEPIC Converter for Series-connected Energy Storage Cells**

Masatoshi Uno, Akio Kukita and Koji Tanaka, Japan Aerospace Exploration Agency, Japan

TUESDAY, SEPTEMBER 14

3:30 pm – 5:00 pm

**Poster Session II**

Grand Salon

Chair: Ayman El-Refaie, GE Global Research Center, United States

**P301 • State Monitoring and Fault Diagnosis of the PWM Converter using the Magnetic Near Field of the Inductor Components**

Yu Chen, Songsong Nie, Xuejun Pei and Yong Kang, Huazhong University of Science and Technology, China

**P302 • A DSP-based Diagnostic System for DC-DC Converters using the Shape of Voltage across the Magnetic Components**

Songsong Nie, Yu Chen, Xuejun Pei and Yong Kang, Huazhong University of Science and Technology, China

**P303 • Multiple-output DC-DC Converters with the Shared Leg Structure: Basic Topologies, ZVS Analysis and Experimental Results**

Yu Chen, Songsong Nie, Xuejun Pei and Yong Kang, Huazhong University of Science and Technology, China

**P304 • The Multiple-output DC-DC Converter with the Shared Leg Chain**

Yu Chen, Songsong Nie, Xuejun Pei and Yong Kang, Huazhong University of Science and Technology, China

**P305 • A Novel Clamping Diode Current Reset Scheme for ZVS PWM Full-bridge Converter**

Wu Chen, Xinbo Ruan, Qianhong Chen and Junji Ge, Nanjing university of aero. and astro., China

**P306 • A Double-input Flyback DC-DC Converter with Single Primary Winding**

Qin Wang, Jie Zhang, Xinbo Ruan and Ke Jin, Nanjing University of Aeronautics and Astronautics, China; Huazhong University of Science and Technology, China

**P307 • An Inductorless Asymmetrical ZVS Full Bridge Converter for Step-up Applications with Wide Input Voltage Range**

Pyosoo Kim, Sewan Choi and Jeongeun Kim, Seoul National University of Technology, Republic of Korea; Power Plaza Co., Republic of Korea

**P308 • Dynamic Response Improvement in a Three-level Buck Type Converter**

Lisheng Shi, Mehdi Ferdowsi and Mariesa Crow, Missouri University of Science and Technology, United States

**P309 • An Improved Two-switch Buck-boost Converter with Reduced Reverse-recovery Losses**

Chen Yang, Huafeng Xiao and Shaojun Xie, Nanjing University of Aeronautics and Astronautics, China

**P310 • Unified Three-terminal Switch Model for Current Mode Controls**

Yingyi Yan and Fred C. Lee, Virginia Tech, United States

**P311 • Low-frequency Modeling of Three-phase, Four-core, Strip-wound Transformers in High-power DC-DC Converters**

Robert Lenke, Bernard Szymanski and Rik De Doncker, E.ON Energy Research Center / RWTH Aachen, Germany; Warsaw University of Technology, Poland

**P312 • Derivation of a Nonlinear Output Capacitor Current Programming Technique Applicable for a Buck Converter Operating in CCM and DCM**

Victor Cheung, Henry Chung and Alan Lo, City University of Hong Kong, Hong Kong; Chu Hai College of Higher Education, Hong Kong

**P313 • Evaluating the Confidence of Frequency Response Function of a Switched-mode Converter Using Distributional Models**

Tomi Roinila, Tomi Helin, Matti Viikko, Mikko Hankaniemi and Hannu Koivisto, Tampere University of Technology, Finland; Celerium Technologies Ltd, Finland

**P314 • Adaptive Frequency Modulation Method for Synchronous Buck Converters at Light Loads**

In-Ho Cho, Il-Oun Lee and Gun-Woo Moon, KAIST, Republic of Korea

**P315 • An Efficient Communication Protocol for Single- and Multi-module Isolated Digital Power Supplies Using a Single Pulse-transformer**

Zhiyuan Hu, Yan-Fei Liu and Tet Yeap, Queen's University, Canada; University of Ottawa, Canada

**P316 • A Resonant, Frequency-tracking, Step-down Piezoelectric Transformer Based Converter**

Marco Pinto, Beatriz Borges, Hugo Ribeiro and Marcelino Santos, Instituto de Telecomunicacoes, IST, Portugal; INESC, IST, Portugal

**P317 • Achieving Constant Frequency Operation in DC-DC Resonant Converters through Magnetic Control**

J. Marcos Alonso, Marina Perdigao, David Gacio, Lidia Campa and Eduardo Saraiva, University of Oviedo, Spain; Instituto de Telecomunicacoes, Portugal

**P318 • Discrete Time Domain Small Signal Modeling of Full Bridge Phase Shifted Series Resonant Converter**

A. A. Aboushady, K. H. Ahmed, S. J. Finney and B. W. Williams, Strathclyde University, United Kingdom

**P319 • Performance Analysis of Isolated ZVT Interleaved Converter with Winding-cross-coupled Inductors and Switched-capacitors**

Rui Xie, Wuhua Li, Yi Zhao, Jing Zhao, Xiangning He and Fengwen Cao, Zhejiang University, China; Suzhou Vocational University, China

**P320 • Constant On-time Digital Peak Voltage Control for Buck Converter**

Yanyan Jin, Jianping Xu and Guohua Zhou, Southwest Jiaotong University, China

**P321 • A New Digital Capacitor Charge Balance Control Algorithm for Boost DC-DC Converter**

Fang Wei, Qiu Yajie, Liu Xiaodong and Liu Yanfei, Anhui University of Technology, China; Queen's University, Canada

**P322 • A New Digital Control Algorithm to Improve the Dynamic Response of Dual-transistors Forward Converter**

Fang Wei, Qiu Yajie, Liu Xiaodong and Liu Yanfei, Anhui University of Technology, China; Queen's University, Canada



**P323 • On the AC Stability of High Power Factor Three-phase Rectifiers**

Rolando Burgos, Dushan Boroyevich, Fred Wang, Kamiar Karimi and Gerald Francis, ABB Corporate Research, United States; CPES-Virginia Tech, United States; University of Tennessee, United States; The Boeing Company, United States

**P324 • Power Factor Correction Using Projected Cross Point Control (PCPC)**

Mostafa Khazraei, Hossein Sepahvand and Mehdi Ferdowsi, Missouri University of Science and Technology, United States

**P325 • A Novel Neutral Point Potential Balance Control Strategy Based on Vector Controlled VIENNA Rectifier**

Li-gao He and Xin-bing Chen, NanJing University of Astronautic and Aeronautic, China

**P326 • Three-phase Three-level Boost Rectifier Based on Three-switching Cells for UPS Applications Using FPGA**

Raphael da Camara, Paulo Praca, Cicero Cruz, Rene Bascope and Luiz Henrique Barreto, Universidade Federal do Ceara, Brazil

**P327 • Three-phase Rectifier with an Active Current Injection and a Single High-frequency Inductor**

Rima Abi Rached, Hadi Kanaan and Kamal Al-Haddad, Saint-Joseph University, Lebanon; Ecole de Technologie Superieure, Canada

**P328 • Input Resonance Investigation and LC Filter Design for PWM Current Source Rectifiers**

Hua Zhou, Yunwei Li, Navid Zargari, Zhongyuan Cheng and Jinwei He, University of Alberta, Canada; Rockwell Automation, Canada

**P329 • Large Power Three-level Voltage Source Inverter with IGCTs and the Experiment**

Chengsheng Wang, Chongjian Li, Yaohua Li, Chunyi Zhu and Zhiming Lan, Automation Research and Design Institute of Meta, China; Institute of Electrical Engineering, Chinese Aca, China

**P330 • Analysis and Design Optimization of Brushless DC Motor's Driving Circuit Considering the CDV/DT Induced Effect**

Shen Xu, Weifeng Sun and Daying Sun, Southeast University, China

**P331 • An Improved Control Strategy for Input-series and Output-parallel Inverter System at Extreme Conditions**

Wu Chen and Xinbo Ruan, Nanjing University of Aeronautics and Astronautics, China

**P332 • Current Sharing of IGBT Modules in Parallel with Thermal Imbalance**

Xuesong Wang, Zhengming Zhao and Liqiang Yuan, Tsinghua University, China

**P333 • A Current Decoupling Parallel Control Strategy of Single Phase Inverter with Voltage and Current Dual Closed-loop Feedback**

Shungang Xu and Jianping Xu, Electrical Engineering, Southwest Jiaotong Univ, China

**P334 • Characteristics of Two Induction Motor Independent Drives Fed by a Four-leg Inverter**

Nobutaka Kezuka, Kazuo Oka and Kouki Matsuse, Meiji University, Japan

**P335 • New Control Strategy Applied to a CSI Inverter with Amplified Sinusoidal Output Voltage: Analysis, Simulation and Experimental Results**

Lucas Sampaio, Natalia Morais, Luiz Carlos Gomes Freitas, Joao Batista Vieira Jr. and Valdeir Jose Farias, Universidade Federal de Uberlandia - UFU, Brazil

**P336 • Novel Proposal of Multilevel Inverter Using Buck EIE Converter**

Natalia M. A. Costa, Luiz C. G. Freitas, Joao B. Vieira Jr., Ernane Antonio Alves Coelho and Valdeir J. Farias, Universidade Federal de Uberlandia - UFU, Brazil

**P337 • Model Predictive Control of a Cascaded H-bridge StatCom**

Christopher Townsend, Terrence Summers and Robert Betz, The University of Newcastle, Australia

**P338 • Implementation of a Three-phase Multilevel Boosting Inverter Using Switched-capacitor Converter Cells**

Arthur Barnes and Juan Carlos Balda, University of Arkansas, United States

**P339 • High-power Modular Multilevel Converters with SiC JFETs**

Dimosthenis Pefitsis, Georg Tolstoy, Antonios Antonopoulos, Jacek Rabkowski, Mietek Bakowski, Lennart Ängquist, Hans-Peter Nee and Jang-Kwon Lim, KTH-Royal Institute of Technology, Sweden; Acreo, Sweden

**P340 • A Simplified Space Vector Based Current Controller for Any General N-level Converter**

Jun Li, Xiaohu Zhou, Zhigang Liang, Subhashish Bhattacharya and Alex Huang, North Carolina State University, United States

**P341 • A Novel Active Clamping Soft Switching SVM Controlled Three-phase Inverter**

Rui Li, Zhiyuan Ma and Dehong Xu, Zhejiang University, China

**P342 • An Automatic Half-bridge Resonant Inverter with Three-phase Three-switch Buck-type Rectifier**

Yachiangkam Samart, Chakkuchan Panithan, Saichol Chudjuarjeen, Anawach Sangswang and Chayant Koompai, King Mongkut's University of Technology Thonburi, Thailand

**P343 • Design of Low-profile Nanocrystalline Transformer in High Current Phase-shifted DC-DC Converter**

Yi Wang, Sjoerd W.H. de Haan and J.A. Ferreira, Delft University of Technology, Netherlands

**P344 • Applying Response Surface Methodology to Planar Transformer Winding Design**

Samuel Cove, Martin Ordonez and John Quaicoe, Memorial University of Newfoundland, Canada

**P345 • A Simple Method for Measuring Voltage Dependent Capacitance Using TDR System**

Zen-nosuke Ariga, Keiji Wada and Toshihisa Shimizu, Tokyo Metropolitan University, Japan

**P346 • IGBT Modules Optimized for Three Level Inverters**

Eric Motto and John Donlon, Powerex Inc., United States

**P347 • Single Die Multiple 600V Power Diodes with Vertical Voltage Terminations and Isolation**

Kremena Vladimirova, Jean-Christophe Crebier, Yvan Avenas, Christian Schaeffer and Timothe Simonot, Grenoble Electrical Engineering Laboratory, France

**P348 • Design and Characterization of an Integrated CMOS Gate Driver for Vertical Power MOSFETs**

Timothe Simonot, Nicolas Rouger and Jean-Christophe Crebier, Grenoble Electrical Engineering Lab (G2Elab), France

**P349 • An Investigation into the Utilisation of Power MOSFETs at Cryogenic Temperatures to Achieve Ultra-low Power Losses**

Kennith Leong, Benedict Donnellan, Angus Bryant and Philip Mawby, University of Warwick, United Kingdom

**P350 • Power SiC DMOSFET Model Accounting for JFET Region Nonuniform Current Distribution**

Ruiyun Fu, Alexander Grekov, Jerry Hudgins, Alan Mantooth and Enrico Santi, University of South Carolina, United States; University of Nebraska, United States; University of Arkansas, United States

**P351 • Hardware Laboratories for Power Electronics and Motor Drives Distance Learning Courses**

Giovanna Oriti, Alexander Julian, Daniel Zulaica and Roberto Cristi, Naval Postgraduate School, United States

**P352 • Improving Light Load Efficiency of High Frequency DC-DC Converters with Planar Nonlinear Inductors**

Laili Wang, Yunqing Pei, Xu Yang and Zhaoan Wang, Xi'an Jiaotong University, China

**P353 • Design Issues of Interleaved Critical Conduction Mode Boost PFC Converter with Coupled Inductor**

Fei Yang, Xinbo Ruan, Yang Yang and Zhihong Ye, Nanjing University of Aeronautics and Astronautics, China; Huazhong University of Science and Technology, China; Lite-ON TECHNOLOGY CORP., Taiwan

**P354 • Design of a Contactless Energy Transfer System for Desktop Peripherals**

Pascal Meyer, Paolo Germano, Miroslav Markovic and Yves Perriard, PhD Student, Switzerland; Assistant, Switzerland; Professor, Switzerland

**P355 • Magnetic Properties Measurement of Soft Magnetic Composite Materials Over Wide Range of Excitation Frequency**

Yongjian Li, Jianguo Zhu, Qingxin Yang, Zhiwei Lin, Yi Wang and Wei Xu, Hebei University of Technology, China; University of Technology, Sydney, Australia

**P356 • Comprehensive Optimization Method for Thermal Properties and Parasitics in Power Modules**

Ole Muehlfeld and Friedrich W. Fuchs, Christian-Albrechts-University of Kiel, Germany

**P357 • EMC Behavior of the Internal Supply of Industrial Power Converters**

Sebastian Schulz and Andreas Lindemann, Otto-von-Guericke University, Magdeburg, Germany

**P358 • Automatic Layout Design for Power Module**

Puqi Ning, Fred Wang and Khai Ngo, CPES-Virginia Tech, United States

**P359 • Method to Detect Line-to-ground Faults in High-resistance-ground Networks**

Carlos Rodriguez and Russel Kerkman, Rockwell Automation, United States

**P360 • Reliability Assessment on Power MOSFETs Working in Energy Absorption Mode**

Antonio Testa, Salvatore De Caro, Salvatore Patane', Saverio Panarello, Sebastiano Russo, Davide Patti and Santo Poma, DCIIM - University of Messina, Italy; DFMIE - University of Messina, Italy; ST Microelectronics, Italy

**P361 • Application of Gate-controlled Series Capacitors (GCSC) for Reducing Stresses Due to Sub-synchronous Resonance in Turbine-generator Shaft**

B.S. Umre, J.B. Helonde, J.P. Modak and Sonali Renkey (Rangari), VNIT, Nagpur, India; GNCOE, Nagpur, India; PCOE, Nagpur, India; RKNEC, Nagpur, India

**P362 • Design and Implementation of a High Resolution DPWM Based on a Low-Cost FPGA**

Ge Lusheng, Chen Zongxiang, Chen Zhijie and Liu Yanfei, Anhui University of Technology, China

WEDNESDAY, SEPTEMBER 15

8:00 am – 9:40 am

**S53 DC-AC Inverters: Neutral Point Clamped Inverters**

Room 201

Chairs: Jin Wang, Ohio State University, United States and Lixiang Wei, Rockwell Automation, United States

**8:00 am • Multi-carrier Interleaved PWM Strategies for a New Five-level NPC Inverter Using a Three-phase Coupled Inductor**  
Behzad Vafakhah, Jeffrey Ewanchuk and John Salmon, University of Alberta, Canada

**8:25 am • Improvement of EMI Behavior of NPC Multilevel Inverter Without Balancing the Voltage Bondaries of DC Bank Capacitors**  
Ignace Rasoanarivo, Jean-Philippe Martin and Serge Pierfederici, Nancy Universite - INPL, France

**8:50 am • Improving the Performance of Protection Schemes in Three Level IGCT-based Neutral Point Clamped Converters**  
Anderson Rocha, Gleisson Franca, Manoel Santos, Helder de Paula and Braz Cardoso, CEFET-MG, Brazil; Universidade Federal de Minas Gerais, Brazil; Gerdau-Acominas, Brazil

**9:15 am • A Five/Nine-level Twelve-switch Neutral Point Clamped Inverter for High Speed Electric Drives**  
Jeff Ewanchuk, Behzad Vafakhah and John Salmon, University of Alberta, Canada

**S54 AC-DC Converters: Control of Three Phase PFC**

Room 202

Chair: Mohamed Orabi, South Valley University, Egypt

**8:00 am • Direct Power Control for Three-level Neutral Point Clamped PWM Rectifier Based on Virtual Flux**  
Yingchao Zhang, Zhengming Zhao, Ting Lu and Liping Jin, Tsinghua University, China; Chongqing Communication Institute, China

**8:25 am • Full Discrete Sliding Mode Controller for Three-phase PWM Rectifier Based on Load Current Estimation**  
Jin Ye, Xu Yang, Haizhong Ye and Xiang Hao, Xi'an Jiaotong University, China

**8:50 am • A Novel Control Method Using Two DC Link Current Sensors in Two Parallel Three-phase Boost Converters**  
Chang-Soon Lim, Kui-Jun Lee, Rae-Young Kim and Dong-Seok Hyun, Electrical Engineering, Hanyang University, Republic of Korea

**9:15 am • Voltage Sensorless Bidirectional Three-phase Unity Power Factor AC-DC Converter**  
Ajit Ghodke and Kishore Chatterjee, IIT Bombay, India

**S55 Sustainable Energy Applications: Ocean Wave Energy Systems**

Room 203

Chairs: Annette Von Jouanne and Ted Brakken, Oregon State University, United States

**8:00 am • Analysis of Power Extraction from Irregular Waves by All Electric Power Take Off**

Elisabetta Tedeschi, Marta Molinas, Matteo Carraro and Paolo Mattavelli, Norwegian University of Science and Technology, Norway; University of Padova, Italy; Virginia Tech, United States

**8:25 am • Grid Power Integration Technologies for Offshore Ocean**

**Wave Energy**

*Katsumi Nishida, Tarek Ahmed and Mutsuo Nakaoka, Ube National College of Technology, Japan; Assuit University, Egypt; Kyungnam University, Japan*

**8:50 am • Self-synchronous Control of Doubly-fed Linear Generators for Ocean Wave Energy Applications**

*Jennifer Vining, Thomas Lipo and Giri Venkataramanan, University of Wisconsin - Madison, United States*

**9:15 am • Low-power Autonomous Wave Energy Harvesting Device for Remote Sensing and Communications Applications**

*Deanelle Symonds, R. Cengiz Ertekin and Edward Davis, Trex Enterprises Corporation, United States; University of Hawaii, United States*

**S56 Electric Machines: Wind Generators**

*Room 204*

*Chairs: David Dorrell, University of Technology - Sydney, Australia and Bin Lu, Eaton Corporation, United States*

**8:00 am • Optimal Selection of Excitation Capacitor for 6/3-phase Dual Stator-winding Induction Generator with the Static Excitation Controller Applied in Wind Power**

*Feifei Bu, Wenxin Huang, Yuwen Hu and Kai Shi, Nanjing University of Aeronautics and Astronautics, China*

**8:25 am • Design of New Concept Permanent Magnet Induction Wind Generator**

*Johannes Potgieter and Maarten Kamper, Stellenbosch University, South Africa*

**8:50 am • Design and Control of a High-efficiency Doubly-fed Brushless Machine for Wind Power Generator Application**

*Longya Xu, Bo Guan, Huijuan Liu, Le Gao and Kaichien Tsai, The Ohio State University, United States*

**9:15 am • Condition Monitoring of Wind Turbines Based on Amplitude Demodulation**

*Yassine Amirat, Vincent Choqueuse and Mohamed Benbouzid, University of Brest, EA 4325 LBMS, France*

**S57 Enabling Technologies: Power Device Gate Drive Techniques**

*Room 205*

*Chair: Angus Bryant, University of Warwick, United Kingdom*

**8:00 am • A New Inductorless Bipolar Gate Driver for Control FET of High Frequency Buck Converters**

*Jizhen Fu, Zhiliang Zhang, Liang Jia, Yan-Fei Liu and Paresh Sen, Queen's University, Canada; Nanjing University of Aeronautics and Astronautics, China*

**8:25 am • An Integrated Segmented Gate Driver with Adjustable Driving Capability**

*Armin Akhavan Fomani, Andrew Shorten and Wai Tung Ng, University of Toronto, Canada; University of Toronto, Canada*

**8:50 am • Comparison of Continuous and Discontinuous Current Source Drivers for High Frequency Applications**

*Zhiliang Zhang, Jizhen Fu, Yan-Fei Liu and P.C. Sen, Nanjing University of Aeronautics and Astronautics, China; Queen's University at Kingston, Canada*

**9:15 am • A Special High-frequency Soft-switched High-voltage Isolated DC-DC Power Supply for Six GCT Gate Drivers**

*Jahangir Afsharian, Bin Wu and Navid Zargari, Master of Applied Science Ryerson University, Canada; Professor (Fellow of IEEE) Ryerson University, Canada; Reseach and Designer (Rockwell Automation), Canada*

**S58 DC-DC Converters: Magnetic Designs**

*Room 206*

*Chair: Dushan Boroyevich, Virginia Tech, United States*

**8:00 am • High Frequency Bus Converter with Integrated Matrix Transformers for CPU and Telecommunications Applications**

*David Reusch and Fred Lee, CPES-Virginia Tech, United States*

**8:25 am • High Power Density Interleaved DC-DC Converter Using a Three-phase Integrated Close-coupled Inductor Set Aimed for Electric Vehicles**

*Mitsuaki Hirakawa, Masao Nagano, Yasuto Watanabe, Keigo Andoh, Satoshi Hashino, Somei Nakatomi and Toshihisa Shimizu, Honda RD Co., Ltd., Japan; Tokyo Metropolitan University, Japan*

**8:50 am • Trans-linked Multi-phase Boost Converter for Electric Vehicle**

*Masayuki Nakahama, Masayoshi Yamamoto and Yuki Satake, Shimane University, Japan; Sanshin Electronics, Co., Japan*

**9:15 am • Core-less Multiphase Converter with Transformer Coupling**

*M. Carmen Gonzalez, Narciso Ferreros, Pedro Alou, Oscar Garcia, Jesus Angel Oliver, Jose Antonio Cobos and Horacio Visairo, Universidad Politecnica de Madrid, Spain; Systems Research Center Mexico, Intel Corp, Mexico*

**S59 Electric Machines: Condition Monitoring and Fault Analysis I**

*Room 207*

*Chairs: Marcello Pucci, ISSIA-CNR, Italy and Lee Sang Bin, Korea University, Republic of Korea*

**8:00 am • A Comparative Study of Permanent Magnet-synchronous and Permanent Magnet-flux Switching Machines for Fault Tolerant Drive Systems**

*Tsarafidy Raminosoa and Chris Gerada, The University of Nottingham, United Kingdom*

**8:25 am • Online Broken Rotor Bar Detection of Inverter-fed Induction Motors Operating Under Arbitrary Load Conditions**

*Sung-Kuk Kim and Jul-Ki Seok, EE, Yeungnam University, Republic of Korea*

**8:50 am • Automated Monitoring of Airgap Eccentricity for Inverter-fed Induction Motors Under Standstill Conditions**

*Doosoo Hyun, Jongman Hong, Sang Bin Lee, Kwonhee Kim, Ernesto Wiedenbrug, Mike Teska, Subhasis Nandi and Ilamparithi Thirumarai Chelvan, Korea University, Republic of Korea; Baker Instrument Company - an SKF Group Company, United States; University of Victoria, Canada*

**9:15 am • Evaluation of the Detectability of Broken Rotor Bars for Double Squirrel Cage Rotor Induction Motors**

*Jongbin Park, Byunghwan Kim, Jinkyu Yang, Sang Bin Lee, Ernesto Wiedenbrug, Mike Teska and Seungoh Han, Korea University, Republic of Korea; Baker Instrument Company - an SKF Group Company, United States; Hoseo University, Republic of Korea*



**S60 Sustainable Energy Applications: Wind Energy Systems I***Grand Ballroom C*Chairs: Robert Chin, *ABB, Sweden* and Pat Wheeler, *University of Nottingham, United Kingdom***8:00 am • Design and Implementation of STATCOM Combined with Series Dynamic Breaking Resistor for Low Voltage Ride-through of Wind Farms***Linyuan Zhou, Jinjun Liu and Fangcheng Liu, Xi'an Jiaotong University, China***8:25 am • Low Voltage Ride-through of Wind Turbine Based on Interior Permanent Magnet Synchronous Generators Sensorless Vector Controlled***Mario Rizo, Ana Rodriguez, Emilio Bueno, Santiago Cobreces, Francisco Rodriguez and Carlos Giron, University of Alcalá, Spain***8:50 am • Fault Ride-through Enhancements of Wind Turbine with Doubly-fed Induction Generator Using the Robust Variable Structure System Control***Chia-Chi Chu, Yuan-Zeng Lin, Jian-Hung Liu and Se-Kang Ho, National Tsing Hua University, Taiwan; Industrial Technology Research Institute, Taiwan***9:15 am • Control of an Unbalanced Stand-alone DFIG-based Wind System Using Predictive Current Control Method***Phan Van-Tung and Lee Hong-Hee, University of Ulsan, Republic of Korea***S61 DC-AC Inverters: Special Topics I***Grand Ballroom D*Chair: Abraham Gebregergis, *Nexteer, United States***8:00 am • Performance Evaluation of a New Hybrid-modulation Scheme for High-frequency-AC-link Inverter: Applications for PV, Wind, Fuel Cell, and DER/Storage Applications***Sudip K. Mazumder and Akshay K. Rathore, University of Illinois, Chicago, United States***8:25 am • Performance Enhancement for Digital Implementations of Resonant Controllers***Alejandro G. Yepes, Francisco D. Freijedo, Pablo Fernandez-Comesana, Jano Malvar, Oscar Lopez and Jesus Doval-Gandoy, University of Vigo, Spain***8:50 am • A Fast Space-vector Algorithm for Multilevel Converters without Coordinates Transformation***Luis Gustavo Castro, Mauricio Correa, Cursino Jacobina and Dushan Boroyevich, Universidade Federal de Campina Grande, Brazil; Virginia Tech, United States***9:15 am • Application of a Hybrid Discharge Reactor with D-A Mixed Control in Phenol Degradation***Rui Xie, Chao Chen, Wuhua Li, Jing Zhao and Xiangning He, Zhejiang University, China***S62 Special Industry Session: Industry Perspectives on Emerging Challenges and Opportunities in Renewable Energy and Electrified Transport***Grand Ballroom A*Chair: Deepak Divan, *Georgia Institute of Technology, United States***8:00 am • Power Electronics in Renewable Energy and Electric Transportation from a Utility Perspective***Satish Rajagopalan, Electric Power Research Institute (EPRI), United States***8:25 am • Ready, Set, Charge! How Communities Prepare for Plug-in Electric Vehicles***Don Francis, Clean Cities-Atlanta, United States***8:50 am • Integrated Power Electronics in the Photovoltaics Industry***Pat Chapman, SolarBridge Technologies, United States***9:15 am • Impact of Wind Generation on the Grid — New Developments and Implications on Wind's Growth Rate***Mahesh Morjaria, GE Energy, United States***S63 Sustainable Energy Applications: Microgrid I***Grand Ballroom B*Chairs: Sudip Mazumder, *University of Illinois-Chicago, United States* and Ferdinanda Ponci, *Aachen University, Germany***8:00 am • Stability Studies of a Mixed Islanded Power Network with Varspeed Units Using Simplified Models of the Converters***Yves Pannatier, Basile Kawkabani, Gokhan Sari and Jean-Jacques Simond, EPFL-STI-IEL-LME, Switzerland***8:25 am • Composite Energy Storage System with Flexible Energy Management Capability for Micro-grid Applications***Tanmoy Bhattacharya, Haihua Zhou, Ashwin M. Khambadkone, Duong Tran and Siew Tuck Sing, Terence, National University of Singapore, Singapore***8:50 am • A New Half-bridge Based Inverter with the Reduced-capacity DC Capacitors for DC Micro-grid***Toshihiko Tanaka, Tsukasa Sekiya, Yusuke Baba, Masayuki Okamoto and Eiji Hiraki, Yamaguchi University, Japan***9:15 am • Integration of Battery Energy Storage Element in a CERTS Micro-grid***Micah Erickson and Robert Lasseter, University of Wisconsin - Madison, United States*

WEDNESDAY, SEPTEMBER 15

10:00 am – 11:40 am

**S64 DC-AC Inverters: Motor Drive Inverters***Room 201*Chair: Gui-Jia Su, *Oak Ridge National Laboratories, United States***10:00 am • Bidirectional Rectifier-inverter Multilevel Topology without DC-link Passive Components***Georgios Konstantinou and Vassilios G. Agelidis, The University of New South Wales, Australia***10:25 am • A Square-wave Controller for a High Speed Induction Motor Drive Using a Three-phase Floating Inverter Bridge***Jeff Ewanchuk and John Salmon, University of Alberta, Canada***10:50 am • Interaction Between the Filter and PWM Units in the Sine Filter Configuration Utilizing Three-phase AC Motor Drives Employing PWM Inverters***Onur Cetin and Ahmet Hava, Middle East Technical University, Turkey***11:15 am • Loss Evaluation of a Two-stage Boost Converter Using the Neutral Point of a Motor***Jun-ichi Itoh and Daisuke Ikarashi, Nagaoka University of Technology, Japan*



**S65 AC-DC Converters: PFC Modeling and Control**

Room 202

Chair: Yongsug Suh, Chonbuk National University, Republic of Korea

**10:00 am • A Unified Practical Approach to Analyze the Stability of the Pre-regulator and Complete Two-stage PFC Power Supplies Under Average-current-mode Control**

Mohamed Orabi and Abdelali Elaroudi, APEARC, South Valley University, Egypt; Rovire I Vergili University, Spain

**10:25 am • Small-signal Modeling of DCVM Cuk Converter Operating in both DC Input Voltage Source and PFC Applications**

Yaser Karimi, Vahidreza Nasirian, Mahdi Ahmadian, Jalil Yaghoobi, Mohammad Reza Zolghadri and Mehdi Ferdowsi, Sharif University of Technology, Iran; Missouri University of Science and Technology, United States

**10:50 am • Energy-based Digital Control of a Ripple Correction Circuit of an Unity-power-factor AC-DC Converter**

Toshiji Kato, Kaoru Inoue and Koji Higashiyama, Doshisha University, Japan

**11:15 am • A Fourier Based PLL for Single Phase Grid Connected Systems**

Claudio Santos, Sidelmo Silva and Braz Cardoso, PPGEL, CEFET-MG, Brazil; Universidade Federal de Minas Gerais, Brazil

**S66 Sustainable Energy Applications: Photovoltaics Converters I**

Room 203

Chairs: Robert Balog, Texas A&amp;M University, United States and Lixiang Wei, Rockwell Automation, United States

**10:00 am • Multiple-input Boost Converter to Minimize Power Losses Due to Partial Shading in Photovoltaic Modules**

Sairaj Dhople, Jonathan Ehlmann, Ali Davoudi and Patrick Chapman, University of Illinois, United States

**10:25 am • A High Efficiency Current Fed Multi-resonant Converter for High Step-up Power Conversion in Renewable Energy Harvesting**

Bo Yuan, Xu Yang and Donghao Li, Xi-an Jiaotong University, China

**10:50 am • An Interleaving Double-switch Buck-boost Converter for PV Grid-connected Inverter**

Huafeng Xiao, Ruhai Huang, Shaojun Xie and Wenming Chen, Nanjing University of Aeronautics and Astronautics, China

**11:15 am • Improved MPPT Performance of a Grid Connected Photovoltaic Power Conditioning System under Partially Shaded Conditions**

Young-Ho Park, Myung-Ho Woo, Se-Bong Jeon and Seung-Pyo Ryu, Hyundai Heavy Industries, Republic of Korea

**S67 Electric Machines: Reluctance Machines**

Room 204

Chairs: Gianmario Pellegrino, Politecnico di Torino, Italy and Akira Chiba, Tokyo University of Science, Japan

**10:00 am • Torque Density and Efficiency Improvements of a Switched Reluctance Motor for Hybrid Vehicles without Rare Earth Material**

Yuichi Takano, Motoki Takeno, Takashi Imakawa, Akira Chiba and Nobukazu Hoshi, Tokyo University of Science, Japan

**10:25 am • Position Estimation at Starting and Lower Speeds in Three-phase Switched Reluctance Machines Using Pulse Injection and Two Thresholds**

Gregory Pasquesoone and Iqbal Husain, University of Akron, United States

**10:50 am • A New Excitation Scheme for Polyphase Segmented Switched Reluctance Motor**

Vandana Rallabandi, Saikrishna K. and B.G. Fernandes, IIT Bombay, India

**11:15 am • Design and Optimization of a Synchronous Reluctance Machine with Salient Poles and Flux Barriers**

Remy Constancias, Ignace Rasoanarivo, Nouredine Takorabet and Francois-Michel Sargos, GREEN - INPL, France

**S68 Enabling Technologies: Package Impedance Issues**

Room 205

Chair: Braham Ferreira, Delft University of Technology, Netherlands and Douglas Hopkins, University of Buffalo, United States

**10:00 am • Automatic Layout Optimization of an EMC Filter**

Thomas de Oliveira, Jean-Michel Guichon and Jean-Luc Schanen, G2ELab, France

**10:25 am • Reduction of Stray Inductance in Power Electronic Modules Using Basic Switching Cells**

Shengnan Li, Leon Tolbert, Fred Wang and Fangzheng Peng, The University of Tennessee, Knoxville, United States; Michigan State University, United States

**10:50 am • Power-CAD: A Novel Methodology for Design, Analysis and Optimization of Power Electronic Module Layouts**

Naveed Hingora, Xiangyu Liu, Brice McPherson, Yongfeng Feng and Alan Mantoath, University of Arkansas, United States; Arkansas Power Electronics International, Inc., United States

**11:15 am • Separation Measurement of Parasitic Impedance on a Power Electronics Circuit Board Using TDR**

Satoshi Hashino and Toshihisa Shimizu, Tokyo Metropolitan University, Japan

**S69 DC-DC Converters: Integrated Power Converters**

Room 206

Chairs: Matthew Wilkowski, Epirion, United States and Cian O'Mathuna, Tyndall, Ireland

**10:00 am • A Multi-modes Charge-pump Based High Efficiency Wide Input Range DC-DC Converter**

Rong Guo, Zhigang Liang and Alex Huang, North Carolina State University, United States

**10:25 am • A Monolithic Reconfigurable SC Power Converter with Adaptive Gain Control and On-chip Capacitor Sizing**

Ling Su and Dongsheng Ma, University of Arizona, United States

**10:50 am • Switching Losses Analysis in MHz Integrated Synchronous Buck Converter to Support Optimal Power Stage Width Segmentation in CMOS Technology**

Xiaopeng Wang, Jinseok Park, Edward Robert Brunt Van and Alex. Q. Huang, North Carolina State University, United States; On Semiconductor Corp., United States

**11:15 am • Interleaved Switched-capacitor Converters with Adaptive Control**

*Slew Chong Tan, Kiratipongvoot Sitthisak, Svetlana Bronshtein, Adrian Ioinovici and Yuk Ming Lai, Hong Kong Polytechnic University, Hong Kong; Sami Shamoon College of Engineering, Israel; Holon Institute of Technology, Israel*

**S70 Electric Machines: Condition Monitoring and Fault Analysis II**

*Room 207*

*Chairs: Lee Sang Bin, Korea University, Republic of Korea and Marcello Pucci, ISSIA-CNR, Italy*

**10:00 am • Investigation of Influence of Bearing Load and Bearing Temperature on EDM Bearing Currents**

*Oliver Magdun, Andreas Binder and Yves Gemeinder, Darmstadt University of Technology, Germany*

**10:25 am • Influence of Motor Operating Parameters on Discharge Bearing Current Activity**

*Annette Muetze, Jussi Tamminen and Jero Ahola, Graz University of Technology, Austria; Lappeenranta University of Technology, Finland*

**10:50 am • New Concepts for Online Surge Testing for the Detection of Winding Insulation Deterioration**

*Stefan Grubic, Thomas Habetler and Jose Restrepo, Georgia Institute of Technology, United States; Universidad Simon Bolivar, Venezuela*

**11:15 am • Forces and Vibrations Analysis in Industrial PM Motors Having Concentric Windings**

*Alain Cassat, Christophe Espanet, Ralph Coleman, Emmanuel Leleu, Luc Burdet, Dimitri Torregrossa, Jeremy M'Boua and Abdellatif Miraoui, EPFL-STI-IMT-LAI, Switzerland; University of Franche-Comte, France; ETEL SA, Switzerland; CONVERTTEAM SAS, France; UTBM, France*

**S71 Sustainable Energy Applications: Wind Energy Systems II**

*Grand Ballroom C*

*Chairs: Pat Wheeler, University of Nottingham, United Kingdom and Robert Chin, ABB, Sweden*

**10:00 am • Improvement of Power Quality for PMSG Wind Turbine Systems**

*Thanh Hai Nguyen, Dong-Choon Lee, Seung-Ho Song and Eel-Hwan Kim, Yeungnam University, Republic of Korea; Kwangwoon University, Republic of Korea; Jeju National University, Republic of Korea*

**10:25 am • Fault Ride Through of DFIG Wind Turbines During Symmetrical Voltage Dip with Crowbar or Stator Current Feedback Solution**

*Christian Wessels and Friedrich W. Fuchs, University of Kiel, Germany*

**10:50 am • Converter Structure-based Power Loss and Static Thermal Modeling of the Press-pack IGBT-based Three-level ANPC and HB VSCs Applied to Multi-MW Wind Turbines**

*Osman S. Senturk, Lars Helle, Stig Munk-Nielsen, Pedro Rodriguez and Remus Teodorescu, Aalborg University, Denmark; Vestas Wind Systems, Denmark; Universitat Politecnica De Catalunya, Spain*

**11:15 am • Induction Generator Model for Unbalanced Distribution Power-flow Analysis**

*Karar Mahmoud, Mamdouh Abdel-Akher and Orabi Mohamed, Faculty of Engineering, South Valley University, Egypt*

**S72 DC-AC Inverters: Special Topics II**

*Grand Ballroom D*

*Chairs: Antonio Ginart, Impact Technologies, United States and Madhav Manjrekar, Siemens, United States*

**10:00 am • An Improved Soft-switching Inverter with an Unidirectional Auxiliary Switch**

*Se-Jin Sohn, Kui-Jun Lee, Rae-Young Kim and Dong-Seok Hyun, Hanyang University, Republic of Korea*

**10:25 am • Control and Implementation of a High Voltage Series Resonant Power Supply for Industrial Electrostatic Precipitators**

*Carastro Fabio, Clare Jon, Goodman Andrew, Wheeler Patrick and Leach John, University of Nottingham, United Kingdom; Castlet Ltd, United Kingdom*

**10:50 am • High-efficiency Inverter for Photovoltaic Applications**

*David Perreault, Brandon Pierquet, Aleksey Trubitsyn, Alexander Hayman, Garet Gamache and Charles Sullivan, Massachusetts Institute of Technology, United States; Dartmouth College, United States*

**11:15 am • A Single-phase Photovoltaic Inverter Topology with a Series-connected Power Buffer**

*Brandon Pierquet and David Perreault, Massachusetts Institute of Technology, United States*

**S73 Electric Drives: Control Techniques**

*Grand Ballroom A*

*Chairs: Fabio Giulii Capponi, Sapienza University of Rome, Italy and Marcello Pucci, ISSIA-CNR, Italy*

**10:00 am • An Adaptive Predictive Current Control Technique for Permanent Magnet Synchronous Motors**

*Yilmaz Sozer, David Torrey and Erkan Mese, The University of Akron, United States; Advanced Energy Conversion, United States; Yildiz Technical University, Turkey*

**10:25 am • Comparative Study of Conventional PI-control, PI-based State Space Control and Model Based Predictive Control for Drive Systems with Elastic Coupling**

*Soenke Thomsen, Nils Hoffmann and Friedrich W. Fuchs, Christian-Albrechts-University of Kiel, Germany*

**10:50 am • A Comparison of Control and Modulation Schemes for Medium-voltage Drives: Emerging Predictive Control Concepts Versus Field Oriented Control**

*Tobias Geyer, The University of Auckland, New Zealand*

**11:15 am • Control Method for IPMSM-based on PTC and PWM Hold Model in Overmodulation Range-study on Robustness and Comparison with Anti-windup Control**

*Takayuki Miyajima, Hiroshi Fujimoto and Masami Fujitsuna, Yokohama National University, Japan; The University of Tokyo, Japan; Denso Corporation, Japan*

**S74 Sustainable Energy Applications: Microgrid II**

*Grand Ballroom B*

*Chair: Yu (Peter) Liu, Eaton Corporation, United States*

**10:00 am • Distribution Voltage Control for DC Microgrid by Converters of Energy Storages Considering the Stored Energy**

*Hiroaki Kakigano, Atsuo Nishino, Yushi Miura and Toshifumi Ise, Osaka University, Japan*

**10:25 am • Analysis and Design of Interfacing Inverter Output Virtual Impedance in a Low Voltage Microgrid**

*Jinwei He and Yunwei Li, University of Alberta, Canada*

**10:50 am • A Medium-voltage DC (MVDC) System with Series Active Injection for Shipboard Power System Applications**

*Hesam Mirzaee, Sumit Dutta and Subhashish Bhattacharya, Department of ECE, North Carolina State University, United States*

**11:15 am • An Adaptive Controller for Inverter-interfaced DGs Connected to Grids with a Wide Range of Unknown Impedances**

*Xiaolin Mao and Raja Ayyanar, Arizona State University, United States*

WEDNESDAY, SEPTEMBER 15

1:30 pm – 3:10 pm

**S75 DC-AC Inverters: Z-Source Topology I**

*Room 201*

Chair: Fang Peng, Michigan State University, United States

**1:30 pm • Optimal Design of the Inductor in Z-source Inverter with Single Phase Shoot-through SVPWM Strategy**

*Jiudong Ding, Shaojun Xie and Yu Tang, Nanjing University of Aeronautics and Astronautics, China*

**1:55 pm • Power Loss Analysis of Current-fed Quasi-Z-source Inverter**

*Qin Lei, Fangzheng Peng, Liangzong He and Shuitao Yang, Student, United States; Professor, United States; Student, China*

**2:20 pm • Hybrid Pulse Width Modulation for Z-source Inverters**

*Euzeli Cipriano dos Santos Jr, Eugenio P.X. Pimentel Filho, Alexandre Cunha Oliveira and Edison R. Cabral Silva, Federal University of Campina Grande, Brazil*

**2:45 pm • A Z-source Sparse Matrix Converter Under Voltage Sag Condition**

*Park Kiwoo and Lee Kyo-Beum, Ajou University, Republic of Korea*

**S76 AC-DC Converters: PFC Converters**

*Room 202*

Chair: Mohammed Agamy, GE, United States

**1:30 pm • Bridgeless Single-stage Full-bridge Converter with One Cycle Control in the Output Voltage**

*Hugo Ribeiro, Fernando Silva, Sonia Pinto and Beatriz Borges, Instituto de Telecomunicacoes, Portugal; Instituto Superior Tecnico, Portugal; Instituto Superior Tecnico, IT, Portugal*

**1:55 pm • A Magnetically Coupled Passive Lossless Snubber with Low Voltage Stress for Continuous Current Mode (CCM) Boost Converter**

*Kyu-Min Cho, Ki-Bum Park, Young-Do Kim and Gun-Woo Moon, KAIST, Republic of Korea*

**2:20 pm • An AC-DC Power Conversion Based on Series-connected Universal Link Converter**

*Anno Yoo, MyoungHo Kim and Seung-Ki Sul, Seoul National University, Republic of Korea*

**2:45 pm • Three-phase Single-switch Boost PFC Converter with High Input Power Factor**

*Kai Yao, Xinbo Ruan, Chi Zou and Zhihong Ye, Nanjing University of Aeronautics and Astronautics, China; Huazhong University of Science and Technology, China; Lite-on Technology Corp., China*

**S77 Sustainable Energy Applications: Photovoltaics Converters II**

*Room 203*

Chair: Grahame Holmes, RMIT University, Australia

**1:30 pm • Digital Controller Development for Grid-tied Photovoltaic Inverter with Model-based Technique**

*Zhigang Liang, Larry Alesi, Xiaohu Zhou, Jun Li and Alex Huang, North Carolina State University, United States; MegaWatt Solar, Inc., United States*

**1:55 pm • A New Wide Input Range High Efficiency Photovoltaic Inverter**

*Zhigang Liang, Rong Guo, Gangyao Wang and Alex Huang, North Carolina State University, United States*

**2:20 pm • Design and Implementation of a 5 kW Photovoltaic System with Li-ion Battery and Additional DC-DC Converter**

*Michael Bragard, Nils Soltan, Armin Schmiegel and Rik De Doncker, RWTH Aachen University, Germany; Voltwerk Electronics GmbH, Germany*

**2:45 pm • Transformerless Split-inductor Neutral Point Clamped Three-level PV Grid-connected Inverter**

*Huafeng Xiao, Shaojun Xie and Chen Yang, Nanjing University of Aeronautics and Astronautics, China*

**S78 Electric Machines: Special Machines I**

*Room 204*

Chairs: Benedikt Schmuelling, RWTH Aachen University, Germany and Elena Lomonova, Eindhoven University of Technology, Netherlands

**1:30 pm • Different Arrangements for Dual-rotor Dual-output Radial-flux Motors**

*Yu-Han Yeh, Min-Fu Hsieh and David Dorrell, National Cheng Kung University, Taiwan; University of Technology Sydney, Australia*

**1:55 pm • New Concept Motor that Uses Compound Magnet Motive Forces for EV Application**

*Tomoaki Shigeta, Kan Akatsu and Takashi Kato, Shibaura Institute of Technology, Japan; Nissan Motor Co., Ltd., Japan*

**2:20 pm • Improvement of a Non-contact Elevator Guiding System by Implementation of an Additional Torsion Controller**

*Benedikt Schmuelling, Peter Laumen and Kay Hameyer, Institute of El. Machines, RWTH Aachen University, Germany*

**2:45 pm • Analysis of a Concentric Planetary Magnetic Gear with Strengthened Stator and Interior Permanent Magnet (IPM) Inner Rotor**

*Nicolas Frank and Hamid Toliyat, Texas A&M University, United States*

**S79 Enabling Technologies: Thermal Management**

*Room 205*

Chairs: Zhenxian Liang, Oak Ridge National Laboratory, United States and Adam Skorek, University of Quebec, Canada

**1:30 pm • Seawater Based Cold Plate for Power Electronics Cooling**

*Juan Marcelo Gutierrez Alcaraz, S.W.H. de Haan and J.A. Ferreira, Delft University of Technology, Netherlands*



**1:55 pm • Dynamic Electro-thermal Modeling in PEBB Applications**

Huan huan Wang, Ashwin M. Khambadkone and Xiaoxiao Yu, NUS, Singapore

**2:20 pm • High Power Density Design of High-current DC-DC Converter with High Transient Power**

Yi Wang, Sjoerd W.H. de Haan and J.A. Ferreira, Delft University of Technology, Netherlands

**2:45 pm • Thermal Modeling and Management of the Integrated HID Ballast**

Yan Jiang, Shuo Wang and Fred Lee, General Electric, United States; Virginia Tech, United States

**S80 DC-DC Converters: Non-Isolated Converters**

Room 206

Chairs: Annabelle Pratt, Intel, United States and Yali Xiong, Volterra, United States

**1:30 pm • A Comprehensive Multi-mode Performance Analysis of Interleaved Boost Converters**

Biswajit Ray, Hiroyuki Kosai, Seana McNeal, Brett Jordan and James Scofield, Bloomsburg University of Pennsylvania, United States; UES, Inc., United States; Air Force Research Laboratory, United States

**1:55 pm • Current Sharing in Multiphase ZVT Boost Converter**

Esther de Jodar, Jose Villarejo, Jacinto Jimenez and Miguel Moreno, Universidad Politecnica de Cartagena, Spain; Universidad de Murcia, Spain

**2:20 pm • Fixed Frequency Controlled Piezoelectric 10W DC-DC Converter**

Yuan-Ping Liu, Dejan Vasic, Francois Costa and Wen-Jong Wu, SATIE, Cachan, France; NTU, Taiwan

**2:45 pm • Improving the Light-load Efficiency of VRMs using Parallel Inductors**

Christina Collins and Maeve Duffy, National University of Ireland, Galway, Ireland

**S81 Transportation Applications: Diagnostics and Fault Tolerance**

Room 207

Chairs: Chingchi Chen, Ford, United States and Suresh Gopalakrishnan, General Motor, United States

**1:30 pm • Real-time Fault Diagnostics for a Permanent Magnet Synchronous Motor Drive for Aerospace Applications**

Milijana Odavic, Mark Sumner, Pat Wheeler and Jing Li, The University of Nottingham, United Kingdom

**1:55 pm • Fault Location in a Zonal DC Marine Power System Using Active Impedance Estimation**

Mark Sumner, Edward Christopher, David Thomas, Xiaohui Wang and de Wildt Frans, University of Nottingham, United Kingdom; Ministry of Defence, United Kingdom

**2:20 pm • Robust Absolute Position Sensing for Maglev**

Raymond Sepe, Steven Bastien, Anton Steyerl and Bogdan Borowy, Electro Standards Laboratories, United States; General Atomics, United States

**2:45 pm • Characteristic Analysis of IPM Type BLDC Motor Considering the Demagnetization of PM by Stator Turn Fault**

Hyung-Kyu Kim, Jin Hur, Gyu-Hong Kang and Byeong-Woo Kim, School of Electrical Engineering University of Ulsan, Republic of Korea; Korea Marine Equipment Research Institute, Republic of Korea

**S82 Sustainable Energy Applications: Wind Energy Systems III**

Grand Ballroom C

Chair: Ahmed Zobaa, University of Exeter, United Kingdom

**1:30 pm • Balance and Unbalance Voltage Dips Impacts on Full Scale Converter Wind Turbines**

Ivan Gabe and Humberto Pinheiro, Universidade Federal de Santa Maria, Brazil

**1:55 pm • Analysis of IGBT Power Cycling Capabilities Used in Doubly Fed Induction Generator Wind Power System**

Lixiang Wei, Haihui Lu, Zhenhuan Yuan, Russ J. Kerkman and Richard A. Lukaszewski, Rockwell Automation - Allen Bradley, United States; Rockwell Automation and Advantce Technology, China

**2:20 pm • Novel Rotor Side Control Scheme for Doubly Fed Induction Generator to Ride through Grid Faults**

Zhendong Zhang, Longya Xu, Yuan Zhang and Bo Guan, The Ohio State University, United States

**2:45 pm • Flexible Control of DC-link Voltage for Doubly-fed Induction Generator During Grid Voltage Swell**

Changjin Liu, Xiaobo Huang, Min Chen and Dehong Xu, Zhejiang University, China

**S83 DC-DC Converters: Control Techniques I**

Grand Ballroom D

Chair: Dong Tan, NGAS, United States

**1:30 pm • Self-tuning Mixed-signal Optimal Controller with Improved Load Transient Waveform Detection and Smooth Mode Transition for DC-DC Converters**

Aleksandar Radic, Aleksandar Prodic and Robert de Nie, University of Toronto, Canada; NXP Semiconductors, Netherlands

**1:55 pm • Comparison between Ramp Pulse Modulation (RPM) and Constant Frequency Modulation for the Beat Frequency Oscillation in Voltage Regulators**

Kisun Lee and Han Zou, ON Semiconductor, United States

**2:20 pm • Investigation of the Steady-state and Dynamic Characteristics of a Buck Converter with Nonlinear Output Capacitor Current Programming**

Victor Cheung, Henry Chung and Alan Lo, City University of Hong Kong, Hong Kong; Chu Hai College of Higher Education, Hong Kong

**2:45 pm • Design Oriented Model for V2 Constant On-time Control**

Feng Yu and Fred C. Lee, CPES-Virginia Tech, United States

**S84 Electric Drives: Sensorless Drives I**

Grand Ballroom A

Chair: Francesco Cupertino, Politecnico di Bari, Italy

**1:30 pm • Temperature Issues in Saliency-tracking Based Sensorless Methods for PM Synchronous Machines**

David Reigosa, Fernando Briz, Michael Degner, Juan Manuel Guerrero and Pablo Garcia, University of Oviedo, Spain; Ford Motor Company, United States

**1:55 pm • HF Injection-based Sensorless Technique for Fault-tolerant IPMSM Drives**

Alfio Consoli, Alberto Gaeta, Giuseppe Scarcella, Giacomo Scelba and Antonio Testa, DIEES - University of Catania, Italy; DCIIM - University of Messina, Italy



**2:20 pm • Model-based Design of a Sensorless Control Scheme for Permanent Magnet Motors Using Signal Injection**

*Francesco Cupertino, Gianmario Pellegrino, Paolo Giangrande and Luigi Salvatore, Politecnico di Bari, Italy; Politecnico di Torino, Italy*

**2:45 pm • Sensorless Control for Induction Machines Using Square-wave Voltage Injection**

*Young-Doo Yoon and Seung-Ki Sul, Seoul National University, Republic of Korea*

**S85 Sustainable Energy Applications: Microgrid III**

*Grand Ballroom B*

*Chair: Prasad N. Enjeti, Texas A&M University, United States*

**1:30 pm • DC Micro-grid Operational Analysis with Detailed Simulation Model for Distributed Generations**

*Ji-Heon Lee, Byung-Moon Han and Num-Sub Choi, Myongji University, Republic of Korea; Chonnam University, Republic of Korea*

**1:55 pm • A Hybrid Control Architecture for Low Voltage Microgrid**

*Xiaoxiao Yu, Ashwin M Khambadkone, Huan Huan Wang and Tuck Sing Siew, ECE, National University of Singapore, Singapore*

**2:20 pm • Voltage Quality Improvement of Microgrids Under Islanding Mode**

*Gustavo Azevedo, Pedro Rodriguez, Joan Rocabert, Marcelo Cavalcanti and Francisco Neves, Federal University of Pernambuco, Brazil; Technical University of Catalonia, Spain*

**2:45 pm • Decentralized LQG Control with Online Set-point Adaptation for Parallel Power Converter Systems**

*Junqi Liu, Dragan Obradovic and Antonello Monti, E.ON Energy Research Center, RWTH Aachen, Germany; Corporate Technology, Siemens AG, Germany*

**WEDNESDAY, SEPTEMBER 15**

**3:30 pm – 5:10 pm**

**S86 DC-AC Inverters: Z-Source Topology II**

*Room 201*

*Chairs: Ahmet Hava, Middle East Technical University, Turkey and Jin Wang, Ohio State University, United States*

**3:30 pm • Bidirectional AC-AC Z-source Inverter with Active Rectifier and Feedforward Control**

*Moritz von Zimmermann, Sebastian Labusch and Bernhard Piepenbreier, University of Erlangen-Nuremberg, Germany*

**3:55 pm • Controller Design for Quasi-Z-source Inverter in Photovoltaic Systems**

*Yuan Li, Fang Zheng Peng, Jorge G. Cintron-Rivera and Shuai Jiang, Sichuan University, China; Michigan State University, United States*

**4:20 pm • Modulation of Three-level Z-source Indirect Matrix Converter**

*Xiong Liu, Poh Chiang Loh, Fang Zheng Peng, Peng Wang and Feng Gao, Nanyang Technological University, Singapore; Michigan State University, United States; Shandong University, China*

**4:45 pm • A Matrix Converter Utility Interface for Grid Resources with a High-frequency Bus**

*Joseph Carr, Juan Balda and Alan Mantoath, University of Arkansas, United States*

**S87 AC-DC Converters: Single Phase PFC**

*Room 202*

*Chairs: Toshihisa Shimizu, Tokyo Metropolitan University, Japan and Sam Ben-Yaakov, Ben-Gurion University, Israel*

**3:30 pm • Inductive Idling Boost Converter with Low Inductor Current-ripple and Improved Dynamic Response for Power Factor Correction**

*Fei Zhang, Jianping Xu, Haikun Yu and Guohua Zhou, Southwest Jiaotong University, China*

**3:55 pm • A Front-end Converter with High Reliability and High Efficiency**

*Kazuaki Mino, Hiroyuki Matsumoto, Yuji Nemoto, Satoru Fujita and Daisuke Kawasaki, Fuji Electric Holdings Co., Ltd., Japan*

**4:20 pm • High-efficiency Bidirectional AC-DC Converter for Energy Storage Systems**

*Hao Qian, Jih-Sheng Lai, Jianhui Zhang and Wensong Yu, Future Energy Electronics Center, Virginia Tech, United States; National Semiconductor Corporation, United States*

**4:45 pm • A New Bridgeless Single-stage Three-level PFC AC-DC Converter**

*Woo-Young Choi, Chonbuk National University, Republic of Korea*

**S88 Sustainable Energy Applications: Photovoltaics Converters III**

*Room 203*

*Chair: Hussam Alatrash, Petra Solar, United States*

**3:30 pm • Power Decoupling Techniques for Micro-inverters in PV Systems**

*Haibing Hu, Harb Souhib, Nasser Kutkut, Issa Batarseh and John Shen, University of Central Florida, United States*

**3:55 pm • PV Fed Boost Type Switched Capacitor Power Supply for a Nano Satellite**

*Pradeep Peter and Vivek Agarwal, Indian Space Research Organisation, India; Indian Institute of Technology Bombay, India*

**4:20 pm • Ground Current Suppression for Grid Connected Transformerless PV Inverter with Unbalanced Output Filter Inductors**

*Na Su, Dehong Xu and Junbing Tao, Institute of Power Electronics, Zhejiang University, China*

**4:45 pm • Multiple-input Modified Inverse Watkins-Johnson Converter without Coupled Inductors**

*Seung Choung and Alexis Kwasinski, UT at Austin, Department of ECE, United States*

**S89 Electric Machines: Special Machines II**

*Room 204*

*Chairs: Benedikt Schmuelling, RWTH Aachen University, Germany and Elena Lomonova, Eindhoven University of Technology, Netherlands*

**3:30 pm • Modelling of Linear Motor End-effects for Saliency-based Sensorless Control**

*Paolo Giangrande, Francesco Cupertino and Gianmario Pellegrino, Politecnico di Bari, Italy; Politecnico di Torino, Italy*

**3:55 pm • A Multi-motor Drive-based on Five-phase Tubular PM Actuators**

*Luca Zarrì, Giovanni Serra, Angelo Tani, Domenico Casadei, Fiorenzo Filippetti and Michele Mengoni, University of Bologna, Italy*

**4:20 pm • Design and Electromagnetic Analysis of a Prototype HTS Linear Induction Motor**

*Jia Zhao, Wei Zhang, Jin Fang, Zhongping Yang and Trillion Q Zheng, Beijing Jiaotong University, China*

**4:45 pm • Fast Optimization of a Linear Actuator by Space Mapping Using Unique Finite Element Model**

*Stephane Vivier, Didier Lemoine and Guy Friedrich, University of Technology of Compiègne, France*

**S90 Enabling Technologies: Wide Bandgap Power Semiconductors**

*Room 205*

*Chair: Enrico Santi, The University of South Carolina, College of Engineering and Computing, United States*

**3:30 pm • Comparison of 10-kV SiC Power Devices in Solid-state Transformer**

*Jun Wang, Gangyao Wang, Subhashish Bhattacharya and Alex Huang, North Carolina State University, United States*

**3:55 pm • An Investigation of SiC-SiC DC Circuit Breakers for Higher Voltage Direct Current Distribution Systems**

*Yukihiko Sato, Syunsuke Tobayashi, Yasunori Tanaka, Akiyoshi Fukui and Mikio Yamasaki, Chiba University, Japan; AIST, Japan; NTT Facilities, Inc., Japan*

**4:20 pm • A High-efficiency, High-frequency Boost Converter Using Enhancement Mode GaN DHFETs on Silicon**

*Jordi Everts, Jo Das, Jeroen Van den Keybus, Jan Genoe, Marianne Germain and Johan Driesen, KULeuven, Belgium; Imec, Belgium; Triphase, Belgium; Imec/KHLim, Belgium; Imec/EpiGaN, Belgium*

**4:45 pm • Performance of a Dual, 1200 V, 400 A, Silicon-carbide Power MOSFET Module**

*Damian Urciuoli, Ronald Green, Aivars Lelis and Dimeji Ibitayo, U.S. Army Research Laboratory, United States*

**S91 DC-DC Converters: Resonant Converters**

*Room 206*

*Chair: Yanfei Liu, Queen's University, Canada*

**3:30 pm • Multiple Output Class E Isolated DC-DC Converter**

*Zoran Pavlovic, Jesus Angel Oliver, Pedro Alou and Jose Antonio Cobos, Universidad Politecnica de Madrid, Spain*

**3:55 pm • PWM Positive Buck-boost Converter with Reduced Switching Loss Employing Quasi-resonant Operation**

*Han-Shin Youn, Ki-Bum Park, Hyun-Wook Seong, Gun-Woo Moon and Myung-Joong Youn, KAIST, Republic of Korea*

**4:20 pm • Analysis of Asymmetrical Duty Controlled LCC Converter with Voltage Triple Rectifier for High Voltage Power Supply**

*Keun-Wook Lee, Ki-Bum Park, Young-Do Kim and Gun-Woo Moon, KAIST, Republic of Korea*

**4:45 pm • Analysis and Design of a Resonant LCC Converter for Low-profile Applications**

*Alexander Pawellek, Markus Schmid, Alexander Bucher and Thomas Duerbaum, University of Erlangen-Nuremberg, Germany*

**S92 Transportation Applications: Drivetrains**

*Room 207*

*Chairs: Hossein Dadkhah, Chrysler LLC, United States and Yu (Peter) Liu, Eaton Corporation, United States*

**3:30 pm • Application of PM Type DMPM in Hybrid Electric Vehicle**

*Xuhui Wen, Feng Zhao, Xinhua Guo, Tao Fan, Longya Xu and Qiongxuan Ge, Institute of Electrical Engineering of CAS, China; Department of Electrical and Computer Engineering, OSU, United States*

**3:55 pm • Comparative Evaluation of Machines for Electric and Hybrid Vehicles Based on Dynamic Operation and Loss Minimization**

*Ali Bazzi and Philip Krein, University of Illinois at Urbana-Champaign, United States*

**4:20 pm • Comparison of Different Motor Design Drives for Hybrid Electric Vehicles**

*David Dorrell, Mircea Popescu, Andrew Knight, Lyndon Evans and David Staton, University of Technology Sydney, Australia; Motor Design Ltd, United Kingdom; University of Alberta, Canada*

**4:45 pm • Comparison of Si and SiC Inverters for IPM Traction Drive**

*Madhu Sudhan Chinthavali, Pedro J. Otaduy and Burak Ozpineci, Oak Ridge National Laboratory, United States*

**S93 Sustainable Energy Applications: Wind Energy Systems IV**

*Grand Ballroom C*

*Chairs: Po-Tai Cheng, National Tsinghua University, Taiwan and Joseph Ojo, Tennessee Tech University, United States*

**3:30 pm • Advanced Power Conditioning System for Grid Integration of Direct-driven PMSG Wind Turbines**

*Marcelo G. Molina, Euzeli C. dos Santos Jr. and Mario Pacas, Universidad Nacional de San Juan, Argentina; Universidade Federal de Campina Grande, Brazil; Universitaet Siegen, Germany*

**3:55 pm • Development of Grid-connected Wind Energy System Employing Interior PM Synchronous Generator and Multi-pulse Rectifier**

*Katsumi Nishida, Tarek Ahmed and Mutsuo Nakaoka, Ube National College of Technology, Japan; Assuit University, Egypt; Kyungnam University, Japan*

**4:20 pm • Comparison of SMES and SFCL for Transient Stability Enhancement of Wind Generator System**

*Mohd. Hasan Ali and Roger A. Dougal, University of South Carolina, United States*

**4:45 pm • A Low Voltage Ride-through Technique for Grid-connected Converters of Distributed Energy Resources**

*Che-Wei Hsu, Chia-Tse Lee and Po-Tai Cheng, National Tsing Hua University, Taiwan*

**S94 DC-DC Converters: Control Techniques II**

*Grand Ballroom D*

*Chair: Gerry Moschopoulos, University of Western Ontario, Canada*

**3:30 pm • Fast Control Technique-based on Peak Current Mode Control of the Output Capacitor Current**

*Miriam del Viejo, Pedro Alou, Jesus A. Oliver, Oscar Garcia and Jose A. Cobos, Universidad Politecnica de Madrid, Spain*

**3:55 pm • A Low Ripple Series-parallel Resonant Converter Based on Robust H-infinity Control Approach**

Majid Pahlevaninezhad, Navid Shafiei, Suzan Eren, Alireza Bakhshai and Praveen Jain, Queen's University, Canada; Esfahan University of Technology, Iran

**4:20 pm • Active Stabilization of DC-DC Converters with Input LC Filters Via Current-mode Control and Input Voltage Feedback**

Ryan Weichel, Guanghui Wang, Jeffrey Mayer and Heath Hofmann, Applied Research Laboratory, Penn State University, United States; Aura Systems, United States; The University of Michigan, United States

**4:45 pm • An Active Current Reconstruction and Balancing Strategy with DC Link Current Sensing for a Multi-phase Coupled-inductor Converter**

Young-Hoon Cho, Ahmed Koran, Hidekazu Miwa, Ben York and Jih-Sheng Lai, Virginia Tech, United States

**S95 Electric Drives: Sensorless Drives II**

Grand Ballroom A

Chair: Yu (Peter) Liu, Eaton Corporation, United States

**3:30 pm • Impact of Saturation and Current Command Selection on the Performance of Sensorless Controlled Three-pole Active Magnetic Bearings**

Pablo Garcia, Juan M. Guerrero, Islam El-Sayed, Fernando Briz and David Reigosa, University of Oviedo, Spain

**3:55 pm • Optimal Design and Sensorless Position Control of a Piezoelectric Motor Integrated into a Mechatronic Cylinder Lock**

Markus Flueckiger, William Zogg and Yves Perriard, EPFL-STI-IMT-LAI, Switzerland; Kaba AG, Switzerland

**4:20 pm • Modeling and Compensation of Inverter Nonlinearity Effects in Carrier Signal Injection-based Sensorless Control Methods from Positive Sequence Carrier Current Distortion**

L.M. Gong and Z.Q. Zhu, University of Sheffield, United Kingdom

**4:45 pm • Spectral Overlap of Saliency Signal Components in Injection Based Sensorless Controlled Induction Machines**

Thomas Wolbank and Mohamed Metwally, Vienna University of Technology, Austria; Menoufia University, Egypt

**S96 Sustainable Energy Applications: Microgrid IV**

Grand Ballroom B

Chairs: Sandeep Bala, ABB, United States and Ahmed Zobaa, University of Exeter, United Kingdom

**3:30 pm • On the Choice of Voltage Regulators for Droop-controlled Voltage Source Converters in Microgrids to Ensure Stability**

Sandeep Bala and Giri Venkataramanan, ABB Corporate Research, United States; University of Wisconsin-Madison, United States

**3:55 pm • Design of D-STATCOM for Voltage Regulation in Microgrids**

Tzung-Lin Lee, Shang-Hung Hu and Yu-Hung Chan, National Sun Yat-sen University, Taiwan

**4:20 pm • Fast Architecture Generation and Evaluation Techniques for the Design of Large Power Systems**

Leonardo Laguna, Roberto Prieto, Jesus Angel Oliver, Jose Antonio Cobos and Horacio Visairo-Cruz, Universidad Politecnica de Madrid, Spain; Intel Corporation, Mexico

**4:45 pm • A Hybrid Synchronous/Fixed Reference Frame PLL for Phase Synchronization with Unbalanced Three-phase Grid Conditions**

A.W. Krieger and J. Salmon, University of Alberta, Canada

THURSDAY, SEPTEMBER 16

8:00 am – 9:40 am

**S97 Electric Machines: Permanent Magnet Machines I**

Room 201

Chairs: Dan Ionel, Vestas, United States and Hamid Toliyat, Texas A&M University, United States

**8:00 am • Influence of Slot Opening on Optimal Stator and Rotor Pole Combination and Electromagnetic Performance of Flux-switching PM Brushless AC Machines**

J.T. Chen, Z.Q. Zhu, S. Iwasaki and R. Deodhar, University of Sheffield, United Kingdom; IMRA UK Research Centre, United Kingdom

**8:25 am • Impact of the Rotor Yoke Geometry on Rotor Losses in Permanent Magnet Machines**

Luigi Alberti, Emanuele Fornasiero and Nicola Bianchi, University of Padova, Italy

**8:50 am • Surface Permanent Magnet Synchronous Machine Design for Self-sensing Position Estimation at Zero and Low Speeds**

Shih-Chin Yang, Takahiro Suzuki, Robert Lorenz and Thomas Jahns, University of Wisconsin-Madison, United States; Hitachi Research Laboratory, Hitachi, Japan, Japan

**9:15 am • Study of Iron Saturation in Brushless Doubly-fed Induction Machines**

Ehsan Abdi, Paul Malliband and Richard McMahon, Cambridge University, United Kingdom

**S98 DC-DC Converters: Special Topics I**

Room 202

Chair: Matthew Wilkowsky, Enpirion, United States

**8:00 am • An Accurate Loss Model for Current-source Gate Driver with Interleaving BUCK Converter**

Zongxiang Chen, Lusheng Ge, Qi Hui and Yanfei Liu, Anhui University of Technology, China

**8:25 am • An Integrated SIDO Boost Power Converter with Adaptive Freewheel Switching Technique**

Yi Zhang, Rajdeep Bondade, Dongsheng Ma and Siamak Abedinpour, The University of Arizona, United States; Integrated Device Technology, United States

**8:50 am • Novel Zero-current Switching Current-fed Half-bridge Isolated DC-DC Converter for Fuel Cell Based Applications**

Akshay K. Rathore and Sudip K. Mazumder, University of Illinois, Chicago, United States

**9:15 am • General Law of Non-isolated Interleaved High Step-up Topologies with Winding-cross-coupled Inductors Deduced from Isolation Counterparts**

Rui Xie, Wuhua Li, Yi Zhao, Jing Zhao, Xiangning He and Fengwen Cao, Zhejiang University, China; Suzhou Vocational University, China

**S99 Sustainable Energy Applications: Flexible Renewable/Alternative Energy System I**

Room 203

Chair: Yu (Peter) Liu, Eaton Corporation, United States

**8:00 am • A Novel Five-level Single-phase Grid-connected Converter for Renewable Distributed Systems**

Giampaolo Buticchi, Giovanni Franceschini and Emilio Lorenzani, University of Parma, Italy



**8:25 am • A High Frequency Link Multiport Converter Utility Interface for Renewable Energy Resources with Integrated Energy Storage**

Joseph Carr, Juan Balda and Alan Mantooh, University of Arkansas, United States

**8:50 am • Control of a Modular Multilevel Cascade BTB System Using Bidirectional Isolated DC-DC Converters**

Hirofumi Akagi and Ryohei Kitada, Tokyo Institute of Technology, Japan

**9:15 am • Seamless Transfer Strategy with Outer Current Loop for Three-phase Inverter in Distributed Generation**

Zeng Liu and Jinjun Liu, Xi'an Jiaotong University, China

**S100 Electric Machines: Turbine Generators**

Room 204

Chairs: Andy Knight, University of Alberta, Canada and Ernesto Ruppert Filho, FEEC/UNICAMP, Brazil

**8:00 am • Structural Mass Minimization of Large Direct-drive Wind Generators Using a Buoyant Rotor Structure**

Deok-Je Bang, Henk Polinder, Jan Abraham Ferreira and Seung-soo Hong, Delft University of Technology, Netherlands; GEM Co. LTD, Republic of Korea

**8:25 am • A Generic Synchronous Machine Model for Real Time Training Simulators**

Jorge Garcia-Garcia, Ivan Galindo-Garcia and Saul Rodriguez-Lozano, Electric Research Institute of Mexico, Mexico

**8:50 am • Advanced Signal Processing Techniques for Fault Detection and Diagnosis of a Wind Turbine Induction Generator Drive Train: A Comparative Study**

Elie AL-Ahmar, Vincent Choqueuse, Mohamed Benbouzid, Yassine Amirat, Joseph El-Assad, Rabih Karam and Farah Sarkis, University of Brest, France; Holy Spirit University of Kaslik, Lebanon

**9:15 am • The Magneto Motive Force of a Novel Dual Stator-winding Induction Generator**

Wenxin Huang, Yuwen Hu, Feifei Bu and Kai Shi, Nanjing University of Aeronautics and Astronautics, China

**S101 Transportation Applications: EV/PHEV Battery Chargers**

Room 205

Chair: Sewan Choi, Seoul National University of Technology, Korea

**8:00 am • A High-performance Single-phase AC-DC Power Factor Corrected Boost Converter for Plug-in Hybrid Electric Vehicle Battery Chargers**

Fariborz Musavi, Wilson Eberle and William G. Dunford, Delta-Q Technologies Corp., Canada; University of British Columbia, Canada

**8:25 am • The Issue of Plug-in Hybrid Electric Vehicles' Grid Integration and Its Control Solution**

Xiaohu Zhou, Jun Li, Zhigang Liang, Alex Huang and Subhashish Bhattacharya, FREEDM Systems Center, North Carolina State University, United States

**8:50 am • Control Scheme Optimization for a Low-cost, Digitally-controlled Charger for Plug-in Hybrid Electric Vehicles**

Lixin Tang and Gui-Jia Su, Oak Ridge National Lab., United States

**9:15 am • A High Power, Current Sensorless, Bidirectional, 16 Phase Interleaved, DC-DC Converter for Hybrid Vehicle Application**

Liqin Ni, Dean Patterson and Jerry Hudgins, University of Nebraska-Lincoln, United States

**S102 Sustainable Energy Applications: Smart Grid Interface**

Room 206

Chairs: Prasad N. Enjeti, Texas A&M University, United States and Po-Tai Cheng, National Tsinghua University, Taiwan

**8:00 am • Increasing Inter-area Available Transfer Capacity Using Controllable Network Transformers**

Debrup Das, Deepak Divan and Ronald Harley, Georgia Institute of Technology, United States

**8:25 am • Active Smart Wires: An Inverter-less Static Series Compensator**

Frank Kreikebaum, Munuswamy Imayavaramban and Deepak Divan, Georgia Institute of Technology, United States

**8:50 am • Islanding Detection in Smart Grids**

Adrian Timbus, Alexandre Oudalov and Carl N.M. Ho, ABB Switzerland Ltd. Corporate Research, Switzerland

**9:15 am • Real-time Dynamic Thermal Rating Evaluation of Overhead Power Lines Based on Online Adaptation of Echo State Networks**

Yi Yang, Ronald Harley, Deepak Divan and Thomas Habetler, Georgia Institute of Technology, United States

**S103 Electric Machines: Design Optimization**

Room 207

Chairs: Yoshiaki Kano, Nagoya Toyota National College of Technology, Japan and Yves Perriard, EPFL-LAI, Switzerland

**8:00 am • An Electromagnetic-thermo-mechanical Integrated Design and Optimization Method for Surface Mount Permanent Magnet Machines Considering Load Profiles**

Andrew Semidey, Yao Duan, James Mayor and Ronald Harley, Georgia Institute of Technology, United States

**8:25 am • Maximum Torque Control for Optimal Design to Reduce Cogging Torque in Spoke Type Interior Permanent Magnet Synchronous Motor**

Yul-kyu Son, Kyu-yun Hwang and Byung-il Kwon, Hanyang University, Republic of Korea

**8:50 am • FEA-based Multi-objective Optimization of IPM Motor Design Including Rotor Losses**

Gianmario Pellegrino and Francesco Cupertino, Politecnico di Torino, Italy; Politecnico di Bari, Italy

**9:15 am • Investigation of Torque and Iron Loss Characteristics of Optimized Spoke Type IPMSM Considering Motor Modeling and Motor Drive Circuit**

Kyu-yun Hwang and Byung-il Kwon, Hanyang University, Republic of Korea

**S104 DC-AC Inverters: Multi-Level Inverters I**

Grand Ballroom C

Chair: Leon Tolbert, University of Tennessee, United States

**8:00 am • An Investigation of Voltage Balancing Circuit for DC Capacitors in Diode-clamped Multilevel Inverters to Realize High Output Power Density Converters**

Takumi Ito, Masamu Kamaga, Yukihiko Sato and Hiromichi Ohashi, Chiba University, Japan; National Institute of AIST, Japan



**8:25 am • Regenerative Asymmetrical Multi-level Converter for Multi-megawatt Variable Speed Drives**

Joseph Song-Manguelle, Tobias Thurnherr, Stephan Schroeder, Alfred Rufer and Jean-Maurice Nyobe-Yome, GE Global Research, United States; ABB, Switzerland; GE Global Research, Germany; Swiss Federal Institute of Technology, Switzerland; University of Douala, ENSET, Cameroon

**8:50 am • Voltage Balancing Control and Experiments of a Novel Modular Multilevel Converter**

Kui Wang, Yongdong Li and Zedong Zheng, Tsinghua University, China

**9:15 am • A Modulation Technique for High Power AC-DC Multilevel Converters for Power System Integration**

Stefano Bifaretti, Pericle Zanchetta, Alan Watson, Luca Tarisciotti, Jon Clare and Armando Bellini, University of Rome Tor Vergata, Italy; University of Nottingham, United Kingdom

**S105 DC-DC Converters: Soft Switching Techniques I**

Grand Ballroom D

Chair: David Perreault, Massachusetts Institute of Technology, United States

**8:00 am • Soft-switching Self-driven Buck Converter with Three-switch Cell Structure**

Qiang Li, Fred C. Lee, Douglas Sterk and Ke Jin, CPES, United States

**8:25 am • A New Concept of High Input Voltage to Low Load Voltage (1500 V- 48 V) DC-DC Conversion with Hybrid ZVS-ZCS and Asymmetrical Voltage Distribution**

Huai Wang, Henry Chung and Adrian Ioinovici, City University of Hong Kong, Hong Kong; Holon Institute of Technology, Israel

**8:50 am • Novel DC-DC Architecture for High Efficiency SMPS with Multiple Outputs**

Zhanghe Nan, Ming Xu, Sun Julu, Han Wenchang and Yao Yuan, FSP-Powerland Technology Inc., China

**9:15 am • Zero-voltage-switching Interleaved Two-switch Forward Converter with Phase-shift Control**

Hyoung-Suk Kim, Hyun-Wook Seong, Ki-Bum Park, Han-Shin Youn, Gun-Woo Moon and Myung-Joong Youn, KAIST, Republic of Korea

**S106 Sustainable Energy Applications: Power Quality I**

Grand Ballroom A

Chairs: Kevin Lee, Eaton Corporation, United States and Ahmed Zobaa, University of Exeter, United Kingdom

**8:00 am • Malfunction Mechanism of Semiconductor Circuit Breaker in HVDC Power Supply System**

Seiya Abe, Kentaro Fukushima, Sihun Yang, Mariko Ogawa, Kosuke Nomura, Masahito Shoyama, Tamotsu Ninomiya, Akira Matsumoto, Akiyoshi Fukui and Mikio Yamasaki, ICSEAD, Japan; Kyushu University, Japan; Nagasaki University, Japan; NTT Facilities, Japan

**8:00 am • AC Fault Ride-through Capability of VSC-HVDC Transmission Systems**

Grain Philip Adam, Stephen Jon Finney, Barry Wyne Williams and Hani Ahmed Khaled, University of Strathclyde, United Kingdom

**8:25 am • Three-level Converters with Selective Harmonic Elimination PWM for HVDC Application**

Mehtu Beza and Staffan Norrga, Chalmers University of Technology, Sweden; ABB AB, Corporate Research, Sweden

**8:50 am • Input Impedance Modeling of Multipulse Rectifiers by Double-Fourier Series Method**

Zhonghui Bing and Jian Sun, Rensselaer Polytechnic Institute, United States

**9:15 am • Scheduling Demand Response Events with Constraints on Total Number of Events per Year**

Rajesh Tyagi, Jason Black and Jon Peterson, General Electric, United States

**S107 Sustainable Energy Applications: Wind Turbine Control I**

Grand Ballroom B

Chair: Francisco Canales, ABB, Switzerland

**8:00 am • Growing Neural Gas Based MPPT of Variable Pitch Wind Generators with Induction Machines**

Maurizio Cirrincione, Marcello Pucci and Gianpaolo Vitale, University of Belfort Montbeliard, France; ISSIA-CNR, Italy

**8:25 am • Grid-connected Wind Farm Power Control Using VRB-based Energy Storage System**

Wenliang Wang, Baoming Ge, Daqiang Bi and Dongsen Sun, Beijing Jiaotong University, China; Tsinghua University, China

**8:50 am • Control of Variable Pitch, Variable Speed Wind Turbine in Weak Grid Systems**

Xibo Yuan, Jianyun Chai and Yongdong Li, Tsinghua University, China

**9:15 am • A Battery Energy Storage Interface for Wind Power Systems with the Use of Grid Side Inverter**

Shantha D. Gamini Jayasingha, Don Mahinda Vilathgamuwa and Udaya K. Madawala, Nanyang Technological University, Singapore; The University of Auckland, New Zealand

THURSDAY, SEPTEMBER 16

10:00 am – 11:40 am

**S108 Electric Machines: Permanent Magnet Machines II**

Room 201

Chairs: Dan Ionel, Vestas, United States and Hamid Toliyat, Texas A&M University, United States

**10:00 am • Analysis and Measurement of 3D Torque and Forces for Permanent Magnet Motors with Slotless Windings**

Andreas Looser, Thomas Ivar Baumgartner, Christof Zwysig and Johann Walter Kolar, Power Electronic Systems Laboratory, ETH Zurich, Switzerland; Celeroton AG, Zurich, Switzerland

**10:25 am • Sensorless Drive of Brushless DC Motors with Estimating Torque Constant for Home Appliance**

Je-Wook Park, Seon-Hwan Hwang, Jang-Mok Kim and Jin-Woo Ahn, Pusan National University, Republic of Korea; Kyungsoong University, Republic of Korea

**10:50 am • Cogging Torque Minimization in PM Motors Using Robust Design Approach**

Mohammad Islam, Rakib Islam, Tomy Sebastian, Ashok Chandy and Suat Ozsoylu, Nexteer Automotive, United States

**11:15 am • A Novel E-core Flux-switching PM Brushless AC Machine**

J.T. Chen, Z.Q. Zhu, S. Iwasaki and R. Deodhar, University of Sheffield, United Kingdom; IMRA UK Research Centre, United Kingdom

**S109 DC-DC Converters: Special Topics II**

Room 202

Chairs: Johann Kolar, ETH, Switzerland and Ming Xu, FPL-Powerland, United States

**10:00 am • Sawtooth Burst Mode with Minimum On-time in Stand-by Operation of Power Supply**

Bong-Chul Kim, Ki-Bum Park and Gun-Woo Moon, KAIST, Republic of Korea

**10:25 am • A Linear Assisted DC-DC Converter for Envelope Tracking and Envelope Elimination and Restoration Applications**

*Pablo F. Miaja, Miguel Rodriguez, Javier Sebastian and Alberto Rodriguez, Universidad de Oviedo, Spain*

**10:50 am • High Efficiency Power Amplifier Based on Envelope Elimination and Restoration Technique**

*Miroslav Vasic, Oscar Garcia, Jesus Angel Oliver, Pedro Alou and Daniel Diaz, Universidad Politecnica de Madrid, Spain*

**11:15 am • A New Family of Marx Generator Based on Resonant Converter**

*Sasan Zabihi, Firuz Zare, Gerard Ledwich, Arindam Ghosh and Hidenori Akiyama, QUT, Australia; Kumamoto University, Japan*

**S110 Sustainable Energy Applications: Flexible Renewable/Alternative Energy System II**

*Room 203*

Chairs: Burak Ozpineci, *Oak Ridge National Labs, United States* and Stefan Schröder, *GE Global Research, Germany*

**10:00 am • Predictive Control for Universal and Flexible Power Management**

*Stefano Bifaretti, Pericle Zanchetta, Alan Watson, Luca Tarisciotti and Jon C. Clare, University of Roma Tor Vergata, Italy; University of Nottingham, United Kingdom*

**10:25 am • Instantaneous Active and Nonactive Power Control of Distributed Energy Resources with a Current Limiter**

*Yan Xu, Huijuan Li, Tom Rzy, Fangxing Li and John Kueck, Oak Ridge National Laboratory, United States; The University of Tennessee, United States*

**10:50 am • A Two-stage High Power Density Single-phase AC-DC Bidirectional PWM Converter for Renewable Energy Systems**

*Dong Dong, Dushan Boroyevich, Ruxi Wang and Igor Cvetkovic, Virginia Tech, United States*

**11:15 am • A Novel Phase-shift Bidirectional DC-DC Converter with an Extended High-efficiency Range for 20 kVA Solid State Transformer**

*Haifeng Fan and Hui Li, Florida State University, United States*

**S111 Electric Drives: N-Phase Drives**

*Room 204*

Chairs: Thomas Jahns, *University of Wisconsin-Madison, United States* and Michael Harke, *Danfoss Power Electronics, United States*

**10:00 am • Two-phase Motor Drive Systems with Z-source Inverter and Hybrid PWM**

*Euzeli Cipriano dos Santos Jr., Mario Pacas and Marcelo G. Molina, Federal University of Campina Grande, Brazil; University of Siegen, Germany; National University of San Juan, Argentina*

**10:25 am • Six-phase Machine Drive System with Reversible Parallel AC-DC-AC Converters**

*Euzeli Cipriano dos Santos Jr., Cursino Jacobina, Nady Rocha and Edison Roberto C. Silva, Federal University of Campina Grande, Brazil*

**10:50 am • A Separate Double-winding 12-phase Brushless DC Motor Drive Fed from Individual H-bridge Inverters**

*Byung-Geuk Cho, Young-Doo Yoon, Seung-Ki Sul, Young Kyung Kong and Jae Goo Bin, Seoul National University, Republic of Korea; Agency for Defense Development, Republic of Korea*

**11:15 am • Torque Maximization in High-torque Density Multiphase Drives Based on Induction Motors**

*Luca Zarri, Giovanni Serra, Angelo Tani, Domenico Casadei and Michele Mengoni, University of Bologna, Italy*

**S112 Transportation Applications: Energy Storage**

*Room 205*

Chair: Suresh Gopalakrishnan, *General Motor, United States*

**10:00 am • System Identification-based Lead-acid Battery Online Monitoring System**

*Larry Juang, Philip Kollmeyer, Thomas Jahns and Robert Lorenz, University of Wisconsin-Madison, United States*

**10:25 am • Automatic Charge Equalization Circuit Based on Regulated Voltage Source for Lithium-ion Batteries**

*Moon-young Kim, Chol-Ho Kim, Shin-Young Cho and Gun-Woo Moon, KAIST, Republic of Korea*

**10:50 am • Power Electronics Enabled Energy Management for Energy Storage with Extended Cycle Life and Improved Fuel Economy in a PHEV**

*Lei Wang, Xiaohu Liu, Hui Li, Won-Sang Im and Jang-Mok Kim, Florida State University, United States; Pusan National University, Republic of Korea*

**11:15 am • A Modularized Charge Equalizer Using Battery Monitoring IC for Series Connected Li-ion Battery Strings in an Electric Vehicle**

*Chol-Ho Kim, Moon-young Kim, Daeyoun Cho and Gun-Woo Moon, KAIST, Republic of Korea*

**S113 Sustainable Energy Applications: VAR Compensators**

*Room 206*

Chairs: Subhashish Bhattacharya, *North Carolina State University, United States* and Ambra Sannino, *ABB, Sweden*

**10:00 am • Safe Current Injection Strategies for a STATCOM under Asymmetrical Grid Faults**

*Pedro Rodriguez, Gustavo Medeiros, Alvaro Luna, Marcelo Cavalcanti and Remus Teodorescu, Technical University of Catalonia, Spain; Federal University of Pernambuco, Brazil; Aalborg University, Denmark*

**10:25 am • Design and Implementation of a 154 kV, +/- 50 MVAR Transmission STATCOM Based on 21-level Cascaded Multilevel Converter**

*Burhan Gultekin, Cem Ozgur Gercek, Tevhid Atalik, Mustafa Deniz and Nazan Bicer, Tubitak-Uzay, Middle East Technical University, Turkey; Tubitak-Uzay, Turkey*

**10:50 am • Negative-sequence Reactive-power Control by the Modular Multilevel Cascade Converter Based on Double-star Chopper-cells (MMCC-DSCC)**

*Makoto Hagiwara, Ryo Maeda and Hirofumi Akagi, Tokyo Institute of Technology, Japan*

**11:15 am • Four-branch Star Neutral Current Hybrid Power Filter and Var Compensator**

*Pedro Rodriguez, Ignacio Candela, Alvaro Luna, Remus Teodorescu and Frede Blaabjerg, Technical University of Catalonia, Spain; Aalborg University, Denmark*

**S114 Electric Machines: High Speed Machines**

*Room 207*

Chairs: Andy Knight, *University of Alberta, Canada* and Akira Chiba, *Tokyo University of Science, Japan*

**10:00 am • Harmonic Loss Analysis and Air-gap Optimization of High Speed Induction Motors**

*Katsumi Yamazaki, Akihiro Suzuki, Motomichi Ohto, Teruyuki Takakura and Satoshi Nakagawa, Chiba Institute of Technology, Japan; Yaskawa Electric Corporation, Japan*

**10:25 am • Novel High-speed, Lorentz-type, Slotless Self-bearing Motor**

*Thomas Ivar Baumgartner, Andreas Looser, Christof Zwyssig and Johann Walter Kolar, Power Electronic Systems Laboratory, ETH Zurich, Switzerland; Celeroton AG, Zurich, Switzerland*

**10:50 am • Rotor Design of a High-speed Permanent Magnet Synchronous Machine Rating 100,000 RPM at 10 kW**

*Bjoern Riemer, Marc Lessmann and Kay Hameyer, RWTH Aachen University, Germany*

**11:15 am • Design of a 750,000 RPM Switched Reluctance Motor for Micro Machining**

*Jacob Kunz, Siwei Cheng, Yao Duan, James Mayor and Ronald Harley, School of ME, Georgia Institute of Technology, United States; School of ECE, Georgia Institute of Technology, United States*

**S115 DC-AC Inverters: Multi-Level Inverters II**

*Grand Ballroom C*

Chairs: Gui-jia Su, *Oak Ridge National Laboratories, United States* and Peter Koellensperger, *Siemens, Germany*

**10:00 am • Low Output Frequency Operation of the Modular Multi-level Converter**

*Arthur J. Korn, Manfred Winkelkemper and Peter Steimer, ABB, Switzerland*

**10:25 am • A Hybrid Cascaded Multilevel Inverter Application for Renewable Energy Resources Including a Reconfiguration Technique**

*Surin Khomfoi, Nattapat Praisuwanna and Leon Tolbert, King Mongkut's Institute of Technology Ladkraban, Thailand; The University of Tennessee, United States*

**10:50 am • Review of Novel Multilevel Current-source Inverters with H-bridge and Common-emitter Based Topologies**

*Toshihiko Noguchi and Suroso Suroso, Shizuoka University, Japan; Nagaoka University of Technology, Japan*

**11:15 am • Symmetrical Hybrid Multilevel DC-AC Converter in Cascade**

*Domingo Ruiz Caballero, Samir Ahmad Mussa, Marcelo Lobo Heldwein, Hector Vergara S and Rene Sanhueza R, Pontificia Universidad Catolica de Valparaiso, Chile; UFSC-INEP, Brazil*

**S116 DC-DC Converters: Soft Switching Techniques II**

*Grand Ballroom D*

Chairs: David Perreault, *Massachusetts Institute of Technology, United States* and Michael Andersen, *Technical University of Denmark, Denmark*

**10:00 am • A ZVS Technique for Single-switch PWM Converters Implemented with Paralleled MOSFETS**

*Navid Golbon and Gerry Moschopoulos, ECE Dept, The University of Western Ontario, Canada*

**10:25 am • Zeroing Transformer's DC Current in Resonant Converters with No Series Capacitors**

*Alexander Gertsman and Sam Ben-Yaakov, Ben-Gurion University of the Negev, Israel*

**10:50 am • Design and Implementation of a ZCS Two-switch DC-DC Forward Converter with Variable Inductor**

*Po-Tso Chen, Tsorng-Juu Liang, Lung-Sheng Yang, Ming-Yang Cheng and Shi-Ming Chen, National Cheng-Kung University, Taiwan*

**11:15 am • Rapid Simulation of Multi-resonant LLC Converters with Capacitive Output Filter Based on an Extended First Harmonic Approximation**

*Alexander Bucher, Thomas Duerbaum and Juergen Stahl, Friedrich-Alexander-University Erlangen, Germany*

**S117 Sustainable Energy Applications: Power Quality II**

*Grand Ballroom A*

Chairs: Jinjun Liu, *Xi'an Jiaotong University, China* and Toshihiko Tanaka, *Yamaguchi University, Japan*

**10:00 am • A Simple Sag Generator Using SSRs**

*Osman S. Senturk and Ahmet Hava, Aalborg University, Turkey; Middle East Technical University, Turkey*

**10:25 am • Comparison between Conventional, GA and PSO with Respect to Optimal Capacitor Placement in Agricultural Distribution System**

*K.V.S.Ramachandra Murthy, M. Ramalinga Raju, Govinda Rao Gade and R. Srinivasa Rao, G.V.P. College of Engineering, Visakhapatnam, India; JNTUK, Kakinada., India*

**10:50 am • Direct Power Control for Unified Power Flow Controller Series Converter**

*Jan Verveckken, Fernando Silva, Dionisio Barros and Johan Driesen, ELECTA/ESAT, Katholieke Universiteit Leuven, Belgium; CIEEE, DEEC, Instituto Superior Tecnico, UTL, Portugal; CCCEE University of Madeira, Funchal, Portugal*

**11:15 am • Harmonic Identification in a Power System Using an Echo State Network for Adaptive Power Filter Applications**

*Jing Dai, Ganesh Venayagamoorthy, Ronald Harley and Keith Corzine, Georgia Institute of Technology, United States; Missouri University of Science and Technology, United States*

**S118 Sustainable Energy Applications: Wind Turbine Control II**

*Grand Ballroom B*

Chair: Peter Steimer, *ABB, Switzerland* and Tomonobu Senjyu, *University of the Ryukyus, Japan*

**10:00 am • Review and Critical Analysis of the Research Papers Published Till Date on Maximum Power Point Tracking in Wind Energy Conversion System**

*Syed Muhammad Raza Kazmi, Hiroki Goto, Hai-Jiao Guo and Osamu Icninokura, Tohoku University, Japan; Tohoku Gakuin University, Japan*

**10:25 am • Network Damping Capability of DFIG-based Wind Farm**

*Bing Gong, Dewei Xu and Bin Wu, Ryerson University, Canada*

**10:50 am • Mechanical Sensorless Maximum Power Tracking Control for Direct-drive PMSG Wind Turbines**

*Xu Yang, Xiang Gong and Wei Qiao, University of Nebraska-Lincoln, United States*

**11:15 am • Determination of Steady State Control Laws of Doubly-fed Induction Generator Using Natural and Power Variables**

*Joseph Ojo, Adeola Balogun, Frank Okafor and Sosthenes Karugaba, Tennessee Tech University, United States; University of Lagos, Nigeria*



THURSDAY, SEPTEMBER 16

1:40 pm – 3:20 pm

**S119 Electric Machines: IPM Machines**

Room 201

Chairs: Nicola Bianchi, *University of Padova, Italy* and Philippe Wendling, *Magsoft***1:40 pm • Design Tradeoffs Between Constant Power Speed Range, Uncontrolled Generator Operation and Rated Current of IPM Motor Drives**Gianmario Pellegrino, Paolo Guglielmi and Alfredo Vagati, *Politecnico di Torino, Italy***2:05 pm • Multi Objective Design Improvement of IPM Motor-drive Using Physic-based Motor Model**Ali Sarikhani, Wilder Saint-Hilaire and Osama A. Mohammed, *Florida International University, United States***2:30 pm • Unbalanced Operation of Current Regulated Sine-wave Interior Permanent Magnet Machines**Ian P. Brown, Dan M. Ionel and David G. Dorrell, *AO Smith Corp., Corporate Technology Center, United States; University of Technology Sydney, Australia***2:55 pm • Implementation and Control of a PMSM Self-bearing Motor Drive**Sheng-Ming Yang and Chia-Pin Chen, *National Taipei University of Technology, Taiwan***S120 DC-DC Converters: Modeling and Analysis**

Room 202

Chairs: Regan Zane, *University of Colorado, United States* and Nicola Femia, *Università di Salerno, Italy***1:40 pm • Experimental Study of Chaotic Behaviour in Parallel Connected DC-DC Boost Converters with Unbalanced Inductors**Ammar Natsheh, J. Gordon Kettleborough and Ghada Aldahim, *Amman University, Jordan; Loughborough University, United Kingdom; Damascus University, Syria***2:05 pm • Large-signal Linearization of Boost Converter**Kapil Jha and Santanu Mishra, *Indian Institute of Technology Kanpur, India***2:30 pm • Design of High Performance Point of Load Converters with Ultra-low Output Voltage Ripple**Mohamed Orabi, Shima Fathi, Ahmed Abou-Alfotouh and Fatma Al-Zahara Said, *APEARC, South Valley University, Egypt; Enpirion Inc., United States***2:55 pm • State Space Decoupling Control Design Methodology for Switching Converters**Evandro de C. Gomes, Luiz Antonio R. Souza, Sebastian Catunda, Robert Lorenz and Joao Victor Caracas, *IFMA, Brazil; UFMA, Brazil; University of Wisconsin - Madison, United States***S121 Sustainable Energy Applications: Energy Harvesting I**

Room 203

Chair: Sudip Mazumder, *University of Illinois, United States***1:40 pm • Self-powered Wireless MEMS Sensor Modules for Measuring Electrical Quantities in Residential, Commercial, Distribution, and Transmission Power Systems**Igor Paprotny, Eli Leland, Chris Sherman, Richard White and Paul Wright, *University of California, Berkeley, United States***2:05 pm • Human Powered Axial Flux Permanent Magnet Machines: Review and Comparison**Samuel Ani, Deok-Je Bang, Henk Polinder, Ji-Young Lee, SeungRyul Moon and Dae-Hyun Koo, *Delft University of Technology, Netherlands; Korea Electrotechnology Research Institute, Republic of Korea***2:30 pm • Wideband Energy Harvesting for Resonant Piezoelectric Devices**Cheng Luo and Heath Hofmann, *Ferro Solutions, United States; The University of Michigan, United States***2:55 pm • Wireless Power Transfer Using Weakly Coupled Magnetostatic Resonators**Jose Oscar Mur-Miranda, Giulia Fanti, Yifei Feng, Keerthik Omanakuttan, Roydan Ongie, Albert Setjoadi and Natalie Sharpe, *F.W. Olin College of Engineering, United States***S122 Electric Drives: Control and Testing**

Room 204

Chairs: Radu Bojoi, *Politecnico di Torino, Italy* and Mahesh Swamy, *Yaskawa Electric America, United States***1:40 pm • Closed Loop Control of Active Damped Small DC-link Capacitor Based Drive**RamKrishan Maheshwari and Stig Munk-Nielsen, *Aalborg University, Denmark***2:05 pm • DC-link Voltage Control for Switched Reluctance Drives with Reduced DC-link Capacitance**Christoph Neuhaus and Rik De Doncker, *ISEA, RWTH Aachen University, Germany***2:30 pm • Three-phase Electric Drive with Modified Electronic Smoothing Inductor**Yash Veer Singh, Peter Omand Rasmussen and Torben Ole Andersen, *IET, Aalborg University, Denmark***2:55 pm • Parameter Identification of an Induction Motor at Standstill Using Vector Constructing Method**Yanhui He, Yupeng Feng, Yue Wang, Zhao'an Wang and Wanjun Lei, *Xi'an Jiaotong University, China***S123 Transportation Applications: Power Converters**

Room 205

Chair: Lixin Tang, *Oak Ridge National Laboratory, United States***1:40 pm • The Electromagnetic Compatibility Design Considerations of the Input Filter of a Three-phase Inverter in a Railway Traction System**Mohamed Youssef, Jaber Abu-Qahouq and Mohamed Orabi, *Bombardier Transportation, Canada; University of Alabama, United States; APEARC, South Valley University, Egypt***2:05 pm • Design of Power Electronic Building Blocks (PEBB) for MultiMW Modular Traction Converters**Unai Viscarret, Ion Etxeberria-Otadui, Jose Maria Azurmendi, Jon San-Sebastian and Txomin Nieva, *IKERLAN-IK4 Technological Research Centre, Spain; TRANELEC S.L., Spain***2:30 pm • Design and Implementation of Fully Digital-controlled 400 Hz Active Power Filter for Aircraft Applications**Haibing Hu, Wei Shi and Yan Xing, *Nanjing University of Aeronautics and Astronauts, China***2:55 pm • Multiphase Multilevel Modular DC-DC Converter for High Current High Gain TEG Application**Dong Cao and Fang Z. Peng, *Michigan State University, United States*



**S124 Sustainable Energy Applications: Battery Concepts AMD Modeling**

Room 206

Chair: Zareh Soghomonian, *BMT Syntek Technologies, United States*

**1:40 pm • A Transient-based Approach to Estimation of the Electrical Parameters of a Lead-acid Battery Model**

*Lalit Mandal and Robert Cox, University of North Carolina Charlotte, United States*

**2:05 pm • Improvement of Electrical Modeling of NiMH Battery for Application of Microgrid System**

*Novie Ayub Windarko, Gyo-Bum Chung and Jaeho Choi, Chungbuk National University, Republic of Korea; Hongik University, Republic of Korea*

**2:30 pm • Analysis of an Electro-mechanical Battery for Rural Electrification in Sub-Saharan Africa**

*Richard Okou, Mohamed Azeem Khan, Paul Barendse, Ben Adoniya Sebitosi and Pragasen Pillay, University of Cape Town, South Africa; Stellenbosch University, South Africa; Concordia University, Canada*

**2:55 pm • Series-connected Reconfigurable Multicell Battery: A Novel Design Towards Smart Batteries**

*Taesic Kim, Wei Qiao and Liyan Qu, University of Nebraska-Lincoln, United States*

**S125 Energy Public Policy and Economics: Electrified Transport and Hydrogen Economy**

Room 207

Chair: Philip Krein, *University of Illinois at Urbana-Champaign, United States*

**1:40 pm • On-site Electrolysis Sodium Metal Production by Offshore Wind or Solar Energy for Hydrogen Storage and Hydrogen Fuel Cycle**

*Masataka Murahara and Kazuichi Seki, Tokyo Institute of Technology, Japan; Tokai University, Japan*

**2:05 pm • Flexible Electric Vehicle (EV) Charging to Meet Renewable Portfolio Standard (RPS) Mandates and Minimize Green House Gas Emissions**

*Jorge Hernandez, Frank Kreikebaum and Deepak Divan, Georgia Institute of Technology, United States*

**2:30 pm • Financial Incentives to Encourage Demand Response Participation by Plug-in Hybrid Electric Vehicle Owners**

*Megan Mallette and Giri Venkataramanan, University of Wisconsin - Madison, United States*

**2:55 pm • Investigations into the Minimization of Electrical Costs for Traction-type Elevators**

*Leonard White, Srdjan Lukic and Subhashish Bhattach, Department of Electrical and Computer Engineering, North Carolina State University, United States*

**S126 Electric Drives: Multi-Level Drives**

Grand Ballroom C

Chairs: Ranga Tallam, *Rockwell Automation, United States* and Giacomo Scelba, *DIEES - University of Catania, Italy*

**1:40 pm • On Interaction between Internal Converter Dynamics and Current Control of High-performance High-power AC Motor Drives with Modular Multilevel Converters**

*Antonios Antonopoulos, Kalle Ilves, Lennart Angquist and Hans-Peter Nee, KTH-Royal Institute of Technology, Sweden*

**2:05 pm • Power Quality Enhancement in High Power Multi-level Drives**

*Mehdi Abolhassani and Thomas Keister, Teco Westinghouse Motor Company, United States*

**2:30 pm • Model Predictive Direct Current Control for Multi-level Inverters**

*Tobias Geyer, The University of Auckland, New Zealand*

**2:55 pm • Introduction of a Large Scale High Efficiency Five-level IEGT Inverter for Oil and Gas Industry**

*Mostafa Al Mamun, Masahiko Tsukakoshi, Kazunori Hashimura, Hiromi Hosoda and Steven C. Peak, Toshiba Mitsubishi-Electric Industrial Sys. Co., Japan; TM GE Automation Systems LLC, United States*

**S127 DC-AC Inverters: Advanced Inverter System I**

Grand Ballroom D

Chair: Hideaki Fujita, *Tokyo Institute of Technology, Japan*

**1:40 pm • Advanced Energy Conversion System Using Sinusoidal Voltage Tracking Buck-boost Converter Cascaded Polarity Changing Inverter**

*Nabil A. Ahmed, College of Technological Studies, Kuwait*

**2:05 pm • A New Approach for Real-time Multiple Open-circuit Fault Diagnosis in Voltage Source Inverters**

*Jorge O. Estima and A.J. Marques Cardoso, University of Coimbra/IT, Portugal*

**2:30 pm • Dynamic Voltage Balancing of Series Connected IGBTs Using Slope Regulating and Voltage Clamping**

*Chunpeng Zhang, Yingdong Wei, Qirong Jiang and Luyuan Tong, Tsinghua University, China*

**2:55 pm • High-frequency DC Link Grid-connected Power Conversion with Improved Active Clamp**

*Xiaogao Xie, Hongyun Gui, Junming Zhang and Shirong Liu, Hangzhou Dianzi University, China; Huaxin Consulting Co, Ltd., China; Zhejiang University, China*

**S128 Sustainable Energy Applications: Power Quality III**

Grand Ballroom A

Chairs: Subhashish Bhattacharya, *North Carolina State University, United States* and Mahinda Vilathgamuwa, *Nanyang Technological University, Singapore*

**1:40 pm • Research on Active Harmonic Resister to Damping Resonance in Distribution System**

*Wanjun Lei, Yue Wang, Ninghuan Su and Ming Li, Xi'an Jiaotong University, China*

**2:05 pm • Novel Current Limitation Technique without Current Feedback for Digital-controlled Battery Charger in UPS Applications**

*Bo-Yuan Chen, Chin-Chang Hsu and Yen-Shin Lai, National Taipei University of Technology, Taiwan*

**2:30 pm • Elimination of Transfer Time Effects in Line-interactive and Passive Standby UPSs by Means of a Small-size Inverter**

*Manuel Arias, Marta Hernando, Diego Lamar and Arturo Fernandez, Universidad de Oviedo, Spain; Agencia Espacial Europea, Netherlands*

**2:55 pm • A Hybrid Multilevel Inverter with Both Staircase and PWM Switching Schemes**

*Hossein Sepahvand, Mostafa Khazraei, Mehdi Ferdowsi and Keith Corzine, Missouri University of Science and Technology, United States*

**S129 Enabling Technologies: Magnetic Design and Optimization I***Grand Ballroom B*Chair: Charlie Sullivan, *Dartmouth College, United States***1:40 pm • Single-phase vs. Three-phase High Density Power Transformers***Jing Xue, Fred Wang, Dushan Boroyevich and Zhiyu Shen, University of Tennessee, Knoxville, United States; Oak Ridge National Laboratory and University of Tennessee, Knoxville, United States; Virginia Tech, United States***2:05 pm • Inductor Design Methods with Low-permeability RF Core Materials***Yehui Han and David Perreault, University of Wisconsin - Madison, United States; Massachusetts Institute of Technology, United States***2:30 pm • New Core Loss Measurement Method for High Frequency Magnetic Materials***Mingkai Mu, Qiang Li, David Gilham, Fred Lee and Khai Ngo, Virginia Tech, United States***2:55 pm • Optimal Design of a Pot Core Rotating Transformer***J.P.C. Smeets, D.C.J. Krop, J.W. Jansen, M.A.M. Hendrix and E. Lomonova, Eindhoven University of Technology, Netherlands*

THURSDAY, SEPTEMBER 16

3:40 pm – 4:55 pm

**S130 Electric Drives: Improved PWM Methods***Room 201*Chairs: Fernando Briz, *University of Oviedo, Spain* and Roberto Petrella, *University of Udine, Italy***3:40 pm • Pulse-width Modulation Technique for BLDCM Drives to Reduce Commutation Torque Ripple without Calculation of Commutation Time***Yong-Kai Lin and Yen-Shin Lai, National Taipei University of Technology, Taiwan, Taiwan***4:05 pm • Vector Quantized Spread Spectrum Modulation Scheme for Three-level Inverters***Biji Jacob and Baiju M.R., College of Engineering, Trivandrum, India***4:30 pm • Single Current Sensor Operation with Fixed Sampling points Based on TSPWM***Xiaomeng Cheng, Haifeng Lu and Wenlong Qu, State Key Lab of Power System, Tsinghua University, China***S131 DC-DC Converters: System Architectures***Room 202*Chairs: Dong Tan, *NGAS, United States* and Yali Xiong, *Volterra, United States***3:40 pm • Modeling and Simulation of a Distributed Power System for Avionic***Sanna Vesti, Pedro Alou, Jesus A. Oliver, Oscar Garcia and Roberto Prieto, Technical university of Madrid, Spain***4:05 pm • The Analysis of DC-DC Converter Topologies Based on Stackable Voltage Elements***Ke Zou, Mark.J Scott and Jin Wang, The Ohio State University, United States***4:30 pm • Observer-based Fault Diagnosis of Power Electronics Systems**  
*Kieran Levin, Eric Hope and Alejandro Dominguez-Garcia, University of Illinois at Urbana-Champaign, United States***S132 Sustainable Energy Applications: Energy Harvesting II***Room 203*Chair: Seth Sanders, *University of California-Berkley, United States***3:40 pm • An Input-powered Active AC-DC Converter with Zero Standby Power for Energy Harvesting Applications***Yuan Rao and David Arnold, University of Florida, United States***4:05 pm • A New Single Stage AC-DC Converter for Low Voltage Electromagnetic Energy Harvesting***Rohan Dayal and Leila Parsa, ECSE Department, Rensselaer Polytechnic Institute, United States***4:30 pm • Design of a Low Cost Self-powered "Stick-on" Current and Temperature Wireless Sensor for Utility Assets***Rohit Moghe, Yi Yang, Frank Lambert and Deepak Divan, Georgia Institute of Technology, United States; NEETRAC, United States***S133 Electric Drives: Sensing Techniques***Room 204*Chairs: Semyon Royak, *TBD* and Parag Kshirsugar, *United Technologies Research Center, United States***3:40 pm • Compensation of Analog Rotor Position Errors due to Nonideal Sinusoidal Encoder Output Signals***Seon-Hwan Hwang, Jong-Ho Lee, Jang-Mok Kim and Cheol Choi, Pusan National University, Republic of Korea; HIGEN Motors, Republic of Korea***4:05 pm • Using the Motor Drive as a Sensor to Extract Spatially Dependent Information During Servo Operation***Christopher Wolf and Robert Lorenz, University of Wisconsin-Madison, United States***MOVED TO POSTER SESSION II**  
*4:30 pm • A Method for Speed-sensorless Identification of Two-mass-systems*  
*Henning Zoubek and Mario Pacas, University of Siegen, Germany***S134 Sustainable Energy Applications: Fuel Cell Power Systems***Room 205*Chair: Henry Chung, *City University of Hong Kong, Hong Kong***3:40 pm • Design and Experimental Validation of a Robust Control Method for a Hybrid Fuel Cell Power Generation System***David Hernandez-Torres, Olivier Sename and Delphine Riu, Grenoble Electrical Engineering Laboratory, France; Grenoble Department of Control Systems, France***4:05 pm • Techniques for Efficiency Gains in Soft Switching Full-bridge Fuel Cell Power Conversion***Martin Ordonez and John Quaicoe, Memorial University of Newfoundland, Canada***4:30 pm • Grid-interfaced Fuel Cell Energy System Based on a Boost-inverter with a Bidirectional Back-up Battery Storage***Minsoo Jang and Vassilios G. Agelidis, The University of New South Wales, Australia*

### S135 Enabling Technologies: Power Electronics Modeling and Simulation Tools

Room 206

Chair: Zareh Soghomonian, *BMT Syntek Technologies, United States*

#### 3:40 pm • Efficient CAD Tool for Power Electronics Compensator Design

*Carlos Martinez, Virgilio Valdivia, Antonio Lazaro, Javier Lourido, Isabel Quesada, Carlos Lucena, Pablo Zumel and Andres Barrado, Carlos III University of Madrid, Spain*

#### 4:05 pm • Modeling and Evaluation of Diode Reverse Recovery in Discrete-transition Simulators

*Natan Kriehely and Sam Ben-Yaakov, Ben-Gurion University of the Negev, Israel*

#### 4:30 pm • Digital Flickermeter Design and Implementaton Based on IEC Standard

*Daniel Fregosi, Leonard White, Subhashish Bhattacharya, Eric Green and Jason Watterson, Department of ECE, North Carolina State University, United States*

### S136 Energy Efficiency and Industrial Applications: Special Topics

Room 207

Chair: Po-Tai Cheng, *National Tsinghua University, Taiwan*

#### 3:40 pm • A Review of Monitoring and Identification Methods for Electric Loads in Commercial and Residential Buildings

*Yi Du, Liang Du, Bin Lu, Ronald Harley and Thomas Habetler, Georgia Institute of Technology, United States; Eaton Corporation, United States*

#### 4:05 pm • Design of a Supercapacitor Based Storage System for Improved Elevator Applications

*Sergio Luri, Ion Etxeberria-Otadui, Alejandro Rujas, Endika Bilbao and Antonio Gonzalez, IKERLAN-IK4 Technological Research Centre, Spain; ORONA EIC, Elevator Innovation Centre, Spain*

#### 4:30 pm • Applying a Novel Power Management Unit (PMU) to Replace the Large DC Bus Electrolytic Capacitors in Fuel Cell Power Generation System

*Xiao Li, Chengrui Du, Wenping Zhang, Guoqiao Shen and Dehong Xu, Zhejiang University, China*

### S137 Enabling Technologies: Power Semiconductors III

Grand Ballroom C

Chairs: Angus Bryant, *University of Warwick, United Kingdom* and Madhu Sudhan Chinthavali, *Oak Ridge National Laboratory, United States*

#### 3:40 pm • Analysis of Static Voltage Balance of Series Connected Self-power ETOs

*Qian Chen, Alex Huang and Subhashish Bhattacharya, North Carolina State University, United States*

#### 4:05 pm • The Integrated Emitter Turn-off Thyristor (IETO) — An Innovative Thyristor Based High Power Semiconductor Device Using MOS Assisted Turn-off

*Michael Bragard, Marcus Conrad and Rik De Doncker, RWTH Aachen University, Germany*

#### 4:30 pm • High Frequency Switching High-power Converter with SiC-PiN Diodes and Si-IGTs

*Kazuto Takao, Yasunori Tanaka, Kyungmin Sung, Keiji Wada and Takeo Kanai, Toshiba Corporation, Japan; Advanced Industrial Science and Technology, Japan; Ibaraki National College of Technology, Japan; Tokyo Metropolitan University, Japan; TMEIC, Japan*

### S138 DC-AC Inverters: Advanced Inverter System II

Grand Ballroom D

Chairs: David Torrey, *Advanced Energy Conversion, United States* and Jin Wang, *Ohio State University, United States*

#### 3:40 pm • Analysis and Suppression of a Common Mode Resonance in the Cascaded H-bridge Multilevel Inverter

*Rixin Lai, Maja Harfman Todorovic and Juan Sabate, GE Global Research, United States*

#### 4:05 pm • Optimal Pulsewidth Modulation of Multilevel Inverters for Low Switching Frequency Control of Medium Voltage High Power Industrial AC Drives

*Akshay Rathore, Joachim Holtz and Till Boller, University of Illinois at Chicago, United States; University of Wuppertal, Germany*

#### 4:30 pm • Seven-level Cascaded ANPC-based Multilevel Converter

*Sridhar Reddy Pulikanti, Georgios Konstantinou and Vassilios G. Agelidis, The University of Sydney, Australia; The University of New South Wales, Australia*

### S139 Energy Public Policy and Economics: Reducing Renewable Energy Cost with Power Electronics and Carbon Trading

Grand Ballroom A

Chair: Jonathan Goldman, *HydroPhi Technologies, Inc., United States*

#### 3:40 pm • An Alternative Mechanism for Carbon Emission Permit Price Volatility Mitigation

*Li Xu, Shijie Deng and Valerie Thomas, Georgia Institute of Technology, United States*

#### 4:05 pm • Reduction of Green House Gas Emission by Clean Power Trading

*Jinxu Ding and Arun Somani, Iowa State University, United States*

#### 4:30 pm • Transportation Applications Using Practical Hydrogen-on-demand Systems

*Jonathan Goldman, Suresh Sharma and Steve Suggs, HydroPhi Technologies, Inc., United States*

### S140 Enabling Technologies: Magnetic Design and Optimization II

Grand Ballroom B

Chair: Charlie Sullivan, *Dartmouth College, United States*

#### 3:40 pm • Selection of the Appropriate Winding Setup in Planar Inductors with Parallel Windings

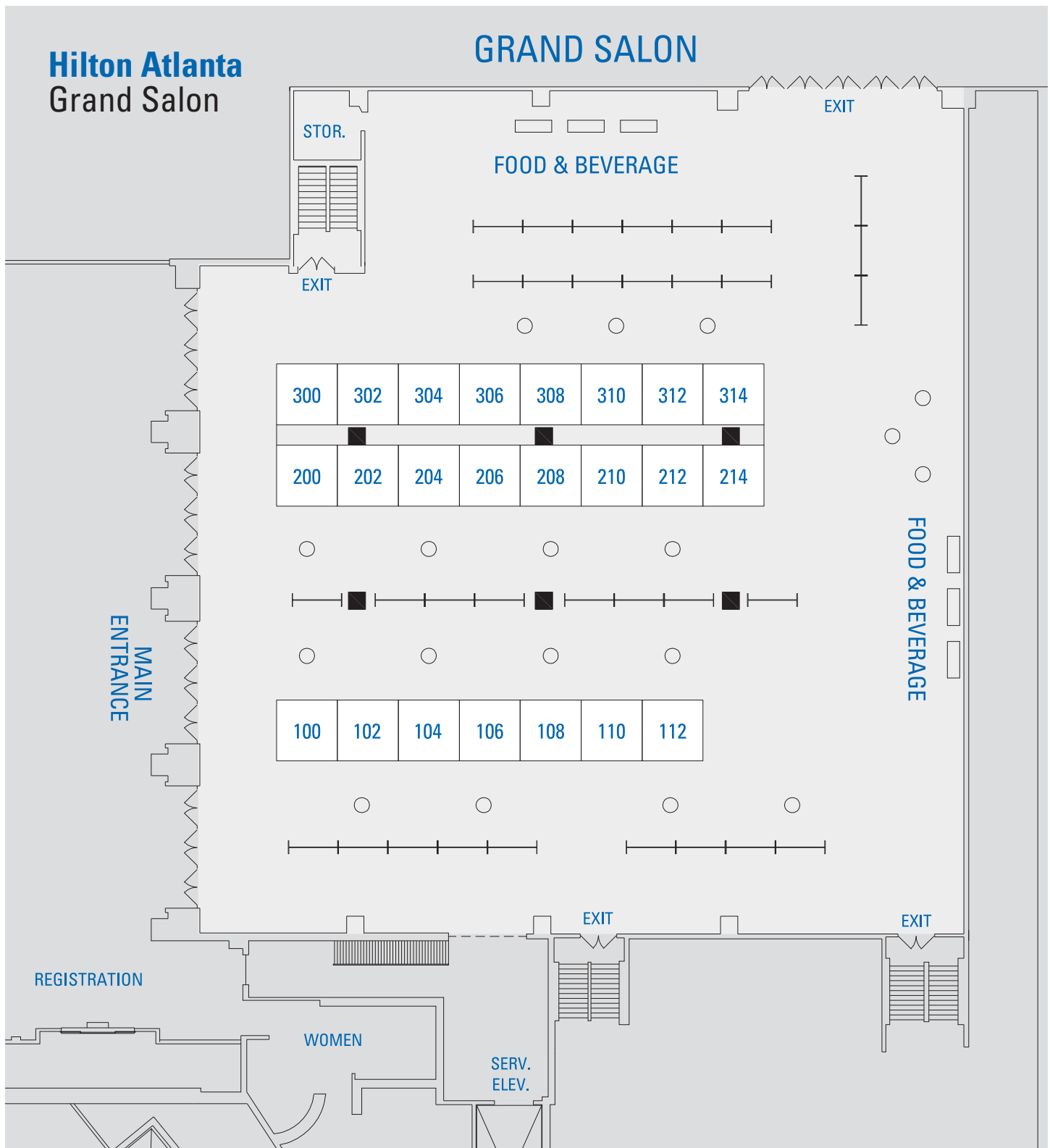
*Roberto Prieto, Rafael Asensi and Jose Cobos, CEI-UPM, Spain*

#### 4:05 pm • A High Efficient Integrated Planar Transformer for Primary-parallel Isolated Boost Converters

*Gokhan Sen, Ziwei Ouyang, Ole C. Thomsen, Michael A.E. Andersen and Lars Moller, Technical University of Denmark, Denmark; H2 Logic A/S, Denmark*

#### 4:30 pm • Planar Integrated Magnetics Design in Wide Input Range DC-DC Converter for Fuel Cell Application

*Ziwei Ouyang, Zhe Zhang, Ole Thomsen, Michael Andersen, Ole Poulsen and Thomas Bjorklund, Technical University of Denmark, Denmark; Flux Company, Denmark*



**Expo**

*Grand Salon*

The Expo will showcase the latest advances in products and services to meet the needs of current and future challenges facing the energy conversion industry.

**Expo Hours:**

Monday, September 13 ..... 5:00 pm – 7:00 pm  
 Tuesday, September 14 ..... 11:30 am – 7:00 pm



**Alphabetical Listing by Company Name:**

Company	Booth(s)
5S Components Inc.....	110
Alizem Inc.....	208
Ansys, Inc.....	304
Cramer Coil & Transformer.....	101
Ferroxcube USA, Inc. ....	200
GE Global Research.....	202
How2Power.com .....	204
IEEE Atlanta Section.....	106
IEEE Industry Applications Society.....	310
IEEE Power Electronics Society (PELS Membership Booth).....	312
JSOL Corporation.....	308
JSR Micro, Inc./JM Energy.....	314
Magnetics .....	108
Magsoft Corporation .....	104
NORWE Inc. ....	206
NSF Center for GRid-connected Advanced Power Electronic Systems (GRAPES) .....	102
Opal-RT Technologies Inc. ....	300-302
Plexim, Inc.....	210
Proto Laminations, Inc. ....	214
TDK-Lambda Americas.....	112
The IET.....	212
United Technology Research Center .....	306

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Cramer Coil & Transformer.....	101
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United Technology Research Center .....	306
JSOL Corporation.....	308
IEEE Industry Applications Society.....	310
IEEE Power Electronics Society (PELS Membership Booth).....	312
JSR Micro, Inc./JM Energy.....	314

**EXHIBITOR DIRECTORY****5S Components, Inc.**

Booth 110

630 Fifth Avenue  
East McKeesport, PA 15035  
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E-mail: info@5Scomponents.com  
Web URL: www.5Scomponents.com



5S Components is an authorized distributor for ABB's high power semiconductors, current sensors and voltage sensors and ICAR capacitors. Based near Pittsburgh, PA, 5S provides sales, distribution and technical support to customers in North America.

**Alizem, Inc.**

Booth 208

1173 Boulevard Charest Ouest  
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E-mail: info@alizem.com  
Web URL: www.alizem.com



Alizem provides FPGA-based Motor Control IP solutions that enable its customers to increase their products differentiation and reliability while reducing their costs and TTM. Alizem COTS solutions replace conventional motor control IC and can be integrated easily on FPGA without the need of extensive FPGA or motor control expertise.

**Ansys, Inc.**

Booth 304

225 W. Station Square Drive  
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Phone: +1 412-261-3200  
Fax: +1 412-471-9427  
Web URL: [www.ansys.com](http://www.ansys.com)



ANSYS, Inc. develops and globally markets engineering simulation software used by designers and engineers across a broad spectrum of industries. The company develops open and flexible simulation solutions that enable users to simulate design performance directly on the desktop, providing a common platform for fast, efficient and cost-effective product development.

**Cramer Coil & Transformer**

Booth 101

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Web URL: [www.cramerco.com](http://www.cramerco.com)



Cramer Coil & Transformer specializes in the design and manufacture of custom high frequency magnetic components for switch mode power supply and filter applications.

**Ferroxcube USA, Inc.**

Booth 200

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E-mail: [ken.blasor@ferroxcube.com](mailto:ken.blasor@ferroxcube.com)  
Web URL: [www.ferroxcube.com](http://www.ferroxcube.com)



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Booth 202

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**How2Power.com**

Booth 204

P.O. Box 755  
Smithtown, NY 11787  
U.S.A.  
Phone: +1 631-269-4540  
E-mail: [david@how2power.com](mailto:david@how2power.com)  
Web URL: [www.how2power.com](http://www.how2power.com)



A free website, How2Power.com helps engineers address power supply design challenges in their applications by locating pre-screened articles from a range of reputable sources. The associated How2Power Today newsletter presents innovative design techniques for power conversion, power component news, and reports on career opportunities for power electronics engineers.

**IEEE Atlanta Section**

Booth 106

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Smyrna, GA 30080  
USA  
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Fax: +1 404-407-9417  
E-mail: [jgostin@ieee.org](mailto:jgostin@ieee.org)  
Web URL: [ieee-atlanta.org](http://ieee-atlanta.org)



The IEEE Atlanta Section consists of over 4,300 active members, including over 900 student members. The Section has 17 Chapters, including Industrial Applications and Power Electronics, and 3 Affinity Groups. IEEE's core purpose is to foster technological innovation and excellence for the benefit of humanity.

**IEEE Industry Applications Society**

Booth 310

445 Hoes Lane  
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USA  
Phone: +1 732-465-6627  
E-mail: [ias-administrator@ieee.org](mailto:ias-administrator@ieee.org)  
Web URL: [www.ieee.org/ias](http://www.ieee.org/ias)



The Industry Applications Society supports the advancement of the theory and practice of electrical and electronic engineering in the development, design, manufacture and application of electrical systems, apparatus, devices and controls to the processes and equipment of industry and commerce; the promotion of safe, reliable and economical installations; industry leadership in energy conservation and environmental health and safety issues; the creation of voluntary engineering standards and recommended practices; and the professional development of its membership.

**IEEE Power Electronics Society (PELS Membership Booth)**

Booth 312

445 Hoes Lane  
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Fax: +1 732-562-3881  
E-mail: [pels@ieee.org](mailto:pels@ieee.org)  
Web URL: [www.pels.org](http://www.pels.org)



The Power Electronics Society is one of the technical societies of the Institute of Electrical and Electronics Engineers (IEEE). The IEEE Power Electronics Society (PELS) helps in the development and effective application of power electronics technology. Join IEEE or renew your 2010 IEEE membership and receive a free Power Electronics Society (PELS) membership. Drop your business card in the box provided at the booth.

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Booth 308

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Fax: +81(3)5859-6035  
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JMAG is a comprehensive software suite for electromechanical design and development. Complex phenomena can be obtained quickly providing valuable insights to the internal workings of machines. JMAG was developed in 1983 as a tool to support product development and design for electric/electronic equipment and power electronics including motors, transformers, actuators, circuit components, antennas, and much more. Since 1983, JMAG has been utilized by many companies and academic institutions.

**JSR Micro, Inc./JM Energy**

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Fax: +1 412-696-1333  
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Web URL: [www.mag-inc.com](http://www.mag-inc.com)



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Booth 104

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Magsoft Corporation offers CAE simulation software solutions for virtual prototyping. Assess design ideas for devices like motors, actuators, and transformers. Obtain the experimental results you need without physically testing in the lab. Flux (FEM), Portunus (system simulation), Speed (Motor Design), MotorCAD (Thermal analysis for rotating machines), Inca (bus bars)

**NORWE, Inc.**

Booth 206

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Fax: +1 330-305-0592  
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Web URL: www.norwe.com



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**NSF Center for GRid-connected Advanced Power Electronic Systems (GRAPES)** Booth 102

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Fax: +1 479-575-6967  
E-mail: mgcolli@uark.edu  
Web URL: http://grapes.uark.edu

**GRAPES**

A National Science Foundation Industry/University Cooperative Research Center since 2009. Headquartered at the University of Arkansas- Fayetteville, GRAPES conducts research on design, development, evaluation, control and standardization of grid-connected power electronic equipment on both the supply and load side of power systems.

**Opal-RT Technologies Inc.**

Booth 300-302

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Montreal, QC H3K 1G6  
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E-mail: marketing@opal-rt.com  
Web URL: www.opal-rt.com



Opal-RT Technologies (www.Opal-RT.com) is the leading supplier of Real-Time Simulators and Hardware-in-the-Loop testing equipment for electrical, electromechanical and power electronic systems. Electrical engineers at organizations like ABB, Hydro-Quebec, GE, Hitachi, Mitsubishi Electric and countless universities & research facilities use Opal-RT Real-Time Simulators to design, test, and conduct transient studies of large scale power grids incorporating wind farms and other Distributed Generation devices.

**Plexim, Inc.**

Booth 210

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E-mail: info@plexim.com  
Web URL: www.plexim.com



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Booth 214

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Fax: +1 562-404-1650  
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Proto Laminations, Inc., is a manufacturer of specialty electrical laminations for rotating machinery. We support the development, prototype evaluation and limited production requirements of motor and generator manufacturers and academic researchers worldwide.

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Web URL: [www.theiet.org](http://www.theiet.org)



The IET is one of the world's leading professional societies for the engineering and technology community, with more than 150,000 members in 127 countries and offices across three continents. The IET provides a global knowledge network to disseminate ideas and promote the positive role of science, engineering and technology globally.

**United Technology Research Center**

Booth 306

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**PHOENIX, ARIZONA**  
**SEPTEMBER 17-22, 2011**

Mark your calendars! The third Annual IEEE Energy Conversion Congress and Exposition will be held in the 'solar capital' — Phoenix, Arizona, on September 17-22, 2011. ECCE is a major global event for Energy Conversion professionals, combining: newly formed, industry driven, application oriented technical sessions and energy policy and economics sessions, along with the core component focused contents of the former IEEE Power Electronics Specialists Conference (PESC) and the technical sessions of the Industrial Power Conversion Systems Department previously presented at the IEEE Industry Applications Society Annual Meeting.

ECCE 2011 will bring together practicing engineers, researchers and other professionals for interactive discussions on latest advances in various areas related to Energy Conversion. Technical papers are solicited on any subject pertaining to the scope of the conference that includes but is not limited to the following major topics:

### Energy Conversion Systems

- ▶ Renewable and alternative energy systems, including solar, wind, wave, and energy harvesting
- ▶ Electric transportation systems
- ▶ Modeling, analysis and simulation of energy conversion systems in specific applications.
- ▶ Grid interface of renewable and distributed energy resources and storage
- ▶ Enabling energy conversion technology for smart grid concepts and microgrids
- ▶ Electric power systems
- ▶ Applications of Electrical Energy Conversion systems
- ▶ Control, energy management and optimization
- ▶ Power quality and EMI
- ▶ Thermal management and efficiency
- ▶ Energy policy & economic aspects of the energy conversion business

### Components and Subsystems for Energy Conversion

- ▶ Electric machines and actuators
- ▶ Electric drives
- ▶ Power converters
- ▶ Power electronic devices and packaging
- ▶ Passive components and fault management products
- ▶ Reliability, diagnostics and prognostics

Prospective authors are requested to submit a digest no longer than six (6) pages, single column, 1.5 line spaced, summarizing the proposed paper. The digests will be reviewed using a double-blind peer review process in order to ensure that the final program has highest possible technical quality. Therefore, the digest should include key equations, figures, tables and references as appropriate, but no author names or affiliations. The digests must clearly state the objective of the work, its significance in advancing engineering and/or science, the methods and specific results in sufficient detail to enable a thorough and fair review process. For more information, visit <http://www.ecce2011.org> or contact the ECCE 2011 Technical Program Co-Chairs via email at [Tech\\_Prog\\_Chairs@ecce2011.org](mailto:Tech_Prog_Chairs@ecce2011.org).

**Dr. Ayman EL-Refaie**, GE Global Research Center, USA

**Prof. Iqbal Husain**, University of Akron, OH, USA

**Prof. Yan-Fei Liu**, Queen's University, Canada

**Prof. Zi-Qiang Zhu**, University of Sheffield, UK

### Important Dates

#### January 15, 2011

Digest of proposed papers due (to be submitted via ECCE website)

#### May 1, 2011

Notification to authors of acceptance/rejection of papers

#### July 1, 2011

Final papers with IEEE copyright forms due





# PHOENIX — ARIZONA —

— Tutorials —

— Technical Sessions —

— Rap Sessions —

— Exhibits —

#### FOR MORE INFORMATION CONTACT

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[www.ECCE2011.org](http://www.ECCE2011.org)

2011

17

18

19

20

21

22

SEPTEMBER



Room	Prefunction South	Grand Salon Prefunction Area	Grand Salon	Room 201	Room 202	Room 203	Room 204	Room 205	Room 206	Room 207	Grand Ballroom A	Grand Ballroom B	Grand Ballroom C	Grand Ballroom D
Time														
<b>SATURDAY, SEPTEMBER 11, 2010</b>														
3:00 pm – 5:00 pm	Reg. Open													
<b>SUNDAY, SEPTEMBER 12, 2010</b>														
7:00 am – 7:00 pm	Reg. Open													
8:30 am – 12:00 pm				T1-1	T1-2	T1-3	T1-4							
12:00 pm – 1:00 pm	Lunch on own													
1:00 pm – 5:00 pm				T2-1	T2-2	T2-3	T2-4							
4:30 pm – 5:00 pm														New to ECCE/PELS/IAS Reception
5:00 pm – 7:00 pm														Opening Reception
<b>MONDAY, SEPTEMBER 13, 2010</b>														
7:00 am – 7:00 pm	Reg. Open													
8:00 am – 10:00 am											Plenary Ses.			
10:00 am – 10:20 am		AM Break												
10:20 am – 12:00 pm				S1	S2	S3	S4	S5	S6	S7	S10	S8	S9	
12:00 pm – 1:20 pm	Lunch on own													
1:20 pm – 3:00 pm				S11	S12	S13	S14	S15	S16	S17	S20	S18	S19	
3:00 pm – 3:20 pm		PM Break												
3:20 pm – 5:00 pm				S21	S22	S23	S24	S25	S26	S27	S30	S28	S29	
5:00 pm – 7:00 pm			Reception											
<b>TUESDAY, SEPTEMBER 14, 2010</b>														
7:00 am – 7:00 pm	Reg. Open													
8:00 am – 9:40 am				S31	S32	S33	S34	S35	S36	S37	S40	S41	S38	S39
9:40 am – 10:00 am		AM Break												
10:00 am – 11:40 am				S42	S43	S44	S45	S46	S47	S48	S51	S52	S49	S50
11:30 am – 7:00 pm			Expo Open											
11:40 am – 1:20 pm			Lunch											
1:30 pm – 3:00 pm			Poster Ses. I											
3:00 pm – 3:30 pm			PM Break											
3:30 pm – 5:00 pm			Poster Ses. II											
8:00 pm – 9:00 pm				R1	R2									
<b>WEDNESDAY, SEPTEMBER 15, 2010</b>														
7:00 am – 7:00 pm	Reg. Open													
8:00 am – 9:40 am				S53	S54	S55	S56	S57	S58	S59	S62	S63	S60	S61
9:40 am – 10:00 am		AM Break												
10:00 am – 11:40 am				S64	S65	S66	S67	S68	S69	S70	S73	S74	S71	S72
11:40 am – 1:30 pm	Lunch on own													
1:30 pm – 3:10 pm				S75	S76	S77	S78	S79	S80	S81	S84	S85	S82	S83
3:10 pm – 3:30 pm		PM Break												
3:30 pm – 5:10 pm				S86	S87	S88	S89	S90	S91	S92	S95	S96	S93	S94
7:00 pm – 9:30 pm			Banquet											
<b>THURSDAY, SEPTEMBER 16, 2010</b>														
7:00 am – 3:00 pm	Reg. Open													
8:00 am – 9:40 am				S97	S98	S99	S100	S101	S102	S103	S106	S107	S104	S105
9:40 am – 10:00 am		AM Break												
10:00 am – 11:40 am				S107	S108	S110	S111	S112	S113	S114	S117	S118	S115	S116
11:45 am – 1:40 pm			Awards Lunch											
1:40 pm – 3:20 pm				S119	S120	S121	S122	S123	S124	S125	S128	S129	S126	S127
3:20 pm – 3:40 pm		PM Break												
3:40 pm – 4:55 pm				S130	S131	S132	S133	S134	S135	S136	S139	S140	S137	S138
5:00 pm	Meeting Adjourns													