

Tutorials | Technical Sessions | Exhibits | Rap Sessions



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

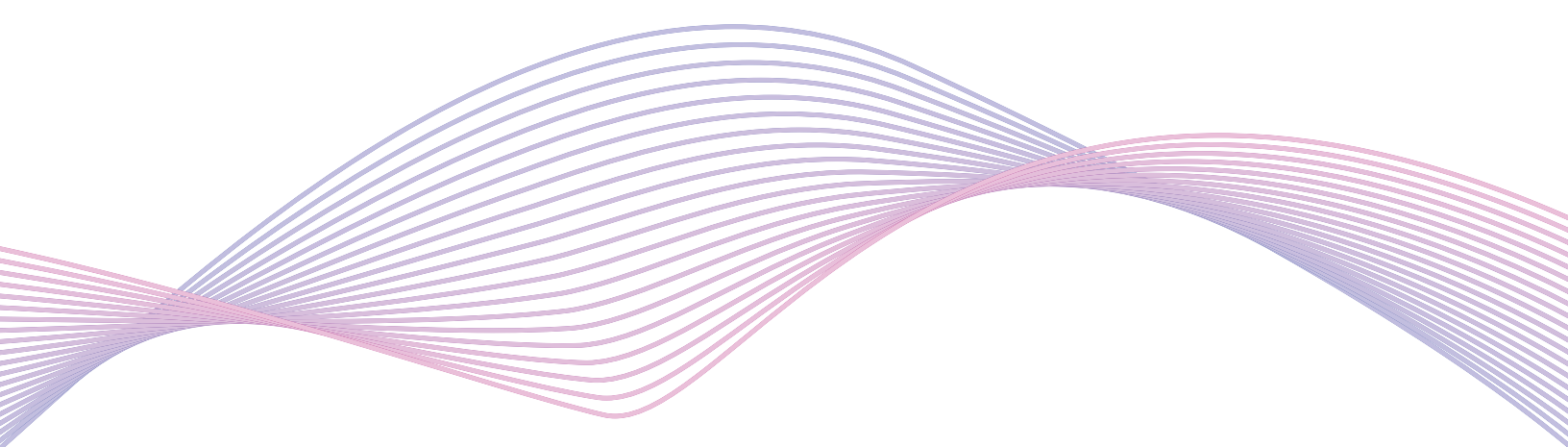
IEEE ENERGY CONVERSION CONGRESS & EXPO



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

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Francisco Canales, ABB, Switzerland
Zhe Chen, Aalborg University, Denmark
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William Peterson (Vice Chair), E & M Power, USA
Stefan Schröder, GE Global Research, Germany
Haidong Yu, John Deere Corporation, USA
Ahmed Zobaa, Brunel University, UK
Caisheng Wang, Wayne State University, USA
Kevin Lee, Eaton Corporation, USA
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

Ali Emadi (Vice Chair), Illinois Institute of Technology, USA
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

Dragan Maksimovic (Vice Chair), University of Colorado, USA
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
Jin Wang, Ohio State University, USA
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	Room 204
	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

12:00 pm – 1:00 pm Lunch on Own

Tutorials Group 2 • 1:00 pm – 5:00 pm

	Room 201	Room 202	Room 203	Room 204
	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 Bidirectional 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 Synchrotron 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
	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
11:10 am – 11:35 am	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 High Frequency 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 Switching 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
	S11 Electric Machines: Machine Design I	S12 DC-AC Inverters: Grid Connected Inverters II	S13 Sustainable Energy Applications: Photovoltaics I	S14 Enabling Technologies: Power Semiconductors II	S15 Energy Public Policy and Economics: Renewable Energy Generation	S16 Sustainable Energy Applications: Sensing and Measurement	S17 Energy Efficiency and Industrial Applications: LED Lighting II	S18 Electric Drives: Drive Control	S19 DC-DC Converters: Digital Control II	S20 DC-DC Converters: Isolated Converters I
1:20 pm – 1:45 pm	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
	S11 Electric Machines: Machine Design I	S12 DC-AC Inverters: Grid Connected Inverters II	S13 Sustainable Energy Applications: Photovoltaics I	S14 Enabling Technologies: Power Semiconductors II	S15 Energy Public Policy and Economics: Renewable Energy Generation	S16 Sustainable Energy Applications: Sensing and Measurement	S17 Energy Efficiency and Industrial Applications: LED Lighting II	S18 Electric Drives: Drive Control	S19 DC-DC Converters: Digital Control II	S20 DC-DC Converters: Isolated Converters I
2:10 pm – 2:35 pm	A Novel Method for Multi-objective Design and Optimization of Three-phase Induction Machines	Exploring Inherent Damping Characteristic of LCL-filters for Three-phase Grid-connected Voltage Source Inverters	Model Construction of Single Crystalline Photovoltaic Panels for Real-time Simulation	Modeling the Inter-electrode Capacitances of Si CoolMOSTM Transistors for Circuit Simulation in High Efficiency Power Systems	Control of Receiver Temperature and Shaft Speed in Dish-stirling Solar Power Plants to Meet Grid Integration Requirements	Real-time Measurement of Power Quantities Under Sinusoidal and Nonsinusoidal Conditions for Single-phase Systems	High Efficiency DC-DC Converter with Twin-bus for Dimmable LED Lighting	A Time-varying Sliding Surface for Robust Position Control of Six Phase Induction Machine (6PIM)	A Novel Digital Capacitor Charge Balance Control Algorithm with a Practical Extreme Voltage Detector	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
3:00 pm – 3:20 pm	Break.....									Grand Salon Prefunction Area

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
	S21 Electric Machines: Machine Design II	S22 DC-AC Inverters: Grid Connected Inverters III	S23 Sustainable Energy Applications: Photovoltaics II	S24 Enabling Technologies: Contactless Power Transfer	S25 Energy Public Policy and Economics: Renewable Energy Integration	S26 Sustainable Energy Applications: Distributed Resources	S27 Energy Efficiency And Industrial Applications: LED Lighting III	S28 Electric Drives: Performance Improvement	S29 DC-DC Converters: Digital Control III	S30 DC-DC Converters: Isolated Converters II
3:20 pm – 3:45 pm	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	DC Bus Voltage Clamp Method to Prevent Over-voltage Failure in Adjustable Speed Drives	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 Online 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

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
	S21 Electric Machines: Machine Design II	S22 DC-AC Inverters: Grid Connected Inverters III	S23 Sustainable Energy Applications: Photovoltaics II	S24 Enabling Technologies: Contactless Power Transfer	S25 Energy Public Policy and Economics: Renewable Energy Integration	S26 Sustainable Energy Applications: Distributed Resources	S27 Energy Efficiency And Industrial Applications: Led Lighting III	S28 Electric Drives: Performance Improvement	S29 DC-DC Converters: Digital Control III	S30 DC-DC Converters: Isolated Converters II
4:10 pm – 4:35 pm	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
4:35 pm – 5:00 pm	Modeling and Design Optimization of PM AC Machines Using Computationally Efficient - finite Element Analysis	Single-stage DC-AC Converter for Photovoltaic System	Performance of Photovoltaic Maximum Power Point Tracking Algorithms in the Presence of Noise	Analysis on a Single-layer Winding Array Structure for Contactless Battery Charging Systems with Localized Charging Feature	Overlaying a Parallel Market to Increase Renewable Penetration	Grid Side Cascade Inverter System as an Interface for Wind Energy Storage	Third Harmonic Filtered 13.56 MHz Push-pull Class-E Power Amplifier	A General Approach of Damping Torsional Resonance Modes in Multi-megawatt Applications	Implementation of Digitally Controlled Phase Shift Full Bridge Converter for Server Power Supply	Improvement of Light Load Efficiency of Dual Active Bridge DC-DC Converter by Using Dual Leakage Transformer and Variable Frequency
5:00 pm – 7:00 pm	Expo Reception/Expo Open									Grand Salon

TUESDAY, SEPTEMBER 14, 2010

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

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	Grand Ballroom B
	S31 Electric Drives: Modeling and Control of Overvoltage Transients	S32 Transportation Applications: PHEV	S33 AC-DC Converters: Analog Control of PFC	S34 Enabling Technologies: EMI Analysis and Suppression I	S35 Enabling Technologies: Reliability and Lifetime Estimation	S36 Electric Machines: Machine Losses and Material Issues	S37 Energy Efficiency And Industrial Applications: HID Lighting	S38 DC-AC Inverters: Inverter Control And Analysis I	S39 Electric Machines: Fractional Slot Machines I	S40 DC-DC Converters Isolated Converters III	S41 DC-DC Converters: Bidirectional Converters I
8:00 am – 8:25 am	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 Solder Fatigue in a Power Module Using the Rise of Case-above-ambient Temperature	New Lines of Investigation on the Effects of Processing 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 Input-series-output-series Inverters System	Design, Analysis, and Fabrication of a High-performance Fractional Slot Concentrated Winding Surface PM Machine	Active Clamped Three-phase Isolated Boost Converter with Series Output Connection for High Step-up Applications	Three-phase Bidirectional DC-DC Converter with Enhanced Current Sharing
8:25 am – 8:50 am	High-frequency Cable and Motor Modeling of Long-cable-fed Induction Motor Drive Systems	Design Considerations for High-voltage DC Bus Architecture and Wire Mechanization for Electric/Hybrid Electric Vehicle Applications	A Novel SFVM Control Scheme for Two-phase Interleaved CCM/DCM Boundary Mode Boost Converter in Power Factor Correction Applications	Characterization of a Modified LISN for Effective Separated Measurements of Common Mode and Differential Mode EMI Noise	The Lifetime/Volume Ratio as an Index to Assess the Reliability of Power Converters	Analytical Prediction of Rotor Eddy Current Loss Due to Stator Slotting in PM Machines	A Timing Controllable and Polarity Tracked Igniter for High Intensity Discharge Lamp Electronic Ballast	Approaches to Enhance Discrete Control Algorithms Serving for Motor Drive System	Unsaturated and Saturated Saliency Trends in Fractional-slot Concentrated-winding Interior Permanent Magnet Machines	A Simple and Effective Control Strategy for Improved Operation of a Current-fed Push-pull Converter	Bidirectional High-voltage DC-DC Converter for Advanced Railway Locomotives

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
	S31 Electric Drives: Modeling and Control of Overvoltage Transients	S32 Transportation Applications: PHEV	S33 AC-DC Converters: Analog Control of PFC	S34 Enabling Technologies: EMI Analysis and Suppression I	S35 Enabling Technologies: Reliability and Lifetime Estimation	S36 Electric Machines: Machine Losses and Material Issues	S37 Energy Efficiency And Industrial Applications: Hid Lighting	S38 DC-AC Inverters: Inverter Control And Analysis I	S39 Electric Machines: Fractional Slot Machines I	S40 DC-DC Converters Isolated Converters III	S41 DC-DC Converters: Bidirectional Converters I
8:50 am – 9:15 am	A Low-loss Motor Terminal Filter for Overvoltage Suppression	Development and Validation of Models for 95% Efficiency, 220 W Wireless Power Transfer Over a 30 cm Air-gap	Sliding Mode Current Control of Grid-connected Voltage Source Converter	Meeting MIL-STD-461 for 2kW Military Tactic Generator Drive System	Real-time Life Consumption Power Modules Prognosis Using Online Rainflow Algorithm in Metro Applications	Analysis of Proximity Losses in High-speed Surface Permanent Magnet Machines with Concentrated Windings	Design and Analysis of a Novel Two-stage Electronic Ballast for HID Lamp	A Fast, Accurate and Robust Algorithm to Detect Fundamental and Harmonic Sequences	Six-phase Supply Feasibility Using a PM Fractional-slot Dual Winding Machine	An Adaptive Blanking Time Control Scheme for Audible Noise Free Quasi Resonant Flyback Converter	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 with Thermal 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

9:40 am – 10:00 am **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
	S42 Electric Drives: AC Machine Control	S43 Transportation Application: Infrastructure	S44 AC-DC Converters: Digital Control of PFC	S45 Enabling Technologies: EMI Analysis And Suppression II	S46 Enabling Technologies: Packaging And Integration	S47 Electric Machines: Machine Losses and Thermal Analysis	S48 Energy Efficiency and Industrial Applications: Fluorescent Ballast	S49 DC-AC Inverters: Inverter Control and Analysis II	S50 Electric Machines: Fractional Slot Machines II	S51 DC-DC Converters: Isolated Converters IV	S52 DC-DC Converters: Bidirectional Converters II
10:00 am – 10:25 am	A New Deep Field-weakening Strategy of IPM Machines Based on Single Current Regulator and Voltage Angle Control	Control Strategy of a Multi-port, Grid Connected, Direct-DC-PV Charging Station for Plug-in Electric Vehicles	A New Digital Control System for a Single-phase Half-bridge Rectifier with Fast Dynamic Response	An Improved Design for Transmission Line Busbar EMI Filter	Integrating Giant Magneto-resistive (GMR) Field Detectors for High Bandwidth Current Sensing in Power Electronic Modules	Thermal Analysis of a Segmented Stator Winding Design	A Single Eco-friendly Ultra-low-loss Magnetic Ballast Design for a Wide Range of T5 High-efficient Fluorescent Lamps	A New Optimal PWM Strategy Applied to Single Phase Inverters with Variable DC Voltage	Considerations on Selecting Fractional-slot Windings	Using Adaptive Off-time Synchronous Rectification to Improve Efficiency in Low Output Voltage Converters	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
	S42 Electric Drives: AC Machine Control	S43 Transportation Application: Infrastructure	S44 AC-DC Converters: Digital Control of PFC	S45 Enabling Technologies: EMI Analysis And Suppression II	S46 Enabling Technologies: Packaging And Integration	S47 Electric Machines: Machine Losses and Thermal Analysis	S48 Energy Efficiency and Industrial Applications: Fluorescent Ballast	S49 DC-AC Inverters: Inverter Control and Analysis II	S50 Electric Machines: Fractional Slot Machines II	S51 DC-DC Converters: Isolated Converters IV	S52 DC-DC Converters: Bidirectional Converters II
10:50 am – 11:15 am	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
	Rap Session 1 Electrical Systems for Future Transportation	Rap Session 2 Update on Wind Energy Systems

WEDNESDAY, SEPTEMBER 15, 2010

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

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 B
	S53 DC-AC Inverters: Neutral Point Clamped Inverters	S54 AC-DC Converters: Control of Three Phase PFC	S55 Sustainable Energy Applications: Ocean Wave Energy Systems	S56 Electric Machines: Wind Generators	S57 Enabling Technologies: Power Device Gate Drive Techniques	S58 DC-DC Converters: Magnetic Designs	S59 Electric Machines: Condition Monitoring and Fault Analysis I	S60 Sustainable Energy Applications: Wind Energy Systems I	S61 DC-AC Inverters: Special Topics I	S63 Sustainable Energy Applications: Microgrid I
8:00 am – 8:25 am	Multi-carrier Interleaved PWM Strategies for a New Five-level NPC Inverter Using a 3-phase Coupled Inductor	Direct Power Control for Three-level Neutral Point Clamped PWM Rectifier Based on Virtual Flux	Analysis of Power Extraction from Irregular Waves by All Electric Power Take Off	Optimal Selection of Excitation Capacitor for 6/3-phase Dual Stator-winding Induction Generator with the Static Excitation Controller Applied in Wind Power	A New Inductorless Bipolar Gate Driver for Control FET of High Frequency Buck Converters	High Frequency Bus Converter with Integrated Matrix Transformers for CPU and Telecommunications Applications	A Comparative Study of Permanent Magnet-synchronous and Permanent Magnet-flux Switching Machines for Fault Tolerant Drive Systems	Design and Implementation of STATCOM Combined with Series Dynamic Breaking Resistor for Low Voltage Ride-through of Wind Farms	Performance Evaluation of a New Hybrid-modulation Scheme for High-frequency-AC-link Inverter: Applications for PV, Wind, Fuel-cell, and DER/Storage Applications	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 **S62 Special Session: Industry Perspectives on Emerging Challenges and Opportunities in Renewable Energy and Electrified Transport** Grand Ballroom A

9:40 am – 10:00 am **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
	S64 DC-AC Inverters: Motor Drive Inverters	S65 AC-DC Converters: PFC Modeling and Control	S66 Sustainable Energy Applications: Photovoltaics Converters I	S67 Electric Machines: Reluctance Machines	S68 Enabling Technologies: Package Impedance Issues	S69 DC-DC Converters: Integrated Power Converters	S70 Electric Machines: Condition Monitoring and Fault Analysis II	S71 Sustainable Energy Applications: Wind Energy Systems II	S72 DC-AC Inverters: Special Topics II	S73 Electric Drives: Control Techniques	S74 Sustainable Energy Applications: Microgrid II
10:00 am – 10:25 am	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 <i>WITHDRAWN</i>	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 a High Speed 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 a 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 Drives: Emerging Predictive Control Concepts Versus Field Oriented Control	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 Grids with a Wide Range of Unknown Impedances
11:40 am – 1:30 pm	Lunch on Own										

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
	S75 DC-AC Inverters: Z-Source Topology I	S76 AC-DC Converters: PFC Converters	S77 Sustainable Energy Applications: Photovoltaics Converters II	S78 Electric Machines: Special Machines I	S79 Enabling Technologies: Thermal Management	S80 DC-DC Converters: Non-Isolated Converters	S81 Transportation Applications: Diagnostics and Fault Tolerance	S82 Sustainable Energy Applications: Wind Energy Systems III	S83 DC-DC Converters: Control Techniques I	S84 Electric Drives: Sensorless Drives I	S85 Sustainable Energy Applications: Microgrid III
1:30 pm – 1:55 pm	Optimal Design of the Inductor in Z-source Inverter with Single Phase Shoot-through SVPWM Strategy	Bridgeless Single-stage Full-bridge Converter with One Cycle Control in the Output Voltage	Digital Controller Development for Grid-tied Photovoltaic Inverter with Model-based Technique	Different Arrangements for Dual-rotor Dual-output Radial-flux Motors	Seawater Based Cold Plate for Power Electronics Cooling	A Comprehensive Multi-mode Performance Analysis of Interleaved Boost Converters	Real-time Fault Diagnostics for a Permanent Magnet Synchronous Motor Drive for Aerospace Applications	Balance and Unbalance Voltage Dips Impacts on Full Scale Converter Wind Turbines	Self-tuning Mixed-signal Optimal Controller with Improved Load Transient Waveform Detection and Smooth Mode Transition for DC-DC Converters	Temperature Issues in Saliency-tracking Based Sensorless Methods for PM Synchronous Machines	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-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 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
	S86 DC-AC Inverters: Z-Source Topology II	S87 AC-DC Converters: Single Phase PFC	S88 Sustainable Energy Applications: Photovoltaics Converters III	S89 Electric Machines: Special Machines II	S90 Enabling Technologies: Wide Bandgap Power Semiconductors	S91 DC-DC Converters: Resonant Converters	S92 Transportation Applications: Drivetrains	S93 Sustainable Energy Applications: Wind Energy Systems IV	S94 DC-DC Converters: Control Techniques II	S95 Electric Drives: Sensorless Drives II	S96 Sustainable Energy Applications: Microgrid IV
3:30 pm – 3:55 pm	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 Enhancement Mode GaN DHFETs on Silicon	Analysis of Asymmetrical Duty Controlled LCC 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 LCC Converter for Low-profile Applications	Comparison of Si and 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
7:00 pm – 9:30 pm	ECCE Banquet										Grand Salon

THURSDAY, SEPTEMBER 16, 2010

7:00 am – 3:00 pm

Registration Open.....

Prefunction South

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	Grand Ballroom B
	S97 Electric Machines: Permanent Magnet Machines I	S98 DC-DC Converters: Special Topics I	S99 Sustainable Energy Applications: Flexible Renewable/ Alternative Energy System I	S100 Electric Machines: Turbine Generators	S101 Transportation Applications: EV/PHEV Battery Chargers	S102 Sustainable Energy Applications: Smart Grid Interface	S103 Electric Machines: Design Optimization	S104 DC-AC Inverters: Multi-Level Inverters I	S105 DC-DC Converters: Soft Switching Techniques I	S106 Sustainable Energy Applications: Power Quality I	S107 Sustainable Energy Applications: Wind Turbine Control I
8:00 am – 8:25 am	Influence of Slot Opening on Optimal Stator and Rotor Pole Combination and Electromagnetic Performance of Flux-switching PM Brushless AC Machines	An Accurate Loss Model for Current-source Gate Driver with Interleaving BUCK Converter	A Novel Five-level Single-phase Grid-connected Converter for Renewable Distributed Systems	Structural Mass Minimization of Large Direct-drive Wind Generators Using a Buoyant Rotor Structure	A High-performance Single-phase AC-DC Power Factor Corrected Boost Converter for Plug-in Hybrid Electric Vehicle Battery Chargers	Increasing Inter-area Available Transfer Capacity Using Controllable Network Transformers	An Electromagnetic-thermo-mechanical Integrated Design and Optimization Method for Surface Mount Permanent Magnet Machines Considering Load Profiles	An Investigation of Voltage Balancing Circuit for DC Capacitors in Diode-clamped Multilevel Inverters to Realize High Output Power Density Converters	Soft-switching Self-driven Buck Converter with Three-switch Cell Structure	AC Fault Ride-through Capability of VSC-HVDC Transmission Systems	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 Copper Torque in 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 **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
	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
10:00 am – 10:25 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
10:25 am – 10:50 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
10:50 am – 11:15 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	Mechanical Sensorless Maximum Power Tracking Control for Direct-drive PMSG Wind Turbines
11:15 am – 11:40 am	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 Hybrid Power 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

11:45 am – 1:40 pm **Awards Luncheon** Grand Salon

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

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
	S130 Electric Drives: Improved PWM Methods	S131 DC-DC Converters: System Architectures	S132 Sustainable Energy Applications: Energy Harvesting II	S133 Electric Drives: Sensing Techniques	S134 Sustainable Energy Applications: Fuel Cell Power Systems	S135 Enabling Technologies: Power Electronics Modeling and Simulation Tools	S136 Energy Efficiency and Industrial Applications: Special Topics	S137 Enabling Technologies: Power Semiconductors III	S138 DC-AC Inverters: Advanced Inverter System II	S139 Energy Public Policy and Economics: Reducing Renewable Energy Cost with Power Electronics and Carbon Trading	S140 Enabling Technologies: Magnetic Design and Optimization II
3:40 pm – 4:05 pm	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-power 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	Moved to Post-Test Session II	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-IEGTs	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 conceirge 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

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**

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**

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 14th 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**Zhiyun 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 Bockerhoff 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

Myoung-ho 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 Astronauts, 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&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 Mantooth, 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 Verwecken, 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 Krihely 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

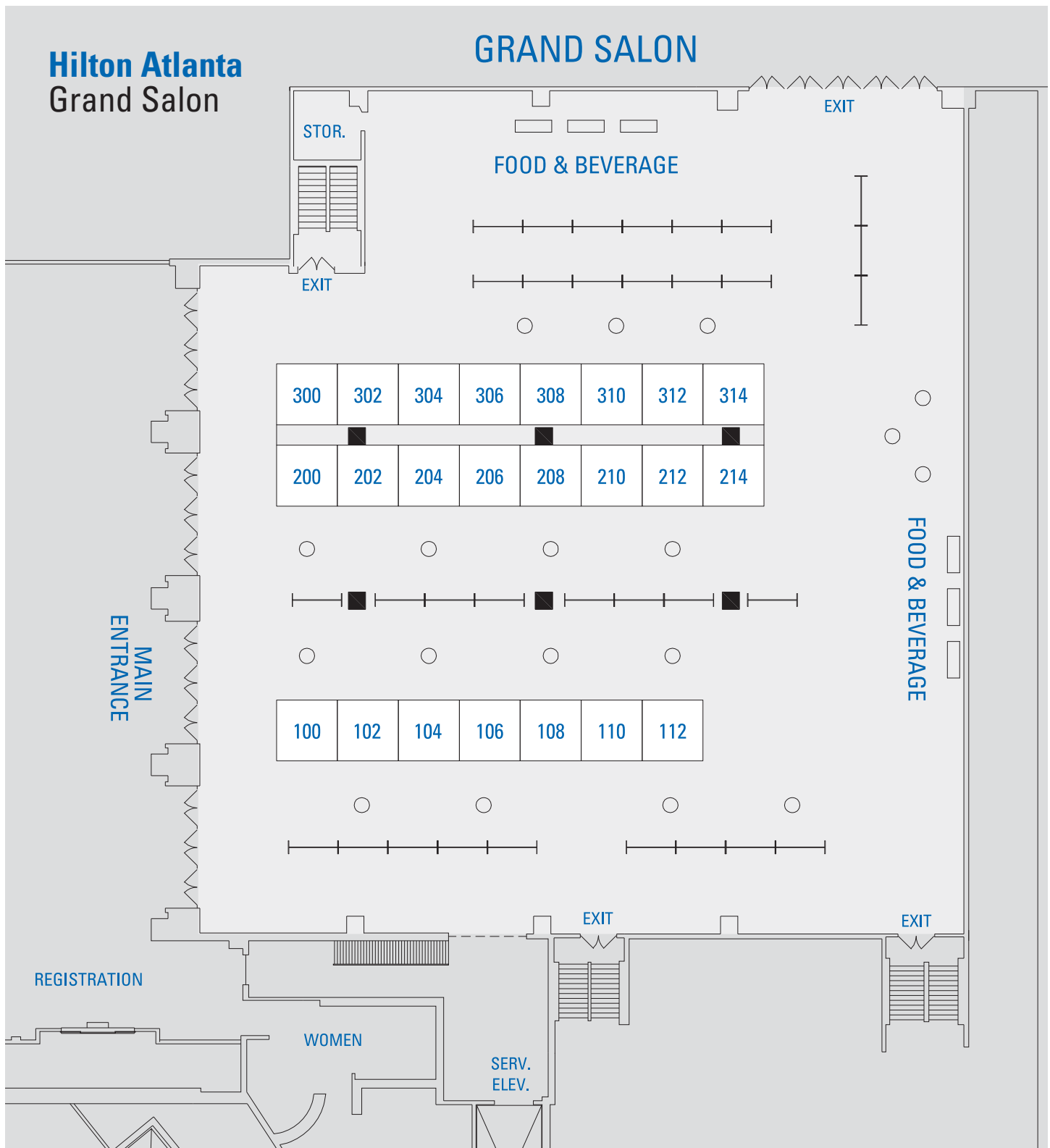
Roberto Prieto, Rafael Asensi and Jose Cobos, CEI-UPM, Spain

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

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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.

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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2011

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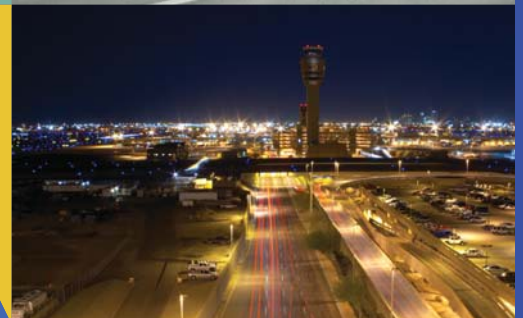
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SEPTEMBER



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														
SATURDAY, SEPTEMBER 11, 2010														
3:00 pm – 5:00 pm	Reg. Open													
SUNDAY, SEPTEMBER 12, 2010														
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
MONDAY, SEPTEMBER 13, 2010														
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											
TUESDAY, SEPTEMBER 14, 2010														
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									
WEDNESDAY, SEPTEMBER 15, 2010														
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											
THURSDAY, SEPTEMBER 16, 2010														
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													