Technical Program Schedule – Oral Sessions

Monday, September 15 - 10:20 am - 12:00 pm

S1 MPPT for Solar PV Systems

Room: 323
Chair: Ahmed Elasser

10:20AM - Distributed Control of PV Strings with Module Integrated Converters in Presence of a Central MPPT *Dezso Sera, Laszlo Mathe, Frede Blaabjerg, Aalborg University, Denmark*

10:45AM - Maximum Power Point Tracking for Multiple Photovoltaic Modules using Root-Finding Methods *Joonhyun Kim, Alexis Kwasinski, University of Texas at Austin, United States*

11:10AM - PV Generation Enhancement with a Virtual Inertia Emulator to Provide Inertial Response to the Grid *Xiaoyu Wang, Meng Yue, Eduard Muljadi, Brookhaven National Laboratory, United States; National Renewable Energy Laboratory, United States*

11:35AM - Using MPPT in Multi-Pulse Converters for Photovoltaic Cogeneration *Lucas Lapolli Brighenti, Rubens Tadeu Hock Jr., Luis Gustavo Kremer, Alessandro Luiz Batschauer, Marcello Mezaroba, Santa Catarina State University, Brazil*

S2 Power Converters for Photovoltaic Applications

Room: 324
Chair: M. Amirabadi, T. Shimizu

10:20AM - Low-Voltage Ride through Capability of Three-Phase Grid-Connected Photovoltaic Inverters with Slim Film Capacitors *Baburaj Karanayil, Josep Pou, Mitra Mirhosseini, Vassilios G. Agelidis, University of New South Wales, Australia; Technical University of Catalonia, Spain*

10:45AM - Modular Photovoltaic Inverter with High-Frequency DC/DC Stage based on Low-Voltage FETs *F. Giuliani, D. Barater, C. Concari, P. Cova, N. Delmonte, R. Menozzi, G. Buticchi, L. Tarisciotti, University of Parma, Italy; University of Kiel, Germany; University of Nottingham, United Kingdom*

11:10AM - Control Approach to Achieve Burst Mode Operation with DC-Link Voltage Protection in Single-Phase Two-Stage PV Inverters *Yang Du, Weidong Xiao, Yihua Hu, Dylan Dah-Chuan Lu, Masdar Institute of Science and Technology, United Arab Emirates; University of Strathclyde, United Kingdom; University of Sydney, Australia*

11:35AM - Optimized Control of Isolated Residential Power Router for Photovoltaic Applications *Yuzhi Zhang, Janviere Umuhoza, Yusi Liu, Chris Farnell, H. Alan Mantooth, Roger Dougal, University of Arkansas, United States; University of South Carolina, United States*

S3 Microgrid Control I

Room: 325
Chair: Sandeep Bala, Dragan Maksimovic

10:20AM - Dual Sequence Current Controller without Current Sequence Decomposition Implemented on DSRF for Unbalanced Grid Voltage Conditions *Sizhan Zhou, Jinjun Liu, Linyuan Zhou, Hongwei She, Xi'an Jiaotong University, China*

10:45AM - Voltage-Frequency Control of an Islanded Microgrid using the Intrinsic Droop Characteristics of Resonant Current Regulators *B. Shoeiby, R. Davoodnezhad, D.G. Holmes, B.P. McGrath, RMIT University, Australia*

11:10AM - Plug and Play Nonlinear Droop Construction Scheme to Optimize Microgrid Operations *Fatih Cingoz, Ali Elrayyah, Yilmaz Sozer, University of Akron, United States*

11:35AM - Transient Droop for Improved Transient Load Sharing in Microgrids *Andrew Paquette, Deepak Divan, Georgia Institute of Technology, United States*

S4 Widebandgap Devices I

Room: 326
Chair: Filippo Chimento, Jerry Hudgins

10:20AM - Modeling and Characterization of a 300 V GaN based Boost Converter with 96% Efficiency at 1 MHz *Raghav Khanna, Brian Hughes, William Stanchina, Rongming Chu, Karim Boutros, Gregory Reed, University of Pittsburgh, United States; HRL Laboratories LLC, United States*

10:45AM - Analytical Loss Model of Low Voltage Enhancement Mode GaN HEMTs *Wang Kangping, Yang Xu, Zeng Xiangjun, Yu Xiaoling, Li Hongchang, Guo Yixuan, Gao Bing, Ma Huan, Xi'an Jiaotong University, China*

11:10AM - Avoiding Si MOSFET Avalanche and Achieving True Zero-Voltage-Switching for Cascode Device *Xiucheng Huang, Weijing Du, Zhengyang Liu, Fred C. Lee, Qiang Li, Virginia Polytechnic Institute and State University, United States*

11:35AM - Characterization and Modeling of a Gallium Nitride Power HEMT *Kang Peng, Enrico Santi, University of South Carolina, United States*

S5 Reliability and Diagnostics in Grid Converters

Room: 327
Chair: Antonio M. Cardoso

10:20AM - Detection of Capacitor Degradation in LC Filters for AC Drives *Rangarajan M. Tallam, Russel J. Kerkman, Richard A. Lukaszewski, Rockwell Automation, United States*

10:45AM - Improved Reliability of Single-Phase PV Inverters by Limiting the Maximum Feed-in Power *Yongheng Yang, Huai Wang, Frede Blaabjerg, Aalborg University, Denmark*

11:10AM - Improved Dual Second-Order Generalized Integrator PLL for Grid Synchronization under Non-Ideal Grid Voltages including DC Offset *Jie Li, Jing Zhao, Jia Wu, Ping-ping Xu, Xi'an University of Technology, China*

11:35AM - Single Phase Synchronous Reference Frame Power Control of Grid Connected Multi Level Inverter *Bhanu Naga V Angirekula, Olorunfemi Ojo, Tennessee Technological University, United States*

S6 Telecom Power Supplies

Room: 328
Chair: Carl Ho, Xiao-Bo Yang

10:20AM - Hyper-Efficient (98%) and Super-Compact (3.3kW/dm3) Isolated AC/DC Telecom Power Supply Module based on Multi-Cell Converter Approach *Matthias Kasper, Dominik Bortis, Johann W. Kolar, Gerald Deboy, ETH Zurich, Switzerland; Infineon Technologies Austria, AG, Austria*

10:45AM - Adaptive Implementation Strategy of Virtual Impedance for Paralleled Inverters UPS *Hongtao Shi, Fang Zhuo, Dong Zhang, Zhiqing Geng, Feng Wang, Xi'an Jiaotong University, China*

11:10AM - Modeling the Output Impedance of Three-Phase Uninterruptible Power Supply in D-Q Frame *Bo Wen, Dushan Boroyevich, Rolando Burgos, Paolo Mattavelli, Virginia Polytechnic Institute and State University, United States; University of Padova, Italy*

11:35AM - A Series-Stacked Architecture for Highly-Efficiency Data Center Power Delivery *Josiah McClurg, Robert C.N. Pilawa-Podgurski, Pradeep S. Shenoy, University of Illinois at Urbana-Champaign, United States; Texas Instruments Inc., United States*

S7 Modulation for Power Converters

Room: 329
Chair: Donald Holmes

10:20AM - Decoupled Modulation Techniques for a Four-Level Five-Phase Open-End Winding Drive *Martin Jones, Milan Darijevic, Emil Levi, Liverpool John Moores University, United Kingdom*

10:45AM - Common-Mode Voltage Reduction of Three Level Four Leg PWM Converter *Seung-Jun Chee, Hyeon-Sik Kim, Seung-Ki Sul, Sanggi Ko, Seoul National University, Korea; Samsung Heavy Industries, Korea*

11:10AM - A Dead-Time Compensation Method for Parabolic Current Control with Improved Current Tracking Precision *Lanhua Zhang, Bin Gu, Jason Dominic, Jih-Sheng Lai, Virginia Polytechnic Institute and State University, United States*

11:35AM - Investigation into the Control Methods to Reduce the DC-Link Capacitor Ripple Current in a Back-to-Back Converter *Zian Qin, Huai Wang, Frede Blaabjerg, Poh Chiang Loh, Aalborg University, Denmark*

S8 Control and Modulation of Multi-Level Converters I

Room: 330
Chair: Pericle Zanchetta, Stefano Bifaretti

10:20AM - A Generalised Natural Balance Model and Balance Booster Filter Design for Three Level Neutral Point Clamped Converters *Z. Mohzani, B.P. McGrath, D.G. Holmes, Robert Bosch Pty. Ltd., Singapore; RMIT University, Australia*

10:45AM - A Reduced Switching Loss PWM Strategy to Eliminate Common Mode Voltage In Multilevel Inverters *Nho-Van Nguyen, Tam Tu Nguyen Khanh, Hai Thanh Quach, Hong-Hee Lee, Hochiminh City University of Technology, Viet Nam; University of Ulsan, Korea*

11:10AM - Capacitor Voltage Balancing of a Five-Level Diode-Clamped Converter using Minimum Loss SVPWM Algorithm for Wide Range Modulation Indices *Aparna Saha, Yilmaz Sozer, Ali Elrayyah, University of Akron, United States*

11:35AM - A New Control Scheme of Five-Level Active NPC Converters for Common Mode Voltage Mitigation in Medium Voltage Drives *Jun Li, Zach Pan, Rolando Burgos, ABB US Corporate Research Center, United States; Virginia Polytechnic Institute and State University, United States*

S9 Assorted Issues in Electric Drives I

Room: 333
Chair: Uday Deshpande, Akshay Rathore

10:20AM - Self-Commissioning of Inverter Dead-Time Compensation by Multiple Linear Regression based on a Physical Model *Nicola Bedetti, Sandro Calligaro, Roberto Petrella, Gefran s.p.a., Italy; DIEG-University of Udine, Italy*

10:45AM - Current Reconstruction Method with Single DC-Link Current Sensor based on the PWM Inverter and AC Motor *Kwang-Sik Kim, Han-Beom Yeom, Hyun-Keun Ku, Jang-Mok Kim, Won-Sang Im, Pusan National University, Korea; Lehigh University, United States*

11:10AM - Dynamic Effects of Mismatched Time Constants in DC-DC Converters with Inductor DCR Current Sensing *Giorgio Spiazzi, Simone Buso, Luca Corradini, University of Padova, Italy*

11:35AM - Insulated Signal Transmission System using Planar Resonant Coupling Technology for High Voltage IGBT Gate Driver *Hiroshi Shinoda, Takahide Terada, Hitachi, Ltd., Japan*

S10 Induction Machines

Room: 334
Chair: Aldo Boglietti, Andy Knight

10:20AM - Modeling and Performance of Novel Scheme Dual Winding Cage Rotor Variable Speed Induction Generator with DC Link Power Delivery *Lucian Nicolae Tutelea, Ion Boldea, Nicolae Muntean, Sorin Ioan Deaconu, Politehnica University of Timisoara, Romania*

10:45AM - A Differential Evolution Algorithm for Designing Inverter-Driven Induction Motors *Alejandro J. Piña, Longya Xu, Ohio State University, United States*

11:10AM - A Five-Phase Induction Machine Model using Multiple DQ Planes Considering the Effect of Magnetic Saturation *Ayman S. Abdel-Khalik, Shehab Ahmed, Ahmed Massoud, Alexandria University, Egypt; Texas A&M University at Qatar, Qatar; Qatar University, Qatar*

11:35AM - Analysis of Non-Intrusive Efficiency Estimation of Induction Machines Compared to the IEEE 112B and IEC 34-2-1 Standards *C.S. Gajjar, M.A. Khan, P. Barendse, University of Cape Town, South Africa*

S11 Flux-Switching Machines

Room: 335
Chair: Ed Lovelace, Peng Zhang

10:20AM - Analysis of Flux Switching Permanent Magnet Machine Design for High-Speed Applications *Yingjie Li, Silong Li, Yida Yang, Bulent Sarlioglu, WEMPEC, University of Wisconsin-Madison, United States*

10:45AM - Analysis of the Torque Production Mechanism for Flux-Switching Permanent Magnet Machines *James D. McFarland, T.M. Jahns, Ayman M. El-Refaie, University of Wisconsin-Madison, United States; GE Global Research Center, United States*

11:10AM - Reduced Rare-Earth Flux Switching Machines for Traction Applications *Tsarafidy Raminosoa, Ayman El-Refaie, Di Pan, Kum-Kang Huh, James Alexander, Kevin Grace, Stefan Grubic, Steven Galioto, Patel Reddy, Xiaochun Shen, GE Global Research, United States; Ensco PLC, United States*

11:35AM - Investigation of On-Loaded Performances of Hybrid-Excitation Flux-Switching Brushless Machines for HEV/EV Applications *Gan Zhang, Wei Hua, Ming Cheng, Jinguo Liao, Jianzhong Zhang, Wei Jiang, Southeast University, China*

Monday, September 15 - 1:30 pm - 3:35 pm

S12 Power Converters for Transportation Applications I

Room: 323
Chair: S. Williamson, Giovanna Oriti

1:30PM - Comparison of Multi-Port Converter Topologies with Bidirectional Energy Flow for Automotive Energy Net Aapplications *Michael Mürken, Markus Simon, Christian Augustin, Johannes Pforr, Technische Hochschule Ingolstadt, Germany*

1:55PM - An Asymmetrical ΓZ-Source Hybrid Power Converter with Space Vector Pulse-Width Modulation *Jun Cai, Qing-Chang Zhong, University of Sheffield, United Kingdom*

2:20PM - Design of a Solid-State D.C. Circuit Breaker for Light Rail Transit Power Supply Network *David Lawes, Li Ran, Zhenyu Xu, London Underground Ltd., United Kingdom; University of Warwick, United Kingdom; Beijing Sifang Automation Ltd., China*

2:45PM - Design of Coupled Inductor for Minimum Inductor Current Ripple in Rapid Traction Battery Charger Systems *Taewon Kang, Beomseok Chae, Tahyun Kang, Yongsug Suh, Chonbuk National University, Korea*

3:10PM - Asymmetric Interleaving in Low-Voltage CMOS Power Management with Multiple Supply Rails *Aaron D. Ho, Marcel Schuck, Robert C.N. Pilawa-Podgurski, University of Illinois at Urbana-Champaign, United States*

S13 Control of Power Converters in Renewable Energy

Room: 324
Chair: Jul-Ki Seok, Mahshid Amirabadi

1:30PM - Analysis and Design of Grid-Current-Feedback Active Damping for LCL Resonance in Grid-Connected Voltage Source Converters *Xiongfei Wang, Frede Blaabjerg, Poh Chiang Loh, Aalborg University, Denmark*

1:55PM - Investigation on Series Active Filter Compensated High Power Grid-Connected Voltage Source Inverters with LCL Filter *S. Nadir Usluer, Ahmet M. Hava, Aselsan Inc., Turkey; Middle East Technical University, Turkey*

2:20PM - Input Current Ripple Cancellation of Current-Fed Switched Inverter *Soumya Shubhra Nag, Arun Sankar, Santanu Mishra, Avinash Joshi, Indian Institute of Technology Kanpur, India*

2:45PM - Advanced Techniques for Integration of Energy Storage and Photovoltaic Generator in Renewable Energy Systems *Suman Dwari, Luis Arnedo, Vladimir Blasko, United Technologies Research Center, United States*

3:10PM - Analysis and PWM Control of Three-Phase Boost-Derived Hybrid Converter *Olive Ray, Vimala Dharmarajan, Santanu Mishra, Ravindranath Adda, Prasad Enjeti, Indian Institute of Technology Kanpur, India; Indian Institute of Technology Guwahati, India; Texas A&M University, United States*

S14 Utility-Scale Battery Systems

Room: 325
Chair: Adel Nasiri

1:30PM - Centralized Control of Large Capacity Parallel Connected Power Conditioning System for Battery Energy Storage System in Microgrid *Jiuqing Cai, Changsong Chen, Shanxu Duan, Dongdong Yang, Huazhong University of Science and Technology, China*

1:55PM - Performance Analysis of LiFePO4 Battery Energy Storage for Utility-Scale PV System *Ye Yang, Hui Li, Florida State University, United States*

2:20PM - Optimization of Power Dispatch to Minimize Battery Storage Capacity in Wind Farm *Cong-Long Nguyen, Hong-Hee Lee, University of Ulsan, South Korea*

2:45PM - Residential Usage Profile Optimization and Experimental Implementation of the Retired HEV Battery with a Hybrid Microgrid Testbed *Feng Guo, He Li, Chengcheng Yao, Mohammed Alsolami, Andong Lang, Xintong Lu, Jin Wang, Ohio State University, United States*

3:10PM - A Hybrid Wind-Solar-Storage Energy Generation System Configuration and Control *Dan Shen, Afshin Izadian, Ping Liao, Purdue School of Engineering and Technology, United States; Nantong University, China*

S15 Widebandgap Devices II

Room: 326
Chair: Jelena Popovic, Enrico Santi

1:30PM - Investigating the Reliability of SiC MOSFET Body Diodes using Fourier Series Modelling *R. Bonyadi, O. Alatise, S. Jahdi, J. Hu, L. Evans, P.A. Mawby, University of Warwick, United Kingdom*

1:55PM - 10 kV - 15 kV Silicon Carbide Power MOSFETs for Next-Generation Energy Conversion and Transmission Systems *Vipindas Pala, Edward V. Brunt, Lin Cheng, Michael O'Loughlin, Jim Richmond, Albert Burk, Scott T. Allen, David Grider, John W. Palmour, Charles J. Scozzie, Cree, Inc., United States; US Army Research Laboratory, United States*

2:20PM - 15-kV 100-A Single-Bias All-Optical SiC Emitter Turn-Off Thyristor *A. Mojab, S.K. Mazumder, University of Illinois at Chicago, United States*

2:45PM - Physics-based Electro-Thermal Saber Model and Parameter Extraction for High-Voltage SiC Buffer IGBTs *T.H. Duong, A.R. Hefner, J.M. Ortiz-Rodríguez, S.-H. Ryu, Edward Van Brunt, Lin Cheng, Scott Allen, John W. Palmour, National Institute of Standards and Technology, United States; Cree, Inc., United States*

3:10PM - High-Efficiency Three-Phase Inverter with SiC MOSFET Power Modules for Motor-Drive Applications *Juan Colmenares, Dimosthenis Peftitsis, Georg Tolstoy, Diane Sadik, Hans-Peter Nee, Jacek Rabkowski, KTH Royal Institute Technology, Sweden; Warsaw University of Technology, Poland*

S16 Modular Multi-Level Converters for HVDC

Room: 327
Chair: Madhav Manjrekar, Qin Lei

1:30PM - Control of Hybrid HVDC Transmission System with LCC and FB-MMC *Younggi Lee, Shenghui Cui, Sungmin Kim, Seung-Ki Sul, Seoul National University, Korea*

1:55PM - A Switching Frequency Reduction and a Mitigation of Voltage Fluctuation of Modular Multilevel Converter for HVDC *Hak-Jun Lee, Jae-Jung Jung, Seung-Ki Sul, LSIS Co., Ltd., Korea; Seoul National University, Korea*

2:20PM - Maximum Modulation Index for Modular Multilevel Converter with Circulating Current Control *Yalong Li, Xiaojie Shi, Bo Liu, Fred Wang, Wanjun Lei, University of Tennessee, United States; Xi'an Jiaotong University, China*

2:45PM - Modulation and Control of MMC based Multiterminal HVDC *Xiu Yao, Luis Herrera, Jin Wang, Ohio State University, United States*

3:10PM - A Peak Current Limit Control Technique in Low-Voltage Ride through Operation of the Star-Connected Cascaded H-Bridges Converter *Chia-Tse Lee, Hsin-Chih Chen, Ching-Wei Wang, Ping-Heng Wu, Ching-Hsiang Yang, Po-Tai Cheng, National Tsing Hua University, Taiwan*

S17 Control of Three-Phase Converters

Room: 328
Chair: Luca Zarri, J. Pou

1:30PM - Power Converter Control Framework for Agile Research and Development *Torben N. Matzen, Kim B. Larsen, Anders L. Jørgensen, Morten Weje, PowerCon A/S, Denmark; PowerCon Embedded A/S, Denmark*

1:55PM - Grid Frequency Tracking Control Strategy without PLL for Three-Phase Inverter *Xinxin Zheng, Lan Xiao, Huizhen Wang, Shuo Liu, Nanjing University of Aeronautics and Astronautics, China*

2:20PM - An Improved Direct Power Control of PWM Rectifier with Active Power Ripple Minimization *Yongchang Zhang, Changqi Qu, Zhengxi Li, Wei Xu, North China University of Technology, China; Huazhong University of Science and Technology, China*

2:45PM - Capacitor Voltage Balancing Control of a Fully Integrated Three-Level Isolated AC-DC PFC Converter for Reliable Operations *Xiong Li, Serkan Dusmez, Bilal Akin, Kaushik Rajashekara, University of Texas at Dallas, United States*

3:10PM - Discrete Time Modeling, Implementation and Design of Current Controllers *Christoph H. van der Broeck, Rik W. De Doncker, Sebastian A. Richter, Jochen von Bloh, RWTH Aachen University, Germany; AixControl GmbH, Germany*

S18 AC-AC Converters

Room: 329
Chair: Patrick Wheeler, Pericle Zanchetta

1:30PM - Single-Phase AC-AC Double-Star Chopper-Cells (DSCC) Converter without Common DC-Link Capacitor *Italo Roger F.M.P. Da Silva, Alexandre C. Oliveira, Cursino B. Jacobina, Federal University of Campina Grande, Brazil*

1:55PM - A Novel Single-Phase Cascaded Multilevel AC-AC Converter without Commutation Problem *Sanghoon Kim, Heung-Geun Kim, Honnyong Cha, Kyungpook National University, Korea*

2:20PM - Evaluation of a Maximum Power Density Design Method for Matrix Converter using SiC-MOSFET *Kazuhiro Koiwa, Jun-ichi Itoh, Nagaoka University of Technology, Japan*

2:45PM - Several-Hundred-kHz Single-Phase to Commercial Frequency Three-Phase Matrix Converter using Delta-Sigma Modulation with Space Vector *Yuki Nakata, Koji Orikawa, Jun-ichi Itoh, Nagaoka University of Technology, Japan*

3:10PM - The Impact of Switching Frequency on Input Filter Design for High Power Density Matrix Converter *Saeed Safari, Alberto Castellazzi, Pat Wheeler, University of Nottingham, United Kingdom*

S19 Single-Phase PFC Converters

Room: 330
Chair: Paolo Mattavelli, Pericle Zanchetta

1:30PM - A Single-Stage Three-Level Isolated PFC Converter *Serkan Dusmez, Xiong Li, Bilal Akin, University of Texas at Dallas, United States*

1:55PM - A Ripple-Free Input Current PFC using Power Semiconductor Filter *Kuen-faat Yuen, Wing-to Fan, Henry Shu-hung Chung, City University of Hong Kong, Hong Kong*

2:20PM - A Family of Single-Phase Hybrid Step-Down PFC Converters *Siyang Zhao, Junming Zhang, Hulong Zeng, Xinke Wu, Zhejiang University, China*

2:45PM - A Bridgeless Hybrid-Resonant PWM Zero Voltage Switching Boost AC-DC Power Factor Corrected Converter *Muntasir Alam, Wilson Eberle, Chris Botting, Murray Edington, University of British Columbia, Canada; Delta-Q Technologies Corp., Canada*

3:10PM - Design and Evaluation of GaN-based Dual-Phase Interleaved MHz Critical Mode PFC Converter
Zhengyang Liu, Xiucheng Huang, Mingkai Mu, Yuchen Yang, Fred C. Lee, Qiang Li, Virginia Polytechnic Institute and State University, United States

S20 Ernesto Weidenbrug Memorial Session: Diagnostics of Electric Machines

Room: 333
Chair: Sang Bin Lee, Peter Wung

1:30PM - Advanced Rotor Assessment of Motors Operating under Variable Load Conditions in Mining Facilities
José A. Antonino-Daviu, V. Climente-Alarcón, J. Pons-Llinares, E. Wiedenbrug, Universitat Politècnica de València, Spain; eta Scientific Inc, United States

1:55PM - PM Synchronous Machine Drive Response to Asymmetrical Short-Circuit Faults *Gilsu Choi, T.M. Jahns, University of Wisconsin-Madison, United States*

2:20PM - Online Broadband Insulation Spectroscopy of Induction Machines using Signal Injection *Prabhakar Neti, Stefan Grubic, General Electric Global Research, United States*

2:45PM - Evaluation of the Influence of Rotor Magnetic Anisotropy on Condition Monitoring of 2 Pole Induction Motors *Sungsik Shin, Jongwan Kim, Sang Bin Lee, Chaewoong Lim, Ernesto J. Wiedenbrug, Korea University, Korea; Hansung Electric Industrial Company, Korea*

3:10PM - Electrical Discharge and its Impact on Drivetrains of Wind Turbines *Pinjia Zhang, GE Global Research, United States*

S21 Inductive Power Transfer I

Room: 335
Chair: Carl Ho, Burak Ozpineci

1:30PM - A Dual-Side Controlled Inductive Power Transfer System Optimized for Large Coupling Factor Variations *Tobias Diekhans, Rik W. De Doncker, Robert Bosch GmbH, Germany; RWTH Aachen University, Germany*

1:55PM - Magnetic Integration of LCC Compensated Resonant Converter for Inductive Power Transfer Applications *Junjun Deng, Junjun Deng, Weihan Li, Siqi Li, Chris Mi, Northwestern Polytechnical University, China; University of Michigan-Dearborn, United States*

2:20PM - A 3.5kW Wireless Charger for Electric Vehicles with Ultra High Efficiency *Raffael Haldi, Kurt Schenk, University of Applied Sciences NTB, Switzerland*

2:45PM - Loosely Coupled Inductive Wireless Power Transfer Systems with Class-E Transmitter and Multiple Receivers *Hiroo Sekiya, Kazuhide Inoue, Tomoharu Nagashima, Tadashi Suetsugu, Shotaro Kuga, Xiuqin Wei, Kenichi Shirota, Hironobu Hatamoto, Satoru Shimizu, Chiba University, Japan; Fukuoka University, Japan; Oki Electric Industry Co.,Ltd., Japan*

3:10PM - Transformer Coupled Asymmetrical Half Bridges for Voltage Balancing of Floating Capacitor Converters *R. Ul Haque, S. Leng, N. Perera, J. Salmon, University of Alberta, Canada*

SS1 US Government Power Electronics and Electric Motors Research for Electric Motors

Room: 334
Chair: Burak Ozpineci

1:30PM - Advanced Power Electronics and Electric Motors Overview *Burak Ozpineci, Oak Ridge National Laboratory, United States*

1:55PM - WBG Power Electronics for Electric Vehicles *Madhu Chinthavali, Oak Ridge National Laboratory, United States*

2:20PM - Thermal Management for Electric Vehicles *Sreekant Narumanchi, National Renewable Energy Laboratory, United States*

2:45PM - Electric Motors for Electric Vehicles *Tim Burress, Oak Ridge National Laboratory, United States*

3:10PM - CMI/Rare Earth Magnets *Iver Anderson, the Ames Laboratory, United States*

Tuesday, September 16 - 8:00 am - 9:40 am

S22 Wind Energy: Control and Operation I

Room: 323
Chair: Bulent Sarlioglu

8:00AM - Reduced Cost of Reactive Power in Doubly Fed Induction Generator Wind Turbine System with Optimized Grid Filter *Dao Zhou, Frede Blaabjerg, Toke Franke, Michael Tonnes, Mogens Lau, Aalborg University, Denmark; Danfoss Silicon Power GmbH, Germany; Siemens Wind Power A/S, Denmark*

8:25AM - Direct Power Control for DFIG under Unbalanced and Harmonically Distorted Grid Voltage in Stationary Frame *Yipeng Song, Heng Nian, Zhejiang University, China*

8:50AM - Impacts of Providing Inertial Response on Dynamic Loads of Wind Turbine Drivetrains *Irving P. Girsang, Jaspreet S. Dhupia, Mohit Singh, Vahan Gevorgian, Eduard Muljadi, Jason Jonkman, Nanyang Technological University, Singapore; National Renewable Energy Laboratory, United States*

9:15AM - A Flux Vector-based Discrete-Time Direct Torque Control for Salient-Pole Permanent-Magnet Synchronous Generators *Zhe Zhang, Yue Zhao, Jianwu Zeng, Wei Qiao, University of Nebraska-Lincoln, United States*

S23 Power Converters for Smart Grid and Utility Applications

Room: 324
Chair: Madhav Manirekar, Milijana Odavic

8:00AM - Development of the Active Capacitor Converter for PFC Converters *Shen-Yang Lee, Yang-Lin Chen, Yaow-Ming Chen, Kwang H. Liu, National Taiwan University, Taiwan; National Taiwan University of Science and Technology, Taiwan*

8:25AM - An Improved DPWM Method for Reduction of Resonant Problem in the Inverter *Jin-Hyuk Park, Hae-Gwang Jeong, Kyo-Beum Lee, Ajou University, Korea; LG Electronics, Korea*

8:50AM - Extremely Sparse Parallel AC-Link Universal Power Converters *Mahshid Amirabadi, University of Illinois at Chicago, United States*

9:15AM - Low Frequency Signal Injection for Grid Impedance Estimation in Three Phase Systems *Pablo García, Juan M. Guerrero, Jorge García, Ángel Navarro-Rodríguez, Mark Sumner, University of Oviedo, Spain; University of Nottingham, United Kingdom*

S24 Grid Stability

Room: 325
Chair: Dragan Maksimovic, Khurram Afridi

8:00AM - Sub-Synchronous Resonance Analysis in DFIG-based Wind Farms: Mitigation Methods - TCSC, GCSC, and DFIG Controllers - Part II *Hossein Ali Mohammadpour, Enrico Santi, University of South Carolina, United States*

8:25AM - Impedance Matching based Stability Criteria for AC Microgrids *Patricio A. Mendoza-Araya, Giri Venkataramanan, University of Chile, Chile; University of Wisconsin-Madison, United States*

8:50AM - A Review of Low Voltage Ride-Through Techniques for Photovoltaic Generation Systems *Hao Tian, Feng Gao, Cong Ma, Guoqing He, Li Guanghui, Shandong University, China; China Electric Power Research Institute, China*

9:15AM - Frequency Stability of Hierarchically Controlled Hybrid Photovoltaic-Battery-Hydropower Microgrids *Yajuan Guan, Juan C. Vasquez, Josep M. Guerrero, Dan Wu, Wei Feng, Yibo Wang, Aalborg University, Denmark; Chinese Academy of Sciences, China*

S25 Widebandgap Devices III

Room: 326
Chair: John Siefken, Craig Winterhalter

8:00AM - SiC MOSFETs based Split Output Half Bridge Inverter: Current Commutation Mechanism and Efficiency Analysis *Helong Li, Stig Munk-Nielsen, Szymon Beczkowski, Xiongfei Wang, Aalborg University, Denmark*

8:25AM - Dynamic Behavior Analysis and Characterization of a Cascode Rectifier based on a Normally-on SiC JFET *A. Vazquez, A. Rodriguez, J. Sebastian, E. Maset, A. Ferreres, E. Sanchis, University of Oviedo, Spain; University of Valencia, Spain*

8:50AM - Evaluation of Switching Performance of SiC Devices in PWM Inverter Fed Induction Motor Drives *Zheyu Zhang, Fred Wang, Leon M. Tolbert, Benjamin J. Blalock, Daniel Costinett, University of Tennessee, United States*

9:15AM - Exploration of a Switching Loop Snubber for Parasitic Ringing Suppression *Zheng Chen, Yiying Yao, Dushan Boroyevich, Khai Ngo, Paolo Mattavelli, Virginia Polytechnic Institute and State University, United States*

S26 Modular Multi-Level Converters I

Room: 328
Chair: Marcello Pucci, Pericle Zanchetta

8:00AM - Branch Energy Control for the Modular Multilevel Direct Converter Hexverter *Dennis Karwatzki, Lennart Baruschka, Malte von Hofen, Axel Mertens, Leibniz Universität Hannover, Germany; Protolar GmbH, Germany*

8:25AM - Realization of a Conceptual Approach for Power VLSI using Integrated Full-Bridge Cells in Modular Multilevel Converters *Hao Jiang, Zhenqiang Ma, Giri Venkataramanan, University of Wisconsin-Madison, United States*

8:50AM - A Low-Speed, High-Torque Motor Drive using the Modular Multilevel Cascade Converter based on Triple-Star Bridge Cells (MMCC-TSBC) *Wataru Kawamura, Kuan-Liang Chen, Makoto Hagiwara, Hirofumi Akagi, Tokyo Institute of Technology, Japan*

9:15AM - Capacitor Voltage Balancing based on Fundamental Frequency Sorting Algorithm for Modular Multilevel Converter *Hao Peng, Ying Wang, Zibo Lv, Yan Deng, Xiangning He, Rongxiang Zhao, Zhejiang University, China*

S27 Resonant Control in Power Converters

Room: 329
Chair: Pericle Zanchetta

8:00AM - Selective Harmonic Control for Power Converters *Keliang Zhou, Yongheng Yang, Frede Blaabjerg, Wenzhou Lu, Danwei Wang, University of Canterbury, New Zealand; Aalborg University, Denmark; Southeast University, China; Nanyang Technological University, Singapore*

8:25AM - Reduced Order Generalized Integrators based Selective Harmonic Compensation Current Controller for Shunt Active Power Filters *Zheng Zeng, Jiaqiang Yang, Shilan Chen, Jin Huang, Zhejiang University, China*

8:50AM - Flexible Grid Connection Technique of Voltage Source Inverter under Unbalanced Grid Conditions based on Direct Power Control *Yongbo Shen, Heng Nian, Zhejiang University, China*

9:15AM - Resonant Controllers with Three-Degree of Freedom for AC Power Electronic Converters *A. Lidozzi, L. Solero, F. Crescimbini, M. Di Benedetto, S. Bifaretti, Roma Tre University, Italy; University of Roma Tor Vergata, Italy*

S28 Switched-Capacitor Converters

Room: 330
Chair: Gui-Jia Su, Qiang Li

8:00AM - A High Step-Up Converter based on Switched-Capacitor Voltage Accumulator *Shiying Hou, Jianfei Chen, Chongqing University, China*

8:25AM - Analysis of Coupled Microinductors for Power-Supply-on-Chip Applications *Ciaran Feeney, Maeve Duffy, Ningning Wang, Santosh Kulkarni, Cian O'Mathuna, National University of Ireland, Ireland; University College Cork, Ireland*

8:50AM - Current Source Converter with Switched-Inductor DC Link Circuit for Reduced Converter Losses *Yichao Zhang, T.M. Jahns, University of Wisconsin-Madison, United States*

9:15AM - Analysis and Design of a 1-kW 3X Interleaved Switched-Capacitor DC-DC Converter *Shouxiang Li, Bin Wu, Keyue Smedley, Sigmond Singer, University of California, Irvine, United States; Tel Aviv University, Israel*

S29 Voltage Control Issues in Electric Drives

Room: 333
Chair: Vladimir Blasko, Sanjib Kumar Panda

8:00AM - An Optimal Solution for Operating a Three-Phase Variable Frequency Drive from a Single-Phase AC Source *Mahesh M. Swamy, Joshua Collins, Anupama Balakrishnan, Yaskawa America, Inc., United States; Missouri University of Science and Technology, United States*

8:25AM - Hexagon Voltage Manipulating Control (HVMC) for AC Motor Drives Operating at Voltage Limits *Jul-Ki Seok, SeHwan Kim, Yeungnam University, Korea*

8:50AM - Interleaved PWM Control for Neutral Point Balancing in Dual 3-Level Traction Drives *Subhadeep Bhattacharya, Diego Mascarella, Benoit Boulet, Geza Joos, McGill University, Canada*

9:15AM - Identification of the Magnetic Model of Permanent Magnet Synchronous Machines using DC-Biased Low Frequency AC Signal Injection *S.A. Odhano, R. Bojoi, S.G. Rosu, A. Tenconi, Politecnico di Torino, Italy; University "Politehnica" of Bucharest, Romania*

S30 Prof. D. Howe Memorial Session: Synchronous Machines

Room: 334
Chair: Z.Q. Zhu, Thomas Jahns

8:00AM - PMSM Magnetization State Estimation based on Stator - Reflected PM Resistance using High Frequency Signal Injection *David Reigosa, Daniel Fernandez, Zi-Qiang Zhu, Fernando Briz, University of Oviedo, Spain; University of Sheffield, United Kingdom*

8:25AM - Comparison of Different Methods for Incipient Fault Diagnosis in PMSMs with Coaxial Insulated Windings *Davide Barater, Jesus Arellano-Padilla, Chris Gerada, University of Parma, Italy; University of Nottingham, United Kingdom*

8:50AM - Analysis of FSCW SPM Servo Motor with Static, Dynamic and Mixed Eccentricity in Aspects of Radial Force and Vibration *Shaofeng Jia, Ronghai Qu, Jian Li, Zansong Fu, Hong Chen, Leilei Wu, Huazhong University of Science and Technology, China*

9:15AM - The Structure Optimization of Novel Harmonic Current Excited Brushless Synchronous Machines based on Open Winding Pattern *Quntao An, Xiaolong Gao, Fei Yao, Lizhi Sun, Thomas Lipo, Harbin Institute of Technology, China; University of Wisconsin-Madison, United States*

S31 Inductive Power Transfer II

Room: 335

Chair: Burak Ozpineci, Fabio Giulii Capponi

8:00AM - Methods for Reducing Leakage Electric Field of a Wireless Power Transfer System for Electric Vehicles *Masaki Jo, Yukiya Sato, Yasuyoshi Kaneko, Shigeru Abe, Saitama University, Japan*

8:25AM - Reducing Leakage Flux in IPT Systems by Modifying Pad Ferrite Structures *Fei Yang Lin, Adeel Zaheer, Mickel Budhia, Grant A. Covic, University of Auckland, New Zealand; Qualcomm NZ Ltd, New Zealand*

8:50AM - Design Methodology of a Series-Series Inductive Power Transfer System for Electric Vehicle Battery Charger Application *Zhicong Huang, Siu-Chung Wong, Chi K. Tse, Hong Kong Polytechnic University, Hong Kong*

9:15AM - Analysis of Co-Planar Intermediate Coil Structures in Inductive Power Transfer Systems *Abhilash Kamineni, Grant A. Covic, John T. Boys, University of Auckland, New Zealand*

S32 Losses in Electrical Machines

Room: 336
Chair: Rafal Wrobel, Emmanuel Agamloh

8:00AM - Combined Experimental and Numerical Method for Loss Separation in Permanent Magnet Brushless Machines *Greg Heins, Dan M. Ionel, Dean Patterson, Steve Stretz, Regal Beloit Corporation, United States*

8:25AM - Vibration Reduction of One-Axis Actively Position Regulated Single-Drive Bearingless Motor with Repulsive Passive Magnetic Bearings *Hiroya Sugimoto, Seiyu Tanaka, Akira Chiba, Tokyo Institute of Technology, Japan*

8:50AM - Winding Design for Minimum Power Loss and Low-Cost Manufacture in Application to Fixed-Speed PM Generator *Rafal Wrobel, Dave Staton, Richard Lock, Julian Booker, David Drury, University of Bristol, United Kingdom; Motor Design Ltd., United Kingdom*

9:15AM - Cylindrical Rotor Design for Acoustic Noise and Windage Loss Reduction in Switched Reluctance Motor for HEV Applications *Kyohei Kiyota, Takeo Kakishima, Akira Chiba, Tokyo Institute of Technology, Japan*

SS2 Wide Band Gap (WBG) Power Switch Modules – Requirements and Challenges

Room: 327
Chair: Krishna Shenai

8:00AM - Single-Chip Data Sheets and Circuit Models - Do We Have Them Right for WBG Devices? *Krishna Shenai, Argonne National Laboratory, United States*

8:25AM - WBG Usage in Automotive: Do Challenges Outweigh Advantages? *Andrew F Pinkos, Propulsion Systems, United States*

8:50AM - Package and Assembly Requirements for SiC-Based Power Modules in Industrial Applications *Thomas Grasshoff, Kevork Haddad, SEMIKRON International GmbH, United States*

9:15AM - Reducing Cost in High-Performance SiC Power Modules *Chad B. O'Neal, Arkansas Power Electronics International, Inc., United States*

Wednesday, September 17 - 8:00 am - 9:40 am

S33 Solar PV Technologies

Room: 323
Chair: Dezso Sera

8:00AM - Power Electronic Components and System Installation for Plug-and-Play Residential Solar PV *Md Tanvir Arafat Khan, Iqbal Husain, David Lubkeman, North Carolina State University, United States*

8:25AM - High-Density Power Converters for Sub-Module Photovoltaic Power Management *Rahul Sangwan, Kapil Kesarwani, Jason T. Stauth, Dartmouth College, United States*

8:50AM - Cost-Effective Photovoltaic Water Pumping System for Remote Regions Communities *Flavio Palmiro, João Onofre Pereira Pinto, Lucio Henrique Pereira, Ruben Barros Godoy, Federal University of Mato Grosso do Sul, Brazil*

9:15AM - PV Arc-Fault Detection using Spread Spectrum Time Domain Reflectometry (SSTDR) *Mohammed Khorshed Alam, Faisal H. Khan, Jay Johnson, Jack Flicker, University of Utah, United States; Sandia National Laboratories, United States*

S34 Energy Management in Residential Applications

Room: 324
Chair: Mahesh Illindala, Feng Guo

8:00AM - Modeling the Energy Features of a Vehicle-to-Home System to Provide User-Specific Technical Requirements *Fabrizio Fattori, Norma Anglani, University of Pavia, Italy*

8:25AM - Performance Characteristics of a Hybrid CERTS Microgrid Electric Vehicle Charging Station *Philip J. Hart, T.M. Jahns, R.H. Lasseter, University of Wisconsin-Madison, United States*

8:50AM - Energy Management System Control and Experiment for Future Home *Wei Zhang, Fred C. Lee, Pin-Yu Huang, Virginia Polytechnic Institute and State University, United States; National Taiwan University of Science and Techno, Taiwan*

9:15AM - A Review of Faults and Fault Diagnosis in Micro-Grids Electrical Energy Infrastructure *James Hare, Xiaofang Shi, Shalabh Gupta, Ali Bazzi, University of Connecticut, United States*

S35 DC-DC Boost Converters

Room: 326
Chair: Hui Li, Paolo Mattavelli

8:00AM - A High-Efficiency High Step-Up DC-DC Converter with Passive Clamped Coupled-Inductor and Voltage Double Cells *Jian Fu, Bo Zhang, Dongyuan Qiu, South China University of Technology, China*

8:25AM - High Power Step-Up Modular Resonant DC/DC Converter for Offshore Wind Energy Systems *Amir Parastar, Jul-Ki Seok, Yeungnam University, Korea*

8:50AM - A New Hybrid Boosting Converter *Bin Wu, Shouxiang Li, Smedley Keyue, University of California-Irvine, United States*

9:15AM - Identification and Robust Control of a Quadratic DC/DC Boost Converter by Hammerstein Model *F. Alonge, R. Rabbeni, M. Pucci, G. Vitale, Università degli Studi di Palermo, Italy; ISSIA-CNR, Italy*

S36 Stability and Quality I

Room: 327
Chair: Robert Pilawa, Hui Li

8:00AM - Dynamic Phasor Models for AC Microgrids Stability Studies *Patricio A. Mendoza-Araya, Giri Venkataramanan, University of Chile, Chile; University of Wisconsin-Madison, United States*

8:25AM - Modeling and Resonant Characteristics Analysis of Multiple Paralleled Grid-Connected Inverters with LCL Filter *Wei Hu, Jianjun Sun, Qian Ma, Chenxu Yin, Fei Liu, Xiaoming Zha, Wuhan University, China*

8:50AM - Strategies for the Connection of Distributed Power Generation Units to Distorted Networks *Cristian Blanco, David Diaz Reigosa, Fernando Briz, Juan M. Guerrero, University of Oviedo, Spain*

9:15AM - Analysis of Sinusoidal Current Reference Generation with Flat Instantaneous Active Power for Unbalanced Grids *Salvador Revelo, Marcelo A. Perez, Universidad Tecnica Federico Santa Maria, Chile*

S37 Modular Multi-Level Converters II

Room: 328
Chair: Marcello Pucci, Alan Watson

8:00AM - Design Considerations on the DC Capacitor of Each Chopper Cell in a Modular Multilevel Cascade Inverters (MMCI-DSCC) for Medium-Voltage Motor Drives *Yuhei Okazaki, Hitoshi Matsui, Makoto Hagiwara, Hirofumi Akagi, Tokyo Institute of Technology, Japan*

8:25AM - Study of Overcurrent Protection for Modular Multilevel Converter *R. Grinberg, E. Bjornstad, P. Steimer, A. Korn, M. Winkelnkemper, D. Gerardi, O. Senturk, O. Apeldoorn, J. Li, ABB Switzerland Ltd., Switzerland; ABB PAOG, Norway; ABB Corporate Research, United States*

8:50AM - Independent Control of Input Current, Load and Capacitor Voltage Balancing for a Modular Matrix Converter *Toshiki Nakamori, Mahmoud A. Sayed, Yuma Hayashi, Takaharu Takeshita, Shizunori Hamada, Kuniaki Hirao, Nagoya Institute of Technology, Japan; South Valley University, Egypt; Meidensha Corporation, Japan*

9:15AM - Analysis of the 5-Cell Single Phase MMC Natural Balancing Mechanism *Wim van der Merwe, Peter Hokayem, Lidia Stepanova, ABB Corporate Research, Switzerland; École Polytechnique Fédérale de Lausanne, Switzerland*

S38 Control of DC-DC Converters

Room: 329
Chair: Giovanna Oriti, S. Williamson

8:00AM - An Adaptive Ramp Compensation Scheme to Improve Stability for DC-DC Converters with Ripple-based Constant On-Time Control *Ting Qian, Brad Lehman, Tongji University, China; Northeastern University, United States*

8:25AM - Resonant Augmentation Circuits for a Buck Converter Achieving Minimum-Time Voltage Recovery from Load Transients *Zhenyu Shan, Siew-Chong Tan, Chi K. Tse, Juri Jatskevich, University of British Columbia, Canada; University of Hong Kong, Hong Kong; Hong Kong Polytechnic University, Hong Kong*

8:50AM - Digital Control of a High-Voltage (2.5 kV) Bidirectional DC-DC Converter for Driving a Dielectric Electro Active Polymer (DEAP) based Capacitive Actuator *Prasanth Thummala, Zhe Zhang, Michael A.E. Andersen, Dragan Maksimovic, Technical University of Denmark, Denmark; University of Colorado-Boulder, United States*

9:15AM - Variable Frequency Multiplier Technique for High Efficiency Conversion over a Wide Operating Range *Wardah Inam, David J. Perreault, Khurram K. Afridi, Massachusetts Institute of Technology, United States*

S39 Active Power Filters and Power Quality

Room: 330
Chair: Milijana Odavic, David D Reigosa

8:00AM - Selected Harmonic Resistance Control based Series Active Power Filter *Xiaoqing Song, Xijun Ni, Alex Q. Huang, North Carolina State University, United States*

8:25AM - Waveform Control Method for Mitigating Harmonics of Inverter Systems with Nonlinear Load *Hao-Ran Wang, Guo-Rong Zhu, Xiao-Bin Fu, Siew-Chong Tan, Wuhan University of Technology, China; University of Hong Kong, Hong Kong*

8:50AM - Shunt Active Power Filter based on the Interconnection of Single-Phase and Three-Phase Converters for Three-Phase Four-Wire Systems *A. de M. Maciel, C.B. Jacobina, E.C. dos Santos Jr., V.M.B. Melo, Federal University of Paraíba, Brazil; Federal University of Campina Grande, Brazil; Purdue School of Engineering and Technology, United States*

9:15AM - Adaptive Resonant Current-Control for Active Power Filtering within a Microgrid *Diarmaid J. Hogan, Fran Gonzalez-Espin, John G. Hayes, Gordon Lightbody, Michael G. Egan, University College Cork, Ireland; United Technologies Research Center, Ireland*

S40 Fault Diagnostics in Power Converters

Room: 333
Chair: Lixiang Wei

8:00AM - A Novel Online ESR and C Identification Method for Output Capacitor of Buck Converter *Kai Yao, Wenbin Hu, Weijie Tang, Jianguo Lyu, Jingcheng Cao, Nanjing University of Science and Technology, China*

8:25AM - A New Fault-Tolerant Realization of the Active Three-Level NPC Converter *Anderson V. Rocha, Sidelmo M. Silva, Igor A. Pires, Alysson A.P. Machado, Fernando V. Amaral, Victor N. Ferreira, Helder de Paula, Braz J. Cardoso Filho, Universidade Federal de Minas Gerais, Brazil; Centro Federal de Educação Tecnológica de Minas Gerais, Brazil*

8:50AM - Detection and Isolation of Multiple Faults in a Modular Multilevel Converter based on a Sliding Mode Observer *Shuai Shao, Jon C. Clare, Alan J. Watson, Patrick W. Wheeler, University of Nottingham, United Kingdom*

9:15AM - Short-Circuit Current Control Strategy for Full-Bridge LLC Converter *Shuo Liu, Ren Ren, Wuji Meng, Xinxin Zheng, Fanghua Zhang, Lan Xiao, Nanjing University of Aeronautics and Astronautics, China*

S41 Control Issues in Electric Drives II

Room: 334
Chair: Bimal Bose, Elena Lomonova

8:00AM - Near Time-Optimal Model Predictive Control using an L1-Norm based Cost Functional *Alexander Dötlinger, Ralph M. Kennel, Technische Universität München, Germany*

8:25AM - Reformulation of the Long-Horizon Direct Model Predictive Control Problem to Reduce the Computational Effort *Petros Karamanakos, Tobias Geyer, Ralph Kennel, Technical University of Munich, Germany; ABB Switzerland Ltd., Switzerland*

8:50AM - On the Benefit of Long-Horizon Direct Model Predictive Control for Drives with LC Filters *Tobias Geyer, Petros Karamanakos, Ralph Kennel, ABB Switzerland Ltd., Switzerland; Technical University of Munich, Germany*

9:15AM - Discrete-Time Control of High Speed Salient Machines *Antonio Altomare, Alessandra Guagnano, Francesco Cupertino, David Naso, Politecnico di Bari, Italy*

S42 IPM Machine Design

Room: 335
Chair: Greg Heins, Jonathan Bird

8:00AM - Design of High Torque Density Variable Flux Permanent Magnet Machine using Alnico Magnets *Maged Ibrahim, Pragasen Pillay, Concordia University, Canada*

8:25AM - Saliency Ratio and Power Factor of IPM Motors Optimally Designed for High Efficiency and Low Cost Objectives *Peng Zhang, Dan M. Ionel, Nabeel A.O. Demerdash, General Motors, United States; Regal Beloit Corp., United States; University of Wisconsin-Milwaukee, United States; Marquette University, United States*

8:50AM - Design Methodology for Variable Leakage Flux IPM for Automobile Traction Drives *Takashi Kato, Hiroki Hijikata, Masanao Minowa, Kan Akatsu, Robert D. Lorenz, Nissan Motor Co., Ltd., Japan; Shibaura Institute of Technology, Japan; University of Wisconsin-Madison, United States*

9:15AM - Design of a Spoke Type IPM Synchronous Motor with Segmented Rotor for Low DC Voltage Applications *Y. Demir, M. Aydin, MDS Motor Design Ltd., Turkey; Kocaeli University, Turkey*

S43 Induction Motor Drives I

Room: 336
Chair: Zach Pan, Mahesh Swamy

8:00AM - Input-Output Feedback Linearization Control of Linear Induction Motors Including the Dynamic End-Effects *F. Alonge, M. Cirrincione, M. Pucci, A. Sferlazza, University of Palermo, Italy; University of the South Pacific, Fiji; ISSIA-CNR, Italy*

8:25AM - Generalized Two-Vectors-based Model Predictive Torque Control of Induction Motor Drives *Yongchang Zhang, Haitao Yang, North China University of Technology, China*

8:50AM - Induction Motor Speed Estimation based on Rotor Slot Effects *Lihang Zhao, Jin Huang, Zhaowen Hou, He Liu, Zhejiang University, China*

9:15AM - Induction Motor Control with Small DC-Link Capacitor Inverters-Fed by Three-Phase Diode Front-End Rectifiers *SeHwan Kim, GwangRok Kim, Anno Yoo, Jul-Ki Seok, Yeungnam University, Korea; LSIS Co., Ltd, Korea*

SS3A Harmonic Resonance in Renewable Energy Systems

Room: 325
Chair: Frede Blaagjerg, Pedro Rodriguez

8:00AM - Harmonic Stability in Renewable Energy Systems: an Overview *Frede Blaabjerg, Xiongfei Wang, Aalborg University, Denmark*

8:25AM - Modeling and Analysis of Supersynchronous Resonance by Sequence Impedances *Jian Sun, Rensselaer Polytechnic Institute, United States*

8:50AM - Influence of Harmonic Grid Resonance on the Operation of Grid-Connected Converters *Axel Mertens, Felix Fuchs, Leibniz University, Germany*

9:15AM - Risk of DC-Side Instabilities in VSC-Based HVDC Systems *Gustavo Pinares, Massimo Bongiorno, Chalmers University of Technology, Sweden*

Wednesday, September 17 - 10:00 am - 11:40 am

S44 LED Drivers I

Room: 323
Chair: Bilal Akin

10:00AM - Harmonics Compensation and Power Factor Improvement using LED Driver *Saeed Anwar, Ali Elrayyah, Yilmaz Sozer, University of Akron, United States*

10:25AM - Multi-Channel LED Driver with CLL Resonant Converter *Xuebing Chen, Daocheng Huang, Qiang Li, Fred C. Lee, Virginia Polytechnic Institute and State University, United States*

10:50AM - Design Consideration of a Current-Source-Output Inductive Power Transfer LED Lighting System *Xiaohui Qu, Siu-Chung Wong, Chi Kong Tse, Guobao Zhang, Southeast University, China; Hong Kong Polytechnic University, Hong Kong*

11:15AM - Electrolytic-Capacitor-Less High-Power LED Driver *Yajie Qiu, Hongliang Wang, Zhiyuan Hu, Laili Wang, Yan-Fei Liu, P.C. Sen, Queen's University, Canada*

S45 LCL Filters for Grid Converters

Room: 324
Chair: Qin Lei, Alessandro Lidozzi

10:00AM - New Optimal Design Method for Trap Damping Sections in Grid-Connected LCL Filters *Remus Narcis Beres, Xiongfei Wang, Frede Blaabjerg, Claus Leth Bak, Marco Liserre, Aalborg University, Denmark; University of Kiel, Germany*

10:25AM - Active Damping for Grid-Connected LCL Filter based on Optimum Controller Design using Injected Grid Current Feedback Only *Mahmoud A. Gaafar, Masahito Shoyama, Kyushu University, Japan*

10:50AM - Comparison of PR Controller and Damped PR Controller for Grid Current Control of LCL Filter based Grid-Tied Inverter under Frequency Variation and Grid Distortion *Ritwik Chattopadhyay, Ankan De, Subhashish Bhattacharya, North Carolina State University, United States*

11:15AM - Rectifier Stage Operation and Controller Design for a Medium Voltage Solid State Transformer with LCL Filter *Fei Wang, Gangyao Wang, Alex Huang, Wensong Yu, Xijun Ni, North Carolina State University, United States*

S46 DC-DC Buck Converters

Room: 326
Chair: Baoming Ge, Gui-Jia Su

10:00AM - A Series-Capacitor Tapped Buck (Sc-TaB) Converter for Regulated High Voltage Conversion Ratio DC-DC Applications *Minjie Chen, Pradeep S. Shenoy, Jeffrey Morroni, Massachusetts Institute of Technology, United States; Texas Instruments Inc., United States*

10:25AM - A Cost-Effective Circuit for Three-Level Flying-Capacitor Buck Converter Combining the Soft-Start, Flying Capacitor Pre-Charging and Snubber Functions *Zhihao Zhong, Yu Chen, Pengcheng Zhang, Yong Kang, Huazhong University of Science and Technology, China*

10:50AM - 100 MHz, 20 V, 90% Efficient Synchronous Buck Converter with Integrated Gate Driver *Yuanzhe Zhang, Miguel Rodríguez, Dragan Maksimović, University of Colorado-Boulder, United States*

11:15AM - Modeling and Control of a Tapped-Inductor Buck Converter with Pulse Frequency Modulation *Luca Bessegato, Tomas Modeer, Staffan Norrga, KTH Royal Institute of Technology, Sweden*

S47 Stability and Quality II

Room: 327
Chair: Robert Pilawa, Feng Guo

10:00AM - A Real-Time Selective Harmonic Elimination based on a Transient-Free, Inner Closed-Loop Control for Cascaded Multilevel Inverters *Hui Zhao, Tian Jin, Shuo Wang, Deliang Wu, Liang Sun, University of Texas at San Antonio, United States*

10:25AM - A Voltage Regulator using Multi-Parallel-Connected Series-Voltage Compensator *Victor Sui-pung Cheung, Henry Shu-hung Chung, Alan Wai-lun Lo, City University of Hong Kong, Hong Kong; Chu Hai College of Higher Education, Hong Kong*

10:50AM - A Voltage Regulator based in a Voltage-Controlled DSTATCOM with Minimum Power Point Tracker *Rubens Tadeu Hock Jr., Yales Rômulo De Novaes, Alessandro Luiz Batschauer, Santa Catarina State University, Brazil*

11:15AM - Stability Analysis of the High Voltage DC Link between the FEC and DC-DC Stage of a Transformer-Less Intelligent Power Substation *Sachin Madhusoodhanan, Awneesh Tripathi, Dhaval Patel, Krishna Mainali, Subhashish Bhattacharya, North Carolina State University, United States*

S48 Control and Modulation of Multi-Level Converters II

Room: 328
Chair: Stefano Bifaretti, Rolando Burgos

10:00AM - PWM for Active Thermal Protection in Three Level Neutral Point Clamped Inverters *The-Minh Phan, Nikolaos Oikonomou, Gernot J. Riedel, Mario Pacas, University of Siegen, Germany; ABB Corporate Research, Switzerland*

10:25AM - Control Strategy of a Multi-Level Converter with Multi-Winding MFT/HFT Isolation *Chunyang Gu, Zedong Zheng, Yongdong Li, Tsinghua University, China*

10:50AM - Carrier Interleaved PWM Techniques in Modular Multilevel Converters: A Comparison based on Same Voltage Level Waveforms *Rosheila Darus, Georgios Konstantinou, Josep Pou, Salvador Ceballos, Vassilios G. Agelidis, University of New South Wales, Australia; Universiti Teknologi Mara, Malaysia; TECNALIA, Spain*

11:15AM - A State Machine Decoder for Phase Disposition Pulse Width Modulation of Three-Phase Coupled-Inductor Semi-Bridge Converters *C.A. Teixeira, B.P. McGrath, D.G. Holmes, RMIT University, Australia*

S49 Modeling and Control of DC-DC Converters

Room: 329
Chair: Sudip Mazumder, Sung Yeul Park

10:00AM - A Detection Method of DC Magnetization Utilizing Local Inhomogeneity of Flux Distribution in Power Transformer Core *Kazuhiro Umetani, Yuki Itoh, Masayoshi Yamamoto, Denso Corporation, Japan; Shimane University, Japan*

10:25AM - Equivalent Circuit Model of Constant On-Time Current Mode Control with External Ramp Compensation *Shuilin Tian, Fred C. Lee, Jian Li, Qiang Li, Pei-hsin Liu, Virginia Polytechnic Institute and State University, United States; Linear Technology, United States*

10:50AM - Dynamic Analysis of Hysteresis Control Strategy based on Ripple Characteristics *Jianfeng Dai, Jinbin Zhao, Keqing Qu, Fen Li, Wei Cao, Shanghai University of Electric Power, China*

11:15AM - A Generic and Accurate Frequency-Domain Model for Buck, Boost and Buck-Boost Converters *Xin Li, Xinbo Ruan, Nanjing University of Aeronautics and Astronautics, China*

S50 Power Converters for Transportation Applications II

Room: 330
Chair: Babak Fahimi, Fabio Giulii Capponi

10:00AM - Reduced Switching Loss based DC-Bus Voltage Balancing Algorithm for Three-Level Neutral Point Clamped (NPC) Inverter for Electric Vehicle Application *Abhijit Choudhury, Pragasen Pillay, M. Amar, Sheldon S. Williamson, Concordia University, Canada; TM4 Inc., Canada*

10:25AM - An Electrical-Magnetic Hybrid Power Quality Compensation System and its Control Strategy for V/V Traction Power Supply System *Baichao Chen, Chenmeng Zhang, Wenjun Zeng, Cuihua Tian, Jiaxin Yuan, Wuhan University, China*

10:50AM - High Frequency Active-Clamp Buck Converter for Low Power Automotive Applications *Chenhao Nan, Raja Ayyanar, Youhao Xi, Arizona State University, United States; Texas Instruments Inc., United States*

11:15AM - Analysis, Modeling and Control of Half-Bridge Current-Source Converter for Supercapacitor Applications *Jorge Garcia, Pablo Garcia, Fabio Giulii Capponi, Gabriele Borocci, Giulio De Donato, University of Oviedo, Spain; University of Rome-Sapienza, Italy*

S51 Performance and Reliability Issues in Electric Drives

Room: 334
Chair: Peter Liu, Radu Bojoi

10:00AM - Improving Position Sensor Accuracy through Spatial Harmonic Decoupling, and Sensor Scaling, Offset, and Orthogonality Correction using Self-Commissioning MRAS-Methods *Caleb W. Secrest, Jon S. Pointer, Michael R. Buehner, Robert D. Lorenz, University of Wisconsin-Madison, United States; Woodward, Inc., United States*

10:25AM - Current Sharing Strategies for Fault Tolerant AC Multi-Drives *G. Scelba, G. Scarcella, M. Pulvirenti, M. Cacciato, A. Testa, S. De Caro, T. Scimone, University of Catania, Italy; University of Messina, Italy*

10:50AM - Performance Evaluation of a Bearingless Flux-Switching Slice Motor *Karlo Radman, Neven Bulić, Wolfgang Gruber, University of Rijeka, Croatia; Johannes Kepler University, Austria*

11:15AM - Novel Discontinuous PWM Control Method to Improve IGBT Reliability at Low Speed *Lixiang Wei, Jeffrey McGuire, Jiangang Hu, Rockwell Automation, United States*

S52 Switched-Reluctance Machines

Room: 335
Chair: Rajeev Vyas, Akira Chiba

10:00AM - A Continuous Toroidal Winding SRM with 6 or 12 Switch DC Converter *R. Marlow, N. Schofield, A. Emadi, McMaster University, Canada*

10:25AM - Digital PWM Control-based Active Vibration Cancellation for Switched Reluctance Motors *H. Makino, T. Kosaka, N. Matsui, Nagoya Institute of Technology, Japan*

10:50AM - Practical Considerations for the Design and Construction of a High Speed SRM with a Flux-Bridge Rotor *Jie Dang, J.Rhet Mayor, S. Andrew Semidey, Ronald Harley, Thomas Habetler, Jose Restrepo, Georgia Institute of Technology, United States; Universidad Simon Bolivar, Venezuela*

11:15AM - Design of a Switched Reluctance Machine for Off-Road Vehicle Applications based on Torque Speed-Curve Optimization *Md Wasi Uddin, Tausif Husain, Yilmaz Sozer, Iqbal Husain, University of Akron, United States; North Carolina State University, United States*

S53 Induction Motor Drives II

Room: 336
Chair: A.J. Marques Cardoso, Tobias Geyer

10:00AM - Current Ripple Analysis of PWM Methods for Open-End Winding Induction Motor *Hajime Kubo, Yasuhiro Yamamoto, Takeshi Kondo, Kaushik Rajashekara, Bohang Zhu, Meidensha Corporation, Japan; University of Texas at Dallas, United States*

10:25AM - New Optimal Pulsewidth Modulation for Single DC-Link Dual Inverter fed Open-end Stator Winding Induction Motor Drives *Amarendra Edpuganti, Akshay K. Rathore, Joachim Holtz, National University of Singapore, Singapore; University of Wuppertal, Germany*

10:50AM - Hybrid Open-End and NPC AC Six-Phase Machine Drive Systems *Victor F.M.B. Melo, Cursino B. Jacobina, Nady Rocha, Federal University of Campina Grande, Brazil; Federal University of Paraiba, Brazil*

11:15AM - A Time-Varying Observer for the Flux Magnitude of the Induction Motor using the Synchronous Reference Frame Model *Trey Mock, Randi Bimeal, Stephen Ling, Mihai Comanescu, Penn State Altoona, United States*

SS3B Harmonic Regulation and Mitigation

Room: 325
Chair: Pedro Rodriguez, Frede Blaagjerg

10:00AM - Harmonic Issues in Distribution Networks: Past and Future *Firuz Zare, Danfoss Power Electronics Company, Denmark*

10:25AM - Active Filtering Techniques for Harmonic Damping *Po-Tai Cheng, National Tsing Hua University, Taiwan*

10:50AM - Harmonic Interaction in High Populations of Distributed Power Resources *Johan Enslin, UNC Charlotte, United States*

11:15AM - LCL+Trap Grid Harmonics Mitigation and Potential Resonance Identification in Large Scale Distributed Power Plants *Pedro Rodriguez, Antoni Mir Cantarellas, Abengoa Research, Spain*

SS4 Optimization of Electric Motors and Multi-Physics Analysis

Room: 333
Chair: Mircea Popescu

10:00AM - High Fidelity and Efficient Computation of Losses in Brushless Permanent Magnet Machines *Phil Mellor, University of Sheffield, United Kingdom*

10:25AM - Modern Design Optimisation of PM and Reluctance Synchronous Machines *Maarten Kamper, Stellenbosch University, South Africa*

10:50AM - Design for Manufacturing Employing Automated Optimization and Multi-Physics Analysis - an Academic and Industrial Point of View *Dan Ionel, Regal Beloit Corp and University of Wisconsin M, United States*

11:15AM - Multiphysics Analysis of Electric Machines for Traction Applications Considering Complex Duty Cycles *David A. Staton, Motor Design Ltd, United Kingdom*

Wednesday, September 17 - 1:30 pm - 3:10 pm

S54 Wave and Wind Generation Systems

Room: 323
Chair: David Dorrell

1:30PM - Hybrid Generator for Wind Generation Systems *Omid Beik, Nigel Schofield, McMaster University, Canada*

1:55PM - A GA-SVM Hybrid Classifier for Multiclass Fault Identification of Drivetrain Gearboxes *Dingguo Lu, Wei Qiao, University of Nebraska-Lincoln, United States*

2:20PM - Marine Current Turbine Generator System with Induction Machine Growing Neural Gas (GNG) MPPT based on Sensorless Sea Speed Estimation *L. Greco, C. Testa, M. Cirrincione, M. Pucci, G. Vitale, INSEAN-CNR, Italy; University of the South Pacific, Fiji*

2:45PM - Pole-Modulated PM Direct-Drive Generator for Wave Energy Conversion *Wen Ouyang, Steven Englebretson, V.R. Ramanan, Giti Karimi-Moghaddam, ABB Corporate Research, United States*

S55 Power Converters for Smart Grid and Utility Applications II

Room: 324
Chair: Subhashish Bhattacharya, Luca Zarri

1:30PM - Novel, Simple Reactive Power Control Strategy with DC Capacitor Voltage Control for Active Load Balancer in Three-Phase Four-Wire Distribution Systems *Tint Soe Win, Yoshihido Hisada, Toshihiko Tanaka, Eiji Hiraki, Masayuki Okamoto, Seong Ryong Lee, Yamaguchi University, Japan; Okayama University, Japan; Ube National College of Technology, Japan; Kunsan National University, Korea*

1:55PM - A Flexible DC Voltage Balancing Control based on the Power Flow Management for Star-Connected Cascaded H-Bridge Converter *Chia-Tse Lee, Hsin-Chih Chen, Ching-Wei Wang, Ping-Heng Wu, Ching-Hsiang Yang, Po-Tai Cheng, National Tsing Hua University, Taiwan*

2:20PM - Multilevel, Multiport, Switched-Capacitor based Inverter for Utility Applications *Mark J. Scott, Rachid Darbali Zamora, Andong Lang, Cong Li, Fanbo Zhang, Jin Wang, Ohio State University, United States*

2:45PM - Black Start Operation for the Solid State Transformer Created Micro-Grid under Islanding with Storage *Sumit Dutta, Vivek Ramachandran, Subhashish Bhattacharya, North Carolina State University, United States*

S56 Microgrid Control II

Room: 325
Chair: Alessandro Lidozzi, Yongsug Suh

1:30PM - Application of Intelligent Agent Systems for Real-Time Coordination of Power Converters (RCPC) in Microgrids *Maryam Nasri, Herbert L. Ginn, Mehrdad Moallem, University of South Carolina, United States; Simon Fraser University, Canada*

1:55PM - Investigation of Extra Power Loss Sharing among Photovoltaic Inverters Caused by Reactive Power Management in Distribution Networks *Erhan Demirok, Dezso Sera, Remus Teodorescu, University of Manchester, United Kingdom; Aalborg University, Denmark*

2:20PM - DC-Bus Voltage Regulation Strategy for Three-Phase Back-to-Back Active Power Conditioners *Cheng-Yu Tang, Yen-Fu Chen, Yu-Cai Hsu, Yaow-Ming Chen, Yih-Der Lee, National Taiwan University, Taiwan; Atomic Energy Council, Taiwan*

2:45PM - An Effective Smooth Transition Control Strategy using Droop Based Synchronization for Parallel Inverters *Nayeem Arafat, Ali Elrayyah, Yilmaz Sozer, University of Akron, United States; Qatar Environment and Energy Research Institute, Qatar*

S57 Battery Models

Room: 326
Chair: Henry Chung, John Miller

1:30PM - A Transient Reduced Order Model for Battery Thermal Management based on Singular Value Decomposition *Xiao Hu, Saeed Asgari, Ibrahim Yavuz, Scott Stanton, Chih-Cheng Hsu, Zhongying Shi, Bao Wang, Hao-Kun Chu, ANSYS Inc., United States; General Motor Company, United States*

1:55PM - Near-Real-Time Parameter Estimation of an Electrical Battery Model with Multiple Time Constants and SOC-Dependent Capacitance *Wenguan Wang, Henry Shu-hung Chung, Jun Zhang, Sun Yat-sen University, China; City University of Hong Kong, Hong Kong*

2:20PM - An Enhanced Circuit-based Battery Model with Considerations of Temperature Effect *Ni Lin, Song Ci, Hongjia Li, University of Nebraska-Lincoln, United States; Chinese Academy of Sciences, China*

S58 Grid Emulation

Room: 327
Chair: Rolando Burgos, Omer Onar

1:30PM - Development of Converter based Reconfigurable Power Grid Emulator *Liu Yang, Yiwei Ma, Jingxin Wang, Jing Wang, Xiaohu Zhang, Leon M. Tolbert, Fred Wang, Kevin Tomsovic, University of Tennessee, United States*

1:55PM - A Power-HIL Microgrid Testbed: Smart Energy Integration Lab (SEIL) *F. Huerta, J.K. Gruber, M. Prodanovic, P. Matatagui, Institute IMDEA Energy, Spain*

2:20PM - Power Hardware-in-the-Loop Simulation of Integrated Voltage Regulation and Islanding Detection for Distributed PV Systems on GRU Model *Ran Mo, Ye Yang, Hui Li, Florida State University, United States*

2:45PM - Static and Dynamic Power System Load Emulation in Converter-based Reconfigurable Power Grid Emulator *Jing Wang, Liu Yang, Yiwei Ma, Jingxin Wang, Leon M. Tolbert, Fred Wang, Kevin Tomsovic, University of Tennessee, United States*

S59 Device Temperature Estimation

Room: 328
Chair: Adam Skorek, Bram Ferreira

1:30PM - Online Junction Temperature Extraction with Turn-Off Delay Time for High Power IGBTs *Pengfei Sun, Haoze Luo, Yufei Dong, Wuhua Li, Xiangning He, Guodong Chen, Enxing Yang, Zuyi Dong, Zhejiang University, China; Shanghai Electric Power Transmission & Distribution Group, China*

1:55PM - P-i-N Diode Chip Temperature Extraction Method by Investigation into Maximum Recovery Current Rate di/dt *Haoze Luo, Pengfei Sun, Yufei Dong, Wuhua Li, Xiangning He, Guodong Chen, Enxing Yang, Zuyi Dong, Zhejiang University, China; Shanghai Electric Power Transmission & Distribution Group, China*

2:20PM - Evaluation of Thermo-Sensitive Electrical Parameters based on the Forward Voltage for On-line Chip Temperature Measurements of IGBT Devices *Laurent Dupont, Yvan Avenas, IFSTTAR, France; Universite de Grenoble, France*

2:45PM - Frequency-Domain Transient Temperature Estimation and Aging Analysis for Weak Points of IGBT Modules *Ze Wang, Wei Qiao, Liyan Qu, University of Nebraska-Lincoln, United States*

S60 Resonant DC-DC Converters I

Room: 329
Chair: Wei Qiao, Shuo Wang

1:30PM - A ZCS-PWM Bidirectional DC-DC Converter with a Two-Terminal Resonant Tank-based Auxiliary Switching Cell *Tomokazu Mishima, Shinya Masuda, Mutsuo Nakaoka, Kobe University, Japan; University of Malaya, Malaysia; Kyungnam University, Korea*

1:55PM - Single-Inductor Resonant Switched Capacitor Voltage Multiplier with Safe Commutation *Julio C. Rosas-Caro, Jonathan C. Mayo-Maldonado, Fernando Mancilla-David, Antonio Valderrabano-Gonzalez, Francisco Beltran Carbajal, Victor M. Sanchez, Universidad Panamericana Campus Guadalajara, Mexico; University of Southampton, United Kingdom; University of Colorado-Denver, United States; Universidad Autonoma Metropolitana Azcapotzalco, Mexico; Universidad de Quintana Roo, Mexico*

2:20PM - Analysis, Design and Implementation of Quadrupler based High Voltage Full Bridge Series Resonant DC-DC Converter *Amit K. Singh, Pritam Das, S.K. Panda, National University of Singapore, Singapore*

2:45PM - A Transformerless Step-Up Resonant Converter for Grid-Connected Renewable Energy Sources *Xiaogang Wu, Wu Chen, Renjie Hu, Yong Ke, Southeast University, China; WuHu Profession and Technology College, China*

S61 AC-DC Multi-Phase Converters

Room: 330
Chair: Marcello Pucci, Norma Anglani

1:30PM - DC Voltage Balancing of Flying Converter Cell Active Rectifier *M. Makoschitz, M. Hartmann, H. Ertl, R. Fehringer, Vienna University of Technology, Austria; Schneider Electric Power Drives, Austria*

1:55PM - Multilevel Multichannel Interleaved AC-DC Converter for High Current Applications *Eddy Aeloiza, Yu Du, ABB Inc., United States*

2:20PM - Voltage Sequence Control based High-Current Rectifier System *Jitendra Solanki, Norbert Fröhleke, Joachim Böcker, Gregor Düppe, Andreas Averberg, Peter Wallmeier, University of Paderborn, Germany; AEG Power Solutions GmbH, Germany*

2:45PM - Modulation Scheme for Delta-Type Current Source Rectifier to Reduce Input Current Distortion *Ben Guo, Fred Wang, Eddy Aeloiza, University of Tennessee, United States; ABB Corporate Research, United States*

S62 Control of Power Converters I

Room: 333
Chair: Vladimir Blasko, Sudip Mazumder

1:30PM - A Dual Voltage Control Strategy for Single-Phase PWM Converters with Power Decoupling Function *Yi Tang, Zian Qin, Frede Blaabjerg, Poh Chiang Loh, Aalborg University, Denmark*

1:55PM - Hybrid Interleaving with Adaptive PLL Loop for Adaptive On-Time Controlled Switching Converters *Pei-hsin Liu, Fred C. Lee, Qiang Li, Virginia Polytechnic Institute and State University, United States*

2:20PM - Dynamic Physical Limits of Boost Converters: A Benchmarking Tool for Transient Performance *Ignacio Galiano Zurbriggen, Matias Anun, Martin Ordonez, University of British Columbia, Canada*

2:45PM - On-Chip Frequency Compensation Control Scheme with Independently Parameters Tuning and Green Native Adaptive Voltage Position (GNAVP) for Voltage Regulators *Ching-Jan Chen, Shao-Hung Lu, Sheng-Fu Hsiao, Yung-Jen Chen, Jian-Rong Huang, RichTek Technology Corporation, Taiwan; National Taiwan University, Taiwan*

S63 Sensorless Control: HF Injection

Room: 334
Chair: David Diaz-Reigosa, Jul-Ki Seok

1:30PM - Analysis of Carrier Signal Injection based Sensorless Control of PMSM Drives under Limited Inverter Switching Frequency Condition *P.L. Xu, Z.Q. Zhu, University of Sheffield, United Kingdom*

1:55PM - Position Sensorless Control Method at Zero Speed Region for Permanent Magnet Synchronous Motors using the Neutral Point Voltage of Stator Windings *Yoshitaka Iwaji, Ryoichi Takahata, Takahiro Suzuki, Shigehisa Aoyagi, Hitachi Ltd., Japan*

2:20PM - High Frequency d-q Modeling of Synchronous Machines for Sensorless Control *Luigi Alberti, Nicola Bianchi, Silverio Bolognani, Free University of Bozen, Italy; University of Padova, Italy*

2:45PM - Carrier Signal Injection Method in Three Shunt Sensing Inverter for Sensorless AC Machine Drive *Sungho Jung, Jung-Ik Ha, Seoul National University, Korea*

S64 Prof. B. Chalmers Memorial Session: IPM Analysis

Room: 335
Chair: Dan Ionel, Thomas Jahns

1:30PM - Analysis of Torque versus Current Capability of Reluctance and Interior PM Machines under Limited Current and Flux-Linkage Operation *Emanuele Fornasiero, Nicola Bianchi, Wen L. Soong, University of Padova, Italy; University of Adelaide, Australia*

1:55PM - Analysis of Iron Loss in Interior PM Machines with Distributed Windings under Deep Field-Weakening *Chun Tang, Wen L. Soong, Nesimi Ertugrul, Thomas M. Jahns, University of Adelaide, Australia; University of Wisconsin-Madison, United States*

2:20PM - Permanent Magnet Volume Minimization of Spoke Type Fractional Slot Synchronous Motors *Enrico Carraro, Nicola Bianchi, Sunny Zhang, Matthias Koch, University of Padova, Italy; Brose Fahrzeugteile GmbH and Co. KG, Germany*

2:45PM - Impact of the Field Weakening on the Iron Losses in the Stator of an Internal Permanent Magnet Synchronous Machine *S. Küttler, K. El Kadri Benkara, G. Friedrich, F. Vangraefschèpe, A. Abdelli, University of Technology of Compiegne, France; IFP New Energies, France*

S65 Magnetic Materials

Room: 336
Chair: Thomas Wu, Galina Mirzaeva

1:30PM - Characterization of Electrical Steels for High Speed Induction Motor Applications: Going Beyond the Standards *André S.L. Costa, Rodrigo R. Bastos, Sebastião C. Paolinelli, Sebastião L. Nau, Ramón M. Valle, Braz J. Cardoso Filho, Universidade Federal de Minas Gerais, Brazil; Aperam South America, Brazil; WEG Motors, Brazil*

1:55PM - Design Considerations of 2-D Magnetizers for High Flux Density Measurements *J.G. Wanjiku, P. Pillay, Concordia University, Canada*

2:20PM - A Simple Method to Minimize Effects of Temperature Variation on IPMSM Control in Real-Time Manner *Sang Min Kim, Taesuk Kwon, Hyundai Mobis, Korea*

2:45PM - Effect of Magnet Properties on Power Density and Flux-Weakening Performance of High-Speed Interior Permanent Magnet Synchronous Machines *James D. McFarland, T.M. Jahns, Ayman M. El-Refaie, Patel B. Reddy, University of Wisconsin-Madison, United States; GE Global Research Center, United States*

Wednesday, September 17 - 3:30 pm - 5:10 pm

S66 Utility Interactive Solar PV System

Room: 323
Chair: Pedro Rodriguez

3:30PM - Comprehensive Modeling of Single-Phase Quasi-Z-Source Photovoltaic Inverter to Investigate Low-Frequency Voltage and Current Ripples *Yushan Liu, Haitham Abu-Rub, Baoming Ge, Dongsen Sun, Hao Zhang, Daqiang Bi, Fang Z. Peng, Beijing Jiaotong University, China; Texas A&M University at Qatar, Qatar; Texas A&M University, United States; University of Texas at San Antonio, United States; Tsinghua University, China; Michigan State University, United States*

3:55PM - A High-Efficiency Single-Phase Inverter for Transformerless Photovoltaic Grid-Connection *Senjun Hu, Wenfeng Cui, Wuhua Li, Xiangning He, Fengwen Cao, Zhejiang University, China; Suzhou Vocational University, China*

4:20PM - Multiphase Parallel Interleaved and Primary-Parallel Secondary-Series Forward Micro-Inverter Comparison *D. Meneses, O. García, P. Alou, J.A. Oliver, J.A. Cobos, Universidad Politécnica de Madrid, Spain*

4:45PM - A High Efficiency PV Micro-Inverter with Grid Support Functions *M. Harfman-Todorovic, F. Tao, M. Agamy, D. Dong, X. Liu, L. Garces, R. Zhou, E. Delgado, D. Marabell, C. Stephens, R. Steigerwald, General Electric Global Research Center, United States*

S67 Power Converters for Renewable Energy Applications

Room: 324
Chair: V. Angelidis

3:30PM - A Single-Switch High Step-Up DC-DC Converter with Coupled Inductor *Liping Zhou, Dongyuan Qiu, Wenxun Xiao, Bo Zhang, South China University of Technology, China*

3:55PM - High Gain Single-Stage Boosting Inverter *Ben Zhao, Alexander Abramovitz, Keyue Smedley, Northwestern Polytechnical University, China; University of California, Irvine, United States*

4:20PM - PV Power Conditioning System with LLC Resonant Converter in DCM *Giovanna Oriti, Alexander L. Julian, Troy D. Bailey, Naval Postgraduate School, United States*

4:45PM - High Efficiency Multilevel Flying-Capacitor DC/DC Converter for Distributed Generation Applications *MingGuo Jin, Amir Parastar, Jul-Ki Seok, Yeungnam University, Korea*

S68 Microgrid Control III

Room: 325
Chair: Hui Li, Mahesh Illindala

3:30PM - Control Design of Coordinated Droop Control for Hybrid AC/DC Microgrid Considering Distributed Generation Characteristics *Wooin Choi, Jong-Bok Baek, Bo-Hyung Cho, Seoul National University, Korea*

3:55PM - Power-based Control of Low-Voltage Microgrids *Tommaso Caldognetto, Paolo Tenti, Danilo Iglesias Brandao, University of Padova, Italy; State University of Campinas, Brazil*

4:20PM - Secondary Coordinated Control of Islanded Microgrids based on Consensus Algorithms *Dan Wu, Tomislav Dragicevic, Juan C. Vasquez, Josep M. Guerrero, Yajuan Guan, Aalborg University, Denmark*

4:45PM - A Controller for the Smooth Transition from Grid-Connected to Autonomous Operation Mode *Stefano Lissandron, Paolo Mattavelli, University of Padova, Italy*

S69 Battery Energy Management

Room: 326
Chair: Chris Mi, Bulent Sarlioglu

3:30PM - Loss Minimization-based Charging Strategy for Lithium-Ion Battery *Zheng Chen, Bing Xia, Chunting Chris Mi, Rui Xiong, University of Michigan-Dearborn, United States*

3:55PM - Enhanced Coulomb Counting Method with Adaptive SOC Reset Time for Estimating OCV *Yong-Min Jeong, Yong-Ki Cho, Jung-Hoon Ahn, Seung-Hee Ryu, Byoung-Kuk Lee, Sungkyunkwan University, Korea*

4:20PM - Equalization System for Serially-Connected Battery Cells based on the Wave-Trap Concept *M. Arias, D. Bretón, M.M. Hernando, U. Viscarret, Iñigo Gil, University of Oviedo, Spain; Ikerlan-Ik4, Spain; Orona, Spain*

4:45PM - Modular Approach for Continuous Cell-Level Balancing to Improve Performance of Large Battery Packs *M. Muneeb Ur Rehman, Michael Evzelman, Kelly Hathaway, Regan Zane, Gregory L. Plett, Kandler Smith, Eric Wood, Dragan Maksimovic, Utah State University, United States; University of Colorado-Colorado Springs, United States; National Renewable Energy Lab, United States; University of Colorado-Boulder, United States*

S70 Other Power Electronics Topics for Grid Applications

Room: 327
Chair: Peng Zhang, Dan Ionel

3:30PM - New Power Electronic Interface Combining DC Transmission, a Medium-Frequency Bus and an AC-AC Converter to Integrate Deep-Sea Facilities with the AC Grid *Andres Escobar- Mejia, Yusi Liu, Juan Carlos Balda, Kenny George, University of Arkansas, United States*

3:55PM - Operational Study of a Modular Direct Current Power System for Subsea Power Delivery *Dong Dong, Di Zhang, Rixin Lai, Song Chi, Maja H. Todorovic, General Electrical Global Research Center, United States*

4:20PM - Investigation on Dynamic Voltage Restorer with Two DC-Links and Series Converters for Three-Phase Four-Wire Systems *Gregory A.A. Carlos, Cursino B. Jacobina, Euzeli C. dos Santos Jr., Federal Institute of Alagoas, Brazil; Federal University of Campina Grande, Brazil; Purdue School of Engineering Technology, United States*

4:45PM - Locking Frequency Band Exposure Method for Islanding Detection and Prevention in Distributed Generation *Iman Mazhari, Lotfi Beghou, Johan Enslin, Babak Parkhideh, Shibashis Bhowmik, University of North Carolina, United States; SineWatts Inc., United States*

S71 Power Electronic Modules I (high T and SiC)

Room: 328
Chair: Yvan Avenas, Puqi Ning

3:30PM - Novel IGBT Module Design, Material and Reliability Technology for 175°C Continuous Operation *Takashi Saito, Yoshitaka Nishimura, Fumihiko Momose, Akira Morozumi, Yuta Tamai, Eiji Mochizuki, Yoshikazu Takahashi, Fuji Electric Co., Ltd., Japan*

3:55PM - A High Temperature Silicon Carbide MOSFET Power Module with Integrated Silicon-on-Insulator based Gate Drive *Zhiqiang Wang, Xiaojie Shi, Leon M. Tolbert, Fred Wang, Zhenxian Liang, Daniel Costinett, Benjamin J. Blalock, University of Tennessee, United States; Oak Ridge National Laboratory, United States*

4:20PM - Evaluation of Commercially Available SiC Devices and Packaging Materials for Operation Up to 350°C *Dean Hamilton, Michael Jennings, Yogesh Sharma, Craig Fisher, Olayiwola Alatise, Philip Mawby, University of Warwick, United Kingdom*

4:45PM - All-SiC Power Module for Delta-Type Current Source Rectifier *Ben Guo, Fred Wang, Eddy Aeloiza, Puqi Ning, Zhenxian Liang, University of Tennessee, United States; ABB Corporate Research, United States; Oak Ridge National Laboratory, United States*

S72 Multi-Level DC-DC Converters

Room: 329
Chair: Madhu Chinthavali, Jin Wang

3:30PM - A Bidirectional Multiple-Input Multiple-Output Modular Multilevel DC-DC Converter *Kia Filsoof, Peter W. Lehn, University of Toronto, Canada*

3:55PM - A Family of the New Interleaved Multi-Channel Three-Level DC-DC Converters *Yu Du, Eddy Aeloiza, ABB Corporate Research, United States*

4:20PM - A ZVS Bidirectional Three-Level DC-DC Converter with Direct Current Slew Rate Control of Leakage Inductance *Lingyu Xu, Deshang Sha, Hongyu Chen, Beijing Institute of Technology, China*

4:45PM - High Voltage Cell Power Supply for Modular Multilevel Converters *Osman S. Senturk, Tobias Maerki, Peter Steimer, Steven McLaughlin, ABB Ltd., Switzerland*

S73 DC-AC Converters

Room: 330
Chair: Radu Bojoi, Luca Solero

3:30PM - Generalized Active Power Decoupling Method for H-Bridge with Minimum Voltage and Current Stress *Runruo Chen, Sisheng Liang, Fang Z. Peng, Michigan State University, United States*

3:55PM - Analysis and Design of Modified Half-Bridge Series Resonant Inverter with DC-Link Neutral Point Clamped Cell *Seung-Hee Ryu, Dong-Gyun Woo, Jung-Hoon Ahn, Byoung-Kuk Lee, Sungkyunkwan University, Korea*

4:20PM - Operation of Current Source Inverters in Discontinuous Conduction Mode *Daniel Drews, Robert Cuzner, Giri Venkataramanan, DRS Power and Control Technologies, United States; University of Wisconsin-Madison, United States*

4:45PM - A Hybrid Modulation Method for Single-Phase Quasi-Z Source Inverter *Hao Zhang, Baoming Ge, Yushan Liu, Haitham Abu-Rub, Dongsen Sun, Fang Zheng Peng, Beijing Jiaotong University, China; Texas A&M University, United States; Texas A&M University at Qatar, Qatar; University of Texas at San Antonio, United States; Michigan State University, United States*

S74 Control of Power Converters II

Room: 333
Chair: Tobias Geyer, Vladimir Blasko

3:30PM - Utilization of Proportional Filter Capacitor Voltage Feedforward to Realize Active Damping for Digitally-Controlled Grid-Tied Inverter Operating under Wide Grid Impedance Variation *Yuanbin He, Ke-wei Wang, Shu-hung Chung, City University of Hong Kong, Hong Kong*

3:55PM - Observer-based State-Space Current Controller for a Grid Converter Equipped with an LCL Filter: Analytical Method for Direct Discrete-Time Design in Synchronous Coordinates *Jarno Kukkola, Marko Hinkkanen, Kai Zenger, Aalto University, Finland*

4:20PM - Gain-Scheduled Control using Voltage Controlled Oscillator with Variable Gain for a LLC Resonant Converter *Sang Woo Kang, Hye Jin Kim, Bo Hyung Cho, Seoul National University, Korea*

S75 Sensorless Control II

Room: 334
Chair: Giacomo Scelba, Fernando Briz

3:30PM - An Integral Method Combining V/Hz and Vector Control of Permanent Magnet Motor *Vladimir Blasko, Luis Arnedo, Dong Jiang, United Technologies Research Center, United States*

3:55PM - High-Speed Sensorless Control of a PMSM Operating under Periodic Magnetic Saturation Conditions *Kwang-Woon Lee, Mokpo National Maritime University, Korea*

4:20PM - Sensorless Control of 3-Phase BLDC Motors using DC Current Model *Won-Sang Im, Wenxin Liu, Jang-Mok Kim, Lehigh University, United States; Pusan National University, Korea*

4:45PM - Sensorless Control of Linear Permanent Magnet Synchronous Motor using a Combined Sliding Mode Adaptive Observer *M.A.M. Cheema, John Edward Fletcher, Dan Xiao, Faz Rahman, University of New South Wales, Australia*

S76 IPM Machines for Automotive Applications

Room: 335
Chair: Bulent Sarlioglu, Rajeev Vyas

3:30PM - Experimental Comparison of PM Assisted Synchronous Reluctance Motors *Nicola Bianchi, Emanuele Fornasiero, Marco Ferrari, Mosè Castiello, University of Padova, Italy*

3:55PM - Influence of Magnet Arrangement on the Performance of IPMSMs for Automotive Applications *S. Yoshioka, S. Morimoto, M. Sanada, Y. Inoue, Osaka Prefecture University, Japan*

4:20PM - Effect of Magnet Types on Performance of High Speed Spoke Interior Permanent Magnet Machines Designed for Traction Applications *Steven J. Galioto, Patel B. Reddy, Ayman M. El-Refaie, GE Global Research Center, United States*

4:45PM - Variable Leakage Flux (VLF) IPMSMs for Reduced Losses over a Driving Cycle while Maintaining the Feasibility of High Frequency Injection-based Rotor Position Self-Sensing *Apoorva Athavale, Takashi Fukushige, Takashi Kato, Chen-Yen Yu, Robert D. Lorenz, University of Wisconsin-Madison, United States; Nissan Motor Co. Ltd., Japan*

S77 Solid-State Transformers

Room: 336
Chair: Yongsug Suh, Zhiguo Pan

3:30PM - Resonant Power Electronic Transformer for Power Grid *Zhaohui Wang, Jiajia Ouyang, Junming Zhang, Kuang Sheng, Wenxi Yao, Zhejiang University, China*

3:55PM - Multiple Objectives Tertiary Control Strategy for Solid State Transformer Interfaced DC Microgrid *Xunwei Yu, Xijun Ni, Alex Huang, North Carolina State University, United States*

4:20PM - Volume/Weight/Cost Comparison of a 1 MVA 10kV/400V Solid-State against a Conventional Low-Frequency Distribution Transformer *Jonas E. Huber, Johann W. Kolar, ETH Zurich, Switzerland*

4:45PM - Design and Operation of a 3.6kV High Performance Solid State Transformer based on 13kV SiC MOSFET and JBS Diode *Fei Wang, Gangyao Wang, Alex Huang, Wensong Yu, Xijun Ni, North Carolina State University, United States; Cree Inc., United States*

Thursday, September 18 - 8:00 am - 9:40 am

S78 Energy Storage Systems

Room: 323
Chair: Ion Exteberria

8:00AM - Converter-Fed Synchronous Machine for Pumped Hydro Storage Plants *Peter K. Steimer, Osman Senturk, Steve Aubert, Stefan Linder, ABB Ltd., Switzerland*

8:25AM - Development of the Flywheel Energy Storage System with Multiple Parallel Drives *Jun-ichi Itoh, Tsuyoshi Nagano, Kenta Tanaka, Koji Orikawa, Noboru Yamada, Nagaoka University of Technology, Japan*

8:50AM - Diagnosis of Lithium-Ion Batteries State-of-Health based on Electrochemical Impedance Spectroscopy Technique *Daniel I. Stroe, Maciej Swierczynski, Ana I. Stan, Vaclav Knap, R. Teodorescu, Søren J. Andreasen, Aalborg University, Denmark*

9:15AM - Derivation of an Equivalent Electrical Circuit Model for Degradation Mechanisms in High Temperature PEM Fuel Cells in Performance Estimation *Chris de Beer, Paul Barendse, Pragasen Pillay, Raghunathan Rengaswamy, Brian Bullecks, University of Cape Town, South Africa; Texas Tech University, United States*

S79 Power Converters for Wind Energy Applications

Room: 324
Chair: D. D. Reigosa, Brian Welchko

8:00AM - Flyback-Type di/dt Snubber for 10kV IGCT in MV Wind Turbines *Kihyun Lee, Yongsug Suh, Chonbuk National University, Korea*

8:25AM - Nine-Switch-Converter-based DFIG Wind Power System and its Dynamic DC Voltage Assigned Approach for Low Voltage Riding through (LVRT) *Wen Gang, Chen Yu, Zhong Zhihao, Kang Yong, Huazhong University of Science and Technology, China*

8:50AM - 13.8 kV Five Level ANPC Inverter for Wind Power *Mohammad Mohebbi, Michael L. McIntyre, John F. Naber, Robert Hickman, University of Louisville, United States; APIQ Semiconductor, United States*

9:15AM - Single-Stage Three-Phase AC/DC Step-Up Medium Voltage Resonant Converter for Offshore Wind Power Systems *John Lam, Praveen K. Jain, York University, Canada; Queen's University, Canada*

S80 Microgrid Modeling

Room: 325
Chair: Sandeep Bala, Rolando Burgos

8:00AM - High Resolution Output Power Estimation of Large-Scale Distributed PV Systems *Tong Yao, Yingying Tang, Raja Ayyanar, Arizona State University, United States*

8:25AM - Modeling, Analysis and Evaluation of Smart Load Functionality in the CERTS Microgrid *Abrez Mondal, David A. Klapp, Mahesh S. Illindala, Joseph H. Eto, Ohio State University, United States; American Electric Power, United States; Lawrence Berkeley National Lab, United States*

8:50AM - Modeling, Analysis, and Measurement of Impedance for Three-Phase AC Distributed Power System *Hongtao Shi, Fang Zhuo, Dong Zhang, Zhiqing Geng, Feng Wang, Xi'an Jiaotong University, China*

9:15AM - Design of the Fort Sill Microgrid *Andrew Paquette, Ronald Harley, Vijay Bhavaraju, Slobodan Krstic, Peter Theisen, Georgia Institute of Technology, United States; Eaton Corporation, United States*

S81 Cascaded Converters for Grid Applications

Room: 326
Chair: David Perreault, Navid Zargari

8:00AM - Optimization of Fundamental Frequency Modulation for Cascaded Multilevel Inverter based Transformer-Less UPFC *Shuitao Yang, Shao Zhang, Xiaorui Wang, Deepak Gunasekaran, Fang Z. Peng, Michigan State University, United States*

8:25AM - One Dimensional Cell Inversion: A Modulation Strategy for Hybrid Cascaded Converters *Christopher D. Townsend, Daniel Tormo, Hector Zelaya De La Parra, ABB Corporate Research, Sweden*

8:50AM - Efficiency Improved and Current Balanced Three-Phase Modular Cascaded H-Bridge Multilevel PV Inverter for Grid-Connected Applications *Bailu Xiao, Leon M. Tolbert, University of Tennessee, United States*

9:15AM - Zero-Sequence Voltage Injection for DC Capacitor Voltage Balancing Control of the Star-Connected Cascaded H-Bridge PWM Converter under Unbalanced Grid *Chia-Tse Lee, Hsin-Chih Chen, Ching-Wei Wang, Ping-Heng Wu, Ching-Hsiang Yang, Po-Tai Cheng, National Tsing Hua University, Taiwan*

S82 Power Electronic Modules II

Room: 327
Chair: Robert Pilawa, Jean Luc Schanen

8:00AM - Substrate Layout Evaluation for T-Type Three-Level IGBT Modules *Nan Zhu, Min Chen, Xingyao Zhang, Jie Ma, Dehong Xu, Zhejiang University, China*

8:25AM - A Compact Planar Rogowski Coil Current Sensor for Active Current Balancing of Parallel-Connected Silicon Carbide MOSFETs *Yang Xue, Junjie Lu, Zhiqiang Wang, Leon M. Tolbert, Benjamin J. Blalock, Fred Wang, University of Tennessee, United States*

8:50AM - Realization and Characterization of an IGBT Module based on the Power Chip-on-Chip 3D Concept *Jean-Louis Marchesini, Pierre-Olivier Jeannin, Yvan Avenas, Leonardo Ruffeil de Oliveira, Cyril Buttay, Raphaël Riva, Universite de Grenoble, France; Université de Lyon, France*

9:15AM - Develop Parasitic Inductance Model for the Planar Busbar of an IGBT H Bridge in a Power Inverter *Ning Zhang, Shuo Wang, Hui Zhao, University of Texas at San Antonio, United States*

S83 Multi-Level Converters

Room: 328
Chair: Stefano Bifaretti, Alan Watson

8:00AM - Multi-Phase Multi-Level LLC Resonant Converter with Low Voltage Stress on the Primary-Side Switches *Feng Jin, Fuxin Liu, Xinbo Ruan, Xiaoli Meng, Nanjing University of Aeronautics and Astronautics, China*

8:25AM - Three-Phase Three-Level LC-Type Series Resonant DC/DC Converter with Variable Frequency Control *Yue Chen, Fuxin Liu, Xinbo Ruan, Xiaoling Meng, Nanjing University of Aeronautics and Astronautics, China*

8:50AM - Five-Level Unidirectional T-Rectifier for High Speed Gen-Set Applications *Petar Grbovic, Alessandro Lidozzi, Luca Solero, Fabio Crescimbini, Huawei Technologies Dusseldorf GmbH, Germany; Roma Tre University, Italy*

9:15AM - Characterization of the Voltage and Electric Field Stresses in Multi-Cell Solid-State Transformers *Thomas Guillod, Jonas E. Huber, Gabriel Ortiz, Ankan De, Christian M. Franck, Johann W. Kolar, ETH Zurich, Switzerland; North Carolina State University, United States*

S84 Resonant DC-DC Converters II

Room: 329
Chair: Yogesh Patel, Hui Li

8:00AM - Design and Implementation of a Half-Bridge Dual LLC Converter with Symmetrical Autotransformer *Ke-Ming Chen, Tsorng-Juu Liang, Shih-Ming Chen, Shih-Wen Tsai, National Cheng Kung University, Taiwan*

8:25AM - LLC Resonant DC Transformer (DCX) with Parallel PWM Tight Regulation *Hui Chen, Xinke Wu, Zhejiang University, China*

8:50AM - A Bi-Directional Resonant DC/DC Converter with Frequency Tracking Control *Qicheng Huang, Keyan Shi, Xiaoyu Jia, Changsheng Hu, Dehong Xu, Zhejiang University, China*

9:15AM - Analysis on the Influence of Secondary Parasitic Capacitance to ZVS Transient in LLC Resonant Converter *Hui Chen, Xinke Wu, Zhejiang University, China*

S85 EMI and Power Converters

Room: 330
Chair: Sung Yeul Park, Jiangang Hu

8:00AM - Development of a Frequency-Analysis Equipment Capable of Judging Propagation Direction of Conductive EMI *Noriyuki Nosaka, Satoshi Ogasawara, Masatsugu Takemoto, Yoshitaka Iwaji, Kazutoshi Ogawa, Hokkaido University, Japan; Hitachi, Ltd., Japan*

8:25AM - Shielding-Cancellation Technique for Suppressing Common Mode EMI in Isolated Power Converters *Lihong Xie, Xinbo Ruan, Qing Ji, Zhihong Ye, Nanjing University of Aeronautics and Astronautics, China; Lite-On Technology, China*

8:50AM - DC-Link Input EMI Filter Design in a Centralized Architecture PV Inverter: Impedance Approach *Djilali Hamza, Khalifa Hasan Al Hosani, Petroleum Institute, United Arab Emirates*

9:15AM - Analysis and Filter Design of Differential Mode EMI Noise for GaN-based Interleaved MHz Critical Mode PFC Converter *Yuchen Yang, Zhengyang Liu, Fred C. Lee, Qiang Li, Virginia Polytechnic Institute and State University, United States*

S86 Electric Vehicle Technologies

Room: 333
Chair: Yang Wang, Rahman Khwaja

8:00AM - A New Integrated Onboard Charger and Accessory Power Converter for Plug-in Electric Vehicles *Gui-Jia Su, Lixin Tang, Oak Ridge National Laboratory, United States*

8:25AM - Optimal Sizing of Propulsion Systems Applied to Fuel Cell based Vehicles *C. Raga, A. Barrado, A. Lázaro, I. Quesada, H. Miniguano, P. Zumel, M. Sanz, Universidad Carlos III de Madrid, Spain*

8:50AM - Transverse Flux Permanent Magnet Motor with Double-C Stator Hoops and Flux-Concentrated Rotor for In-Wheel Drive Electric Vehicle *Zhou Jia, Heyun Lin, Hui Yang, Zhou Jia, Chris Mi, Southeastern University, China; University of Michigan-Dearborn, United States*

9:15AM - Integrated Capacitor for Common-Mode EMI Mitigation Applicable to High Frequency Planar Transformers used in Electric Vehicles DC/DC Converters *Djilali Hamza, Majid Pahlevaninezhad, The Petroleum Institute, United Arab Emirates; Queen's University, Canada*

S87 Asymmetry and Forces in Electric Machines

Room: 334
Chair: Antonio Cardoso, Dave Dorrell

8:00AM - Effects of Unbalanced Magnetic Pull in Large Permanent Magnet Machines *M. Michon, K. Atallah, G. Johnstone, University of Sheffield, United Kingdom; Romax Technology Ltd., United Kingdom*

8:25AM - Experimental Verification of 6th Radial Force Control for IPMSMs based on Flux Linkage *Masato Kanematsu, Hiroshi Fujimoto, Yoichi Hori, Toshio Enomoto, Masahiko Kondou, Hiroshi Komiya, Kantaro Yoshimoto, Takayuki Miyakawa, University of Tokyo, Japan; Nissan Motor Co., Ltd., Japan*

8:50AM - The Measurement and Indexing of Unbalanced Magnetic Pull in Electrical Machines *David G. Dorrell, Jonathan K.H. Shek, Min-Fu Hsieh, University of Technology Sydney, Australia; University of Edinburgh, United Kingdom; National Cheng Kung University, Taiwan*

S88 Permanent Magnet Machine Drives I

Room: 335
Chair: Gianmario Pellegrino, Long Wu

8:00AM - Plug-in, Direct Flux Vector Control of PM Synchronous Machine Drives *Gianmario Pellegrino, Barbara Boazzo, Thomas M. Jahns, Politecnico di Torino, Italy; University of Wisconsin-Madison, United States*

8:25AM - Analysis and Control of Mono Inverter Dual Parallel SPMSM Drive System *Yongjae Lee, Jung-Ik Ha, Seoul National University, Korea*

8:50AM - Mechanical Parameter Estimation of Permanent Magnet Synchronous Machines with Aiding from Estimation of Rotor PM Flux Linkage *Kan Liu, Z.Q. Zhu, University of Sheffield, United Kingdom*

9:15AM - Flux Regulation Strategies for Hybrid Excitation Synchronous Machines *F. Giulii Capponi, G. Borocci, G. De Donato, F. Caricchi, University of Roma "La Sapienza", Italy*

S89 Non-Conventional Electric Machines

Room: 336
Chair: Elena Lomonova, Abraham Gebregergis

8:00AM - Transient Analysis of a Line Start Hysteresis Interior Permanent Magnet Motor *S.F. Rabbi, M.A. Rahman, Memorial University of Newfoundland, Canada*

8:25AM - Bearingless Transverse Flux Permanent Magnet Machine for Large Direct-Drive *Deok-je Bang, Seon-Hwan Hwang, Ji-Won Kim, Wook Hwang, Pil-Wan Han, Dae-Hyun Koo, Korea Electrotechnology Research Institute, Korea, Kyungnam University, Korea*

8:50AM - Hardware Integration for an Integrated Modular Motor Drive Including Distributed Control *Adam Shea, T.M. Jahns, University of Wisconsin-Madison, United States*

9:15AM - Modeling of Dual Mechanical Port Machine with Squirrel-Cage Outer Rotor for Hybrid Electric Vehicles *Haiwei Cai, Longya Xu, Ohio State University, United States*

Thursday, September 18 - 10:00 am - 11:40 am

S90 Wind Energy: Control and Operation II

Room: 323
Chair: Wei Qao

10:00AM - Control of a Small Wind Turbine in the High Wind Speed Region *Carlos Lumbreras, Juan M. Guerrero, Pablo García, Fernando Briz, David Díaz, University of Oviedo, Spain*

10:25AM - Sideband Torque Ripple in Direct Drive Permanent Magnet Wind Power Generator System *W. Liang, W. Fei, P.C.K. Luk, Cranfield University, United Kingdom*

10:50AM - Intelligent Maximum Power Extraction Control for Wind Energy Conversion Systems based on Online Q-Learning with Function Approximation *Chun Wei, Zhe Zhang, Wei Qiao, Liyan Qu, University of Nebraska-Lincoln, United States*

11:15AM - Proportional Derivative based Stabilizing Control of Paralleled Grid Converters with Cables in Renwable Power Plants *Xiongfei Wang, Frede Blaabjerg, Poh Chiang Loh, Aalborg University, Denmark*

S91 Voltage Control Issues in Renewable Energy Applications

Room: 324
Chair: Jiangang Hu, Jaedo Park

10:00AM - Estimation of Synchronization Signal using Sinusoidal Amplitude Integrator in Synchronous Reference Frame *Xiong Du, Yandong Liu, Guoning Wang, Pengju Sun, Luowei Zhou, Heng-Ming Tai, Chongqing University, China; University of Tulsa, United States*

10:25AM - High-Dynamic Single-Phase Hilbert-based PLL for Improved Phase-Jump Ride-Through in Grid-Connected Inverters *Buticchi Giampaolo, Davide Barater, Luca Tarisciotti, Pericle Zanchetta, University of Kiel, Germany; University of Parma, Italy; University of Nottingham, United Kingdom*

10:50AM - Output Voltage Control of 3-ϕ Switched Boost Inverter for Standalone Renewable Energy based Distribution Generation Systems *Ravindranath Adda, Avinash Joshi, Santanu Mishra, Indian Institute of Technology Guwahati, India; Indian Institute of Technology Kanpur, India*

11:15AM - Decoupled Capacitor Voltage Control of Modular Multilevel Converters *Marcelo A. Perez, Jose Rodriguez, Steffen Bernet, Universidad Tecnica Federico Santa Maria, Chile; Technical University of Dresden, Germany*

S92 Grid Devices

Room: 325
Chair: Hui Li, Khurram Afridi

10:00AM - A Six-Switch Solid State Variable Capacitor with Minimum DC Capacitance *Sisheng Liang, Fang Z. Peng, Dong Cao, Michigan State University, United States; North Dakota State University, United States*

10:25AM - Verification by Current Control of Multi-Phase Transformer-Linked Type Boost Chopper Circuit using Current Sensorless Method *Taichi Kawakami, Hirotaka Tanada, Masayoshi Yamamoto, Shimane University, Japan*

10:50AM - An Alternative Topology for Fault Current Limiting and Interrupting Devices *R. Alaei, S.A. Khajehoddin, W. Xu, S.H. Fathi, University of Alberta, Canada; Amirkabir University of Technology, Iran*

11:15AM - A Silicon Carbide Fault Current Limiter for Distribution Systems *Yusi Liu, Chris Farnell, Hao Zhang, Andrés Escobar-Mejía, H. Alan Mantooth, Juan Carlos Balda, Simon S. Ang, University of Arkansas, United States*

S93 Power Converters for Grid Applications

Room: 326
Chair: Luca Solero, Di Pan

10:00AM - An Isolated Multiport Bidirectional DC-DC Converter for PV-Battery-DC Microgrid Applications *Jianwu Zeng, Wei Qiao, Liyan Qu, University of Nebraska-Lincoln, United States*

10:25AM - Bidirectional DC-AC Converter for Isolated Microgrids with Voltage Unbalance Reduction Capabilities *Felipe S.F. e Silva, Luiz A. de S. Ribeiro, José Gomes de Matos, Federal University of Maranhao, Brazil*

10:50AM - A Multiport Power Sharing Converter Topology for Renewable-to-Grid Interface *J.T. Hawke, H.S. Krishnamoorthy, P.N. Enjeti, Texas A&M University, United States*

11:15AM - Y-Connected Three-Leg Converters Applied in Three or Four-Wire Shunt Compensator *Edgard L.L. Fabricio, Cursino B. Jacobina, Montiê A. Vitorino, Maurício B.R. Correa, Federal University of Campina Grande, Brazil; Federal University of Paraiba, Brazil*

S94 Control of Power Converters based on Physical and Virtual Models

Room: 327
Chair: Tobias Geyer, Tiefu Zhao

10:00AM - Estimation of the Plant Time Constant of Current-Controlled Voltage Source Converters *Ana Vidal, Alejandro G. Yepes, Jano Malvar, Óscar López, Jesús Doval-Gandoy, Francisco D. Freijedo, University of Vigo, Spain; Aalborg University, Denmark*

10:25AM - Model Predictive Current Control for Modular Multilevel Converters *Georgios Darivianakis, Tobias Geyer, Wim van der Merwe, ABB Corporate Research Center, Switzerland*

10:50AM - Virtual Impedance Current Sharing Control of Parallel Connected Converters for AC Motor Drives *Bassim Jassim, Bashar Zahawi, David J. Atkinson, Baghdad University, Iraq; Khalifa University, United Arab Emirates; Newcastle University, United Kingdom*

11:15AM - Improving Power Quality with Multi-Objective Modulated Model Predictive Control *Luca Tarisciotti, Pericle Zanchetta, Alan Watson, Jon Clare, Stefano Bifaretti, University of Nottingham, United Kingdom; University of Rome "Tor Vergata", Italy*

S95 DC-AC Multi-Phase Converters

Room: 328
Chair: Radu Bojoi, Norma Anglani

10:00AM - A New Four-Level π-Type Converter with Neutral Point Voltage Balancing Capability *Xibo Yuan, University of Bristol, United Kingdom*

10:25AM - SVPWM-based D-Σ Digital Control for 3φ Grid-Connected Inverter with Wide Inductance Variation *T.-F. Wu, C.-H.. Chang, L.-C. Lin, National Tsing Hua University, Taiwan; National Chung Cheng University, Taiwan*

10:50AM - Switched Coupled-Inductor Z-Source Inverters with Large Conversion Ratio and Soft-Switching Condition *Xinping Ding, Chenghui Zhang, Qingdao Technological University, China; Shandong University, China*

11:15AM - A Novel P-Q Variations Method using a Decoupled Injection of Reference Currents for a Precise Estimation of Grid Impedance *Je-Hee Cho, Ki-Young Choi, Yong-Wook Kim, Rae-Young Kim, Hanyang University, Korea*

S96 Soft-Switching Bridge DC-DC Converters

Room: 329
Chair: Jin Wang, Madhu Chinthavali

10:00AM - A Low-RMS-Current Passive Auxiliary Circuit for ZVS Operation of Full Bridge Converters *Alireza Safaee, Praveen Jain, Alireza Bakhshai, Bombardier Transportation Inc., Canada; Queen's University, Canada*

10:25AM - The Cost-Efficient, Full ZVS Range Hybrid Full-Bridge-Half-Bridge Family with Shared Lagging Leg: Topology Derivation, Optimization Design and Experimental Results *Yu Chen, Gang Wen, Li Peng, Yong Kang, Huazhong University of Science and Technology, China*

10:50AM - Three-Phase Current-Fed Zero Current Switching Phase-Shift PWM DC-DC Converter *Ali Mohammadpour, Tao Li, Leila Parsa, Rensselaer Polytechnic Institute, United States*

11:15AM - A Novel High Efficiency High Power Density Three-Port Converter based on Interleaved Half-Bridge Converter for Renewable Energy Applications *Lili Zhu, Hongfei Wu, Peng Xu, Haibing Hu, Hongjuan Ge, Nanjing University of Aeronautics and Astronautics, China*

S97 Flux and Direct Torque Control

Room: 330
Chair: Mario Pacas, Robert Cuzner

10:00AM - A Novel Stator Flux Oriented V/f Control Method in Sensorless Induction Motor Drives for Accuracy Improvement and Oscillation Suppression *Bin Chen, Wenxi Yao, Zhengyu Lu, Kevin Lee, Zhejiang University, China; Eaton Corporation, United States*

10:25AM - Loss Manipulation Capabilities of Deadbeat-Direct Torque and Flux Control Induction Machine Drives *Yukai Wang, Takumi Ito, Robert D. Lorenz, University of Wisconsin-Madison, United States; Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan*

10:50AM - A Novel Method of Maximum Torque per Ampere Control for a Direct Torque-Controlled PMSM in a Stator Flux-Linkage Synchronous Frame *Tatsuki Inoue, Yukinori Inoue, Shigeo Morimoto, Masayuki Sanada, Osaka Prefecture University, Japan*

11:15AM - Super-Twisting Sliding Mode Direct Torque Control of Induction Machine Drives *Cristian Lascu, Frede Blaabjerg, University Politehnica of Timisoara, Romania; Aalborg University, Denmark*

S98 Synchronous Reluctance Machines

Room: 333
Chair: Francesco Cupertino,Thomas Wu

10:00AM - FE-Aided Analytical Method to Predict the Capabilities of Line-Start Synchronous Motors *Damiano Mingardi, Nicola Bianchi, University of Padova, Italy*

10:25AM - A Mechanically Robust Rotor with Transverse-Laminations for a Synchronous Reluctance Machine for Traction Applications *Seyedmorteza Taghavi, Pragasen Pillay, Concordia University, Canada*

10:50AM - Design of a 50,000 rpm Synchronous Reluctance Machine for an Aeronautic Diesel Engine Compressor *M. Palmieri, M. Perta, F. Cupertino, Politecnico di Bari, Italy*

11:15AM - On the Feasibility of Integer and Fractional Number of Slots per Pole Distributed Winding Designs for Synchronous Reluctance Motors *Mircea Popescu, James E. Goss, David A. Staton, Yi Wang, Dan M. Ionel, Motor Design Ltd., United Kingdom; University of Wisconsin-Milwaukee, United States*

S99 Modeling of Electric Machines

Room: 334
Chair: Jagadeesh Tangudu, Ronghai Qu

10:00AM - Ultrafast Steady-State Multi-Physics Model for PM and Synchronous Reluctance Machines *Yi Wang, Dan M. Ionel, David Staton, University of Wisconsin-Milwaukee, United States; Regal Beloit Corp., United States; Motor Design, Ltd., United Kingdom*

10:25AM - Coupled Electromagnetic/Thermal Machine Design Optimization based on Finite Element Analysis with Application of Artificial Neural Network *Wenying Jiang, T.M. Jahns, University of Wisconsin-Madison, United States*

10:50AM - A Multi-Physics Design Methodology Applied to a High-Force-Density Short-Duty Linear Actuator *N. Simpson, R. Wrobel, P.H. Mellor, University of Bristol, United Kingdom*

11:15AM - A Methodology for Predicting the Thermal Behaviour of Modular-Wound Electrical Machines *J.L. Baker, R. Wrobel, D. Drury, P.H. Mellor, University of Bristol, United Kingdom*

S100 Permanent Magnet Machine Drives II

Room: 335
Chair: Thomas Jahns, Gui-Jia Su

10:00AM - Low Switching Frequency Stator Flux Linkage Observer for Interior Permanent Magnet Synchronous Machines *Wei Xu, Robert D. Lorenz, University of Wisconsin-Madison, United States*

10:25AM - Using D-Q Transformation to Variable Switching Frequency PWM Control for Interior Permanent Magnet Synchronous Motor Drives *Fei Yang, Allan Taylor, Hua Bai, Bing Cheng, Arshan Khan, Young Joo Lee, Zhong Nie, Kettering University, United States; Chrysler Group LLC, United States*

10:50AM - Permanent Magnet Temperature Estimation in PMSMs using Pulsating High Frequency Current Injection *David Reigosa, Daniel Fernandez, Hideo Yoshida, Takashi Kato, Fernando Briz, University of Oviedo, Spain; Nissan Motor Co., Ltd., Japan*

11:15AM - Operating within Dynamic Voltage Limits during Magnetization State Increases in Variable Flux PM Synchronous Machines *Brent Gagas, Takashi Fukushige, Takashi Kato, Robert D. Lorenz, University of Wisconsin-Madison, United States; Nissan Motor Co., Ltd., Japan*

S101 Magnetic Materials and Design

Room: 336
Chair: Juan Rivas, Charles Sullivan

10:00AM - A New Core Loss Model for Rectangular AC Voltages *Mingkai Mu, Fred C. Lee, Virginia Polytechnic Institute and State University, United States*

10:25AM - Allowable Power Analysis for High Power Density DC-DC Converters using Integrated Magnetic Components *Shota Kimura, Shogo Aoto, Jun Imaoka, Masayoshi Yamamoto, Shimane University, Japan*

10:50AM - Design and Evaluation of the Constant-Flux Inductor with Enclosed-Winding *Han Cui, Khai D.T. Ngo, Jim Moss, Michele Lim, Ernesto Rey, Virginia Polytechnic Institute and State University, United States; Texas Instruments Inc., United States*

11:15AM - Gap Design for Nonlinear Ferrite Cores to Maximize Inductance *Ting Ge, Khai Ngo, Jim Moss, Michele Lim, Virginia Polytechnic Institute and State University, United States; Texas Instruments Inc., United States*

Thursday, September 18 – 1:30 pm - 3:10 pm

S102 LED Drivers II

Room: 323
Chair: Yilmaz Sozer

1:30PM - An Input-Adaptive Self-Oscillating Synchronous Boost Converter for LED Driving with Ultra-Low Wide-Range Voltage Input *Yi Chen, Yurong Nan, Siheng Zhong, Qinggang Kong, Zhejiang University of Technology, China; Dalian Shinergy Science & Technology Development Co., Ltd., China*

1:55PM - A Parallel LED String Driver using Capacitors for Source and String Ground Separation *Ruihong Zhang, Henry Shu-Hung Chung, City University of Hong Kong, Hong Kong*

2:20PM - Control Scheme for Decoupling Auxiliary Power Supply in Dimmable LED Drivers *Liang Jia, David Fang, Yan-Fei Liu, Philips Electronics North America, United States; Queen's University, Canada*

2:45PM - Inductive Power Transfer System for Driving Multiple OLED Lighting Panels *Rui Zhou, Ruihong Zhang, Henry Shu-hung Chung, City University of Hong Kong, Hong Kong*

S103 DC-DC Converters for Renewable Energy Applications

Room: 324
Chair: Subhashish Bhattacharya, Tiefu Zhao

1:30PM - Frequency-based Control of a Micro-Grid with Multiple Renewable Energy Sources *Giampaolo Buticchi, Marco Liserre, Davide Barater, Carlo Concari, Alessandro Soldati, Giovanni Franceschini, University of Kiel, Germany; University of Parma, Italy*

1:55PM - A Family of Dual-Input DC/DC Converters based on Quasi-Switched-Capacitor Circuit *Feng Guo, Lixing Fu, Xuan Zhang, Chengcheng Yao, He Li, Jin Wang, Ohio State University, United States*

2:20PM - Multi-Input Transformer Coupled DC-DC Converter for PV-Wind based Stand-Alone Single-Phase Power Generating System *B. Mangu, B.G. Fernandes, Indian Institute of Technology Bombay, India*

2:45PM - Inductive-Boost Switched-Capacitor DC/DC Converter for Maximum Power Point Tracking Photovoltaic Systems *Ali Gandomkar, Jul-Ki Seok, Yeungnam University, Korea*

S104 Smart Grid Technologies I

Room: 325
Chair: David Perreault, Zhiguo Pan

1:30PM - Medium Voltage AC Collection Grid for Large Scale Photovoltaic Plants based on Medium Frequency Transformers *Bahaa Hafez, Harish S. Krishnamoorthy, Prasad Enjeti, Uffe Borup, Shehab Ahmed, Texas A&M University, United States; Danfoss Solar Inverters, United States; Texas A&M University at Qatar, Qatar*

1:55PM - Towards Fully Controllable Multi-Terminal DC Grids using Flexible DC Transmission Systems *Kumars Rouzbehi, Arash Miranian, Alvaro Luna, Pedro Rodriguez, Technical University of Catalonia, Spain; Ferdowsi University of Mashhad, Iran; Abengoa Research, Spain*

2:20PM - Standalone ESS Modeling and Dual-Loop Control using Zn-Br Redox Flow Battery *Jung-Muk Choe, Younghoon Cho, Gyu-Ha Choe, Konkuk University, Korea*

2:45PM - Storage System Requirements for Grid Supporting PV-Power Plants *Catalin Gavriluta, Ignacio Candela, Joan Rocabert, Ion Etxeberria-Otadui, Pedro Rodriguez, Technical University of Catalonia, Spain; IKERLAN-IK4 Technological Research Centre, Spain; Abengoa Research, Spain*

S105 HVDC Systems

Room: 326
Chair: Amel Lachichi, Luca Solero

1:30PM - A DC/DC Circuit Suitable for HVDC Applications with Large Step-Ratios *T. Lüth, M. Merlin, T. Green, Imperial College London, United Kingdom*

1:55PM - DC Impedance Modelling of a MMC-HVDC System for DC Voltage Ripple Prediction under a Single-Line-to-Ground Fault *Xiaojie Shi, Zhiqiang Wang, Bo Liu, Yalong Li, Leon M. Tolbert, Fred Wang, University of Tennessee, United States*

2:20PM - Optimization of Limiting Reactors Design for DC Fault Protection of Multi-Terminal HVDC Networks *E. Kontos, S. Rodrigues, R. Teixeira Pinto, P. Bauer, Delft University of Technology, Netherlands*

2:45PM - Implementation and Testing of High-Power IGCT-based Cascaded-Converter Cells *Tomas Modeer, Staffan Norrga, Hans-Peter Nee, KTH Royal Institute of Technology, Sweden*

S106 Dual Active Bridge DC-DC Converters

Room: 327
Chair: Shuo Wang, Wei Qiao

1:30PM - Dual-Input High Gain DC-DC Converter based on the Cockcroft-Walton Multiplier *Lukas Müller, Jonathan W. Kimball, Missouri University of Science and Technology, United States*

1:55PM - Novel Multiobjective Optimization of MF Transformers for Soft-Switching Converters using a Genetic Algorithm *Asier Garcia-Bediaga, Irma Villar, Luis Mir, Ion Etxeberria-Otadui, Alfred Rufer, IK4-IKERLAN Technological Research Centre, Spain; École Polytechnique Fédérale de Lausanne, Switzerland*

2:20PM - An Isolated Hybrid Switched C-L DC-DC Circuit with High Step-Up Ratio and Reduced Switch Voltage Stress *Cong Li, Rachid Darbali Zamora, Chengcheng Yao, Lixing Fu, He Li, Xuan Zhang, Feng Guo, Jin Wang, Ohio State University, United States*

2:45PM - A Series Compensation Enabled ZVS Range Enhancement of a Dual Active Bridge Converter for Wide Range Load Conditions *Awneesh Tripathi, Krishna Mainali, Subhashish Bhattacharya, North Carolina State University, United States*

S107 Multi-Level Converter Topologies I

Room: 328
Chair: Luca Zarri, Patrick Wheeler

1:30PM - A Non-Regenerative Five-Level Rectifier *Xibo Yuan, University of Bristol, United Kingdom*

1:55PM - Optimised Operation Mode for the Hexverter Topology based on Adjacent Compensating Power *Dennis Karwatzki, Lennart Baruschka, Malte von Hofen, Axel Mertens, Leibniz Universität Hannover, Germany; Protolar GmbH, Germany*

2:20PM - Low-Speed Drive Operation of the Modular Multilevel Converter Hexverter Down to Zero Frequency *Lennart Baruschka, Dennis Karwatzki, Malte von Hofen, Axel Mertens, Leibniz Universität Hannover, Germany; Protolar GmbH, Germany*

2:45PM - A Cross Connected Submodule Topology for Hybrid Multilevel Converters *Ebin Cherian Mathew, Anshuman Shukla, Mahendra Ghat, Indian Institute of Technology Bombay, India*

S108 Low-Power Resonant Converters

Room: 329
Chair: Carl Ho, Henry Chung

1:30PM - On-Line DC-Link Voltage Control of LLC Resonant Converter for Server Power Applications *Zih-Jie Su, Yen-Shin Lai, National Taipei University of Technology, Taiwan*

1:55PM - Modeling and Experimentation of Misalignment-Tolerable Loosely-Coupled Coil Structure *Jeff Po Wa Chow, Nan Chen, Henry Shu Hung Chung, Leanne Lai Hang Chan, City University of Hong Kong, Hong Kong; ABB Corporate Research Center, Sweden*

2:20PM - Comparison of Two High Frequency Converters for Capacitive Power Transfer *Liang Huang, Aiguo Patrick Hu, Akshya Swain, Xin Dai, University of Auckland, New Zealand; Chongqing University, China*

2:45PM - Optimal Operation and Burst-Mode Control for Improving the Efficiency of the Quasi-Switched-Capacitor Resonant Converter *Xuan Zhang, Chengcheng Yao, Feng Guo, Jin Wang, Ohio State University, United States*

S109 Modulation for Power Converters II

Room: 330
Chair: J. Pou, Madhav Manirekar

1:30PM - Critical Modulation Method based on PWAM in Back-to-Back Three-Phase System *Hojoon Shin, Jung-Ik Ha, Seoul National University, Korea*

1:55PM - A Comparative Investigation of Various Advanced Bus Clamped Space Vector Pulse Width Modulation (SVPWM) Techniques *Meenu D. Nair, Gopinath Vivek, Anjana Kolathiparambil, Mukti Barai, NIT Calicut, India*

2:20PM - A Control Mechanism to Compensate Nonlinearity of Discontinuous Modulation based Grid-Connected Differential-Mode Ćuk Inverter *Siamak Mehrnami, Sudip K. Mazumder, University of Illinois at Chicago, United States*

2:45PM - A New Space Vector Modulation Technique for Common-Mode Voltage Reduction in both Magnitude and Third-Order Component *Kai Tian, Jiacheng Wang, Bin Wu, Dewei Xu, Zhongyuan Cheng, Navid Reza Zargari, Ryerson University, Canada; Simon Fraser University, Canada; Rockwell Automation Canada, Canada*

S110 Power Electronics Reliability Assessment

Room: 333
Chair: Yehui Han, Shashank Krishnamurthy

1:30PM - Mission Profile Translation to Capacitor Stresses in Grid-Connected Photovoltaic Systems *Yongheng Yang, Ke Ma, Huai Wang, Frede Blaabjerg, Aalborg University, Denmark*

1:55PM - Reliability Assessment of Power MOSFETs Working in Avalanche Mode based on a Thermal Strain Direct Measurement Approach *S. Russo, A. Testa, S. De Caro, S. Panarello, S. Patanè, T. Scimone, G. Scelba, G. Scarcella, STMicroelectronics, Italy; University of Messina, Italy; University of Catania, Italy*

2:20PM - Transient Modelling of Loss and Thermal Dynamics in Power Semiconductor Devices *Ke Ma, Yongheng Yang, Frede Blaabjerg, Aalborg University, Denmark*

2:45PM - An Icepak-PSpice Co-Simulation Method to Study the Impact of Bond Wires Fatigue on the Current and Temperature Distribution of IGBT Modules under Short-Circuit *Rui Wu, Francesco Iannuzzo, Huai Wang, Frede Blaabjerg, Aalborg University, Denmark*

S111 High Power Drives

Room: 334
Chair: Lei Hao, Qin Lei

1:30PM - Improved Selective Harmonics Elimination (SHE) Scheme with Online Harmonic Compensation for High-Power PWM Converters *Ye Zhang, Yun Wei Li, Navid R. Zargari, Zhongyuan Cheng, University of Alberta, Canada; Rockwell Automation, Canada*

1:55PM - Model Predictive Pulse Pattern Control with Very Fast Transient Responses *Tobias Geyer, Nikolaos Oikonomou, ABB Corporate Research, Switzerland*

2:20PM - A Voltage Controlled Current Source Gate Drive Method for IGBT Devices *Lu Shu, Junming Zhang, Fangzheng Peng, Zhiqian Chen, Zhejiang University, China; Michigan State University, United States; IMRA Europe S.A.S, United Kingdom*

2:45PM - Modulation Schemes for a 30 MVA IGCT Converter using NPC H-Bridges *Jie Shen, Stefan Schröder, Bo Qu, Yingqi Zhang, Kunlun Chen, Fan Zhang, Richard Zhang, GE Global Research, Germany; GE Global Research, China; GE Power Conversion, China*

S112 High Speed Electric Machines

Room: 335
Chair: Fabio Capponi, Radu Bojoi

1:30PM - High Speed Operation of Electrical Machines, a Review on Technology, Benefits and Challenges *Reza Rajabi Moghaddam, ABB Corporate Research, Sweden*

1:55PM - High Frequency AC Machines Winding Model-Parameters Estimation *I. Rasoanarivo, A. Baddi, N. Haje Obeid, T. Boileau, B. Nahid-Mobarakeh, N. Takorabet, F. Meibody-Tabar, Université de Lorraine, France*

2:20PM - Minimization of Proximity Losses in Electrical Machines with Tooth-Wound Coils *Mario Vetuschi, Francesco Cupertino, Politecnico di Bari, Italy*

2:45PM - AC Losses in High Frequency Electrical Machine Windings formed from Large Section Conductors *Phil Mellor, Rafal Wrobel, Nick Simpson, University of Bristol, United Kingdom*

S113 Manufacturing Issues of Electric Machines

Room: 336
Chair: Marcello Pucci, Peter Wung

1:30PM - Roll Up Stator Development for 56 Frame PM Synchronous Motor *Jason J. Kreidler, Wes K. Anderson, Sree Venkateswararao, Bill J. Conway, Harold D. Willis, Peter Y.P. Wung, Regal Beloit America Inc., United States; Regal Beloit Inc., India*

1:55PM - Reduction of Cogging Torque due to Production Tolerances of Rotor by using Partially Placed Dummy Slots in Axial Direction *Masatsugu Nakano, Yusuke Morita, Toshihiro Matsunaga, Mitsubishi Electric Corporation, Japan*

2:20PM - Performance and Core Loss of Concentrated Winding IPMSM with Different Core Treatment *Shah Asifur Rahman, Andrew M. Knight, University of Alberta, Canada; University of Calgary, Canada*

2:45PM - Manufacturing Influence on the Magnetic Properties and Iron Losses in Cobalt-Iron Stator Cores for Electrical Machines *Andreas Krings, Marco Cossale, Juliette Soulard, Aldo Boglietti, Andrea Cavagnino, KTH Royal Institute of Technology, Sweden; Politecnico di Torino, Italy*

Thursday, September 18 – 3:30 pm - 5:10 pm

S114 Converters for Solar PV Systems

Room: 323
Chair: Amir Mehdi Pasdar

3:30PM - Analysis and Experimental Verification of Series-Connected Micro-Converter Photovoltaic System *Wang Chen, Min Chen, Zhe Zhang, Chen Jiang, Zhejiang University, China*

3:55PM - Photovoltaic Power Conversion Circuit using a Symmetric Boost Converter for Low-Voltage Distribution Systems *Hideaki Fujita, Ryosuke Amma, Tokyo Institute of Technology, Japan*

4:20PM - New Control Strategy for DCM-232 Three-Phase PV Inverter with Constant Common Mode Voltage and Anti-Islanding Capability *Xiaoqiang Guo, David Xu, Bin Wu, Yanshan University, China*

4:45PM - Single-Switch Single-Magnetic PWM Converter Integrating Voltage Equalizer for Series-Connected Photovoltaic Modules under Partial Shading *Masatoshi Uno, Akio Kukita, Japan Aerospace Exploration Agency, Japan*

S115 Stability Analysis and Power Quality

Room: 324
Chair: T. Shimizu, D. G. Holmes

3:30PM - Stability Analysis of Single-Phase Grid-Connected Inverter with L-Filter *Ruiliang Xie, Xiang Hao, Xu Yang, Lang Huang, Chao Wang, Yuehong Yang, Xi'an Jiaotong University, China*

3:55PM - Comparison of Modulation Techniques for Active Split DC-Bus Three-Phase Four-Leg Inverters *Stefano Bifaretti, Alessandro Lidozzi, Luca Solero, Fabio Crescimbini, University of Roma Tor Vergata, Italy; Roma Tre University, Italy*

4:20PM - Shunt Active Power Filter based on Source Current Detection with a Fast Transient Response *Tomoyuki Mannen, Hideaki Fujita, Tokyo Institute of Technology, Japan*

4:45PM - An Inrush Limited, Surge Tolerant Hybrid Resonant Bridgeless PWM AC-DC PFC Converter *Muntasir Alam, Wilson Eberle, Nicholas Dohmeier, University of British Columbia, Canada; Delta-Q Technologies Corp., Canada*

S116 Smart Grid Technologies II

Room: 325
Chair: Navid Zargari, Norma Anglani

3:30PM - Evaluation and Control Design of Virtual-Synchronous-Machine-based STATCOM for Grids with High Penetration of Renewable Energy *Chi Li, Rolando Burgos, Igor Cvetkovic, Dushan Boroyevich, Lamine Mili, Pedro Rodriguez, Virginia Polytechnic Institute and State University, United States; Abengoa Research, Spain*

3:55PM - Islanding Detection in Three-Phase and Single-Phase Systems using Pulsating High Frequency Signal Injection *David Reigosa, Fernando Briz, Cristian Blanco, Juan Manuel Guerrero, University of Oviedo, Spain*

4:20PM - Analysis of ΔP - ΔQ Area of Uncontrolled Islanding in Low Voltage Grids with PV Generators *Riccardo Sgarbossa, Stefano Lissandron, Paolo Mattavelli, Roberto Turri, Alberto Cerretti, University of Padova, Italy; ENEL SpA, Italy*

4:45PM - Design, Simulation and Testing of Semiconductor Assisted OLTC for Grid Voltage Regulator *Thiwanka Wijekoon, Eva-Maria Baerthlein, Ara Panosyan, Balusamy Kullampalayam Parameswaran, Simon Schramm, Stefan Schroeder, GE Global Research-Europe, Germany*

S117 DC Grids

Room: 326
Chair: Dong Jiang, Amel Lachichi

3:30PM - Stability Analysis of a DC Microgrid with Master-Slave Control Structure *Li Guo, Yibin Feng, Xialin Li, Chengshan Wang, Yunwei Li, Tianjin University, China; University of Alberta, Canada*

3:55PM - Design Consideration for Contactless DC Connector in High Power Density Future 380 V DC Distribution System *Yusuke Hayashi, Hajime Toyoda, Toshifumi Ise, Akira Matsumoto, Osaka University, Japan; NTT Facilities, Japan*

4:20PM - DC Pole-to-Pole Short-Circuit Behavior Analysis of Modular Multilevel Converter *Guoju Zhang, Yao Chen, Chenyang Yue, Li Qi, Jiuping Pan, ABB Ltd., China; ABB Ltd., United States*

4:45PM - Control of Voltage Source Converter based Multi-Terminal DC Grid under DC Fault Operating Condition *Nima Yousefpoor, Sungmin Kim, Subhashish Bhattacharya, Quanta Technology, United States; Seoul National University, Korea; North Carolina State University, United States*

S118 Gate Drive Techniques

Room: 327
Chair: David Cotini, Jelena Popovic

3:30PM - Thermal Analysis and Improvement of Cascode GaN HEMT in Stack-Die Structure *Shuojie She, Wenli Zhang, Xiucheng Huang, Weijing Du, Zhengyang Liu, Fred C. Lee, Qiang Li, Beijing University of Technology, China; Virginia Polytechnic Institute and State University, United States*

3:55PM - Gate-Driver for Safe Operation of Depletion-Mode SiC JFETs *Simon Weber, Arvid Merkert, Axel Mertens, Leibniz Universität Hannover, Germany*

4:20PM - Transformer Isolated Gate Drive with Protection for SiC MOSFET in High Temperature Application *Feng Qi, Longya Xu, Guoliang Zhao, Jiangbo Wang, Ohio State University, United States*

4:45PM - Design and Experimental Validation of a High Frequency Gate Driver for Silicon Carbide Power Modules *Alejandro Rujas, Gabriel Garcia, Ion Etxeberria-Otadui, Uxue Larrañaga, Txomin Nieva, IK4-IKERLAN Technological Research Centre, Spain; CAF Power and Automation, Spain*

S119 Multi-Level Converter Topologies II

Room: 328
Chair: Rolando Burgos, Pierluigi Tenca

3:30PM - Partial 5/3 Level Topology for Solar Grid-Tie Inverters *Antonio Ginart, Richard Liou, Andres Salazar, Carlos Restrepo, Michael Ernst, SolarMax, United States; Georgia Institute of Technology, United States*

3:55PM - Design and Implementation of a Novel Multilevel DC-AC Inverter *Cheng-Han Hsieh, Tsorng-Juu Liang, Shih-Wen Tsai, National Cheng Kung University, Taiwan*

4:20PM - A High Voltage Gain Multilevel Modular Switched-Capacitor DC-DC Converter *Dong Cao, Wei Qian, Fang Z. Peng, North Dakota State University, United States; Michigan State University, United States*

4:45PM - Modification of Cascaded H-Bridge Multilevel Inverter to Increase Output Voltage Level with a Single DC Voltage Source *Jin-sung Choi, Feel-soon Kang, Hanbat National University, Korea*

S120 DC-DC Converter Applications

Room: 329
Chair: Qiang Li, Baoming Ge

3:30PM - Downsizing Effects of Integrated Magnetic Components in High Power Density DC-DC Converters for EV and HEV *Shota Kimura, Jun Imaoka, Masayoshi Yamamoto, Shimane University, Japan*

3:55PM - A Linear-Assisted DC-DC Hybrid Power Converter for Envelope Tracking RF Power Amplifiers *Rajdeep Bondade, Yi Zhang, Dongsheng Ma, University of Texas at Dallas, United States; Texas Instruments Inc., United States*

4:20PM - A 98.7% Efficient Composite Converter Architecture with Application-Tailored Efficiency Characteristic *Hua Chen, Kamal Sabi, Hyeokjin Kim, Tadakazu Harada, Robert Erickson, Dragan Maksimović, University of Colorado-Boulder, United States*

4:45PM - Discontinuous Conduction Mode Operation of the Two-Phase Integrated-Magnetic Boost Converter *Brendan C. Barry, John G. Hayes, Marek S. Ryłko, Jerzy W. Masłoń, University College Cork, Ireland; dtw Sp. z o.o., Poland*

S121 Control of Power Converters III

Room: 330

Chair: Jaedo Park

3:30PM - Control Strategy for Three-Phase Converter under Unbalanced Grid Voltage Conditions Considering Line Loss *Kyung-Hwan Lee, Jung-Ik Ha, Seoul National University, Korea*

3:55PM - Integrated Grid Inductance Estimation Technique for Finite Control Set Model Predictive Control in Grid Connected Converters *Bilal Arif, Luca Tarisciotti, Pericle Zanchetta, Jon Clare, Marco Degano, University of Nottingham, United Kingdom*

4:20PM - Finite State Model Predictive Control for 3x3 Matrix Converter based on Switching State Elimination *Ozan Gulbudak, Enrico Santi, Janosch Marquart, University of South Carolina, United States; University of Applied Sciences, Switzerland*

4:45PM - Control and Experiment of High Frequency Isolated Modular Converter under Normal and AC Fault Operating Condition *Nima Yousefpoor, Babak Parkhideh, Ali Azidehak, Sungmin Kim, Subhashish Bhattacharya, Quanta Technology, United States; North Carolina State University, United States; Seoul National University, Korea*

S122 Energy-Efficient Motor Drives

Room: 333
Chair: Ali M. Bazzi, Stefan Schroeder

3:30PM - Minimum Copper Loss Control of a Single-Phase Grid-Connected Wound Rotor Machine over Full Speed Range *Kahyun Lee, Yongsu Han, Jung-Ik Ha, Seoul National University, Korea*

3:55PM - Power Loss, System Efficiency, and Leakage Current Comparison between Si IGBT VFD and SiC FET VFD with Various Filtering Options *Mahesh Swamy, Jun-Koo Kang, Kohei Shirabe, Yaskawa America, Inc., United States*

4:20PM - Pulsating Torque Control with Voltage Suppression Period for Position-Dependent Load Torque Applications *Takahiro Suzuki, Yuichi Shimizu, Hitachi, Ltd., Japan; Hitachi Appliances, Inc., Japan*

S123 Wound-Field Machines

Room: 334
Chair: Jiaqi Liang, Lei Hao

3:30PM - Separately Excited Synchronous Motor with Rotary Transformer for Hybrid Vehicle Application *Constantin Stancu, Terence Ward, Khwaja Rahman, Robert Dawsey, Peter Savagian, General Motors, United States*

3:55PM - Investigation of an Improved Hybrid-Excitation Flux Switching Brushless Machine for HEV/EV Applications *Gan Zhang, Wei Hua, Ming Cheng, Jianzhong Zhang, Wei Jiang, Southeast University, China*

4:20PM - Design of SPM and IPM Rotors in Novel One-Axis Actively Positioned Single-Drive Bearingless Motor *Hiroya Sugimoto, Itsuki Shimura, Akira Chiba, Tokyo Institute of Technology, Japan*

4:45PM - Design and Control Strategy of a Two-Phase Brushless Exciter for Three-Stage Starter/Generator *Ningfei Jiao, Weiguo Liu, Jichang Peng, Shuai Mao, Hua Zhang, Northwestern Polytechnical University, China*

S124 Axial-Flux Machines

Room: 335
Chair: Jessica Colton, Greg Heins

3:30PM - Increase in Operating Range and Efficiency for Variable Gap Axial Flux Motors *Greg Heins, Mark Thiele, Dean Patterson, Nicholas Lambert, Regal Beloit Corporation, Australia; Charles Darwin University, Australia*

3:55PM - Closed-Form Solution for Winding Types of Axial Flux Permanent Magnet Machines *Ju Hyung Kim, Wooyung Choi, Bulent Sarlioglu, WEMPEC, University of Wisconsin-Madison, United States*

4:20PM - Examination for the Higher Efficiency in a Ferrite Permanent Magnet 10 kW In-Wheel Axial-Gap Motor with Coreless Rotor Structure *Kodai Sone, Masatsugu Takemoto, Satoshi Ogasawara, Kenichi Takezaki, Wataru Hino, Hokkaido University, Japan; Dynax Corporation, Japan*

4:45PM - Analysis and Development of an Axial Flux Magnetic Gear *Matthew Johnson, Alireza Shapoury, Pedram Boghrat, Mike Post, Hamid A. Toliyat, Texas A&M University, United States; Physical Optics Corporation, United States*

S125 Traction and Heavy-Duty Vehicle Systems

Room: 336
Chair: Ozpineci Burak, Drazen Dujiu

3:30PM - A Non-Dissipative Controllable Charging Equalizer for Series Connected High-Capacity Super-Capacitors Urban Rail Transport System *Jianfeng Liu, Cheng Luo, Haikuan Jiang, Zhiwu Huang, Central South University, China; Hunan Engineering Laboratory for Advanced Control and Intelligent Automation, China*

3:55PM - Hybrid Railway Power Conditioner with Partial Compensation for Rating Optimization *NingYi Dai, KengWeng Lao, ChiSeng Lam, University of Macau, Macau*

4:20PM - DC Side Ripple Cancellation in a Cascaded Multi-Level Topology for Automotive Applications *Andrew Goodman, Alan Watson, Anubrata Dey, Jon Clare, Pat Wheeler, Yusuke Zushi, University of Nottingham, United Kingdom; Nissan Motor Co., Ltd, Japan*

4:45PM - Experimental Evaluation of E-Motor Engine Start in a Heavy-Duty Hybrid Vehicle under Cold Soak Conditions *J.G. Vining, Daimler Trucks North America, United States*