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P202  Using Pulse Density Modulation to Improve the Efficiency of IGBT Inverters in Induction Heating Applications
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P203  The sequential switching shunt maximum power regulator and its application in the electric propulsion system of an spacecraft
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P204  Single-Switch Power Supply based on the Class E Amplifier for Ozone Generators
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P205  The state-of-the-art hybrid power supply for FED with carbon nanotube
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P206  New High Power / High Voltage Battery-Free Bus for Electrical Propulsion in Satellites
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P207  Issues, Models and Solutions for Triac Modulated Phase Dimming of LED Lamps
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P208  Particle Swarm Optimization for energy management fuzzy controller design in dual-source electric vehicle
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P209  Modeling and calculation of the efficiency for low-cost round-wire planar windings in domestic induction heating applications
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P210  DBD Modeling as a Function of Waveforms Slope
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P211  Comparative Study on a Low Cost Sustaining Driver with Single and Dual Path Energy Recovery Circuits for Plasma Display Panel (PDP)
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P212  A Probabilistic Approach of Designing Driving Circuits for Strings of High-Brightness Light Emitting Diodes
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P213  Experimental investigation on the performance characteristics of white LEDs used in illumination application
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P214  Single-Chip FPGA Implementation of a Digital VRM Controller with Interlaced Sampling and Control Technique
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P215  A Layered Modular Controller Structure for Multilevel Converters
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P216  Voltage and Current Ripple Considerations for Improving Lifetime of Ultra-Capacitors used for Energy Buffer Applications at Converter Inputs
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P217  A High Density Power Converter for Remotely Operated Loads
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P229  Analyzing Current Ripple in Variable-Frequency Boost Converter
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8:55AM  A Quick Capacitor Charge Balance Control Method to Achieve Optimal Dynamic Response for Buck Converters
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9:20AM  Optimal Design of Current Source Gate Driver for a Buck Voltage Regulator Based on a New Analytical Loss Model
Zhiliang Zhang, Wilson Eberle, Zhihua Yang, Yan-Fei Liu and Paresh C. Sen 1556

9:45AM  Dual-Edge Pulse Width Modulation Scheme for Fast Transient Response of Multiple-Phase Voltage Regulators
Weihong Qiu, Greg Miller and George Liang 1563

DC/AC Inverters: Multilevel Inverters I, Chair: Michigan State University Fang Peng, Room: Salon II

8:30AM  A New Multilevel Inverter - Hexagram Inverter for Medium Voltage Adjustable Speed Drive Systems. Part II. Three-phase Motor Drive
Jun Wen and Keyue Smedley 1571

8:55AM  Topological Design and Modulation Strategy for Buck-Boost Three-Level Inverters
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<td>9:20AM</td>
<td>A Four-Level Converter with Optimized Switching Patterns for High-Speed Electric Drives</td>
<td>Haiqing Weng, Kunlun Chen, Jianmei Zhang, Rajib Datta and Xianghui Huang</td>
<td>1585</td>
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<td>9:45AM</td>
<td>A Hybrid Multilevel Converter System with Extended Adjustable Voltage Range</td>
<td>Shoji Fukuda and Takatsugu Yoshida</td>
<td>1592</td>
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<td>Shielded LTCC inductor as substrate for power converter</td>
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<td>1605</td>
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<td>9:20AM</td>
<td>Design and Fabrication of Integrated Power Inductor Based on Silicon Molding Technology</td>
<td>Mingliang Wang, Issa Batarseh, Khai Ngo and Huikai Xie</td>
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<td>9:45AM</td>
<td>Analysis and Suppression of Inductive Interference in Active Integrated Power Electronics Module</td>
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<td>Efficiency-Optimized Flux-Weakening Control of PMSM Incorporating Speed Regulation</td>
<td>Song Chi, Longyu Xu and Zheng Zhang</td>
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<td>8:55AM</td>
<td>A Novel Direct Torque Control Method of PM Synchronous Motors</td>
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<td>Optimum Control of a Five-phase Integrated Modular Permanent Magnet Motor Under Normal and Open-Circuit Fault Conditions</td>
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<td>Comparison of Proportional+Integral Control and Variable Structure Control of Interior Permanent Magnet Synchronous Motor Drives</td>
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<td>Increased Transient Performance of Dc-DC Converters Via Augmentation and Geometric Control</td>
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<td>Construction of Autonomous Decentralized Control UPS system with HW/SW Codesign using FPGA based Hardware Controller</td>
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<td>Olivier Trescases, Amir Parayandeh, Aleksandar Prodic and Wai Tung Ng</td>
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<td>8:30AM</td>
<td>Single Sensor MPPT Algorithm for Multiple Solar Panels Configurations</td>
<td>Florent Boico and Brad Lehman</td>
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<td>8:55AM</td>
<td>A New Single-Stage Current Source Inverter for Photovoltaic and Fuel Cell Applications using Reverse Blocking IGHTs</td>
<td>Christian Klumpner</td>
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<td>9:20AM</td>
<td>Digital Ripple Correlation Control for Photovoltaic Applications</td>
<td>Jonathan Kimball and Philip Krein</td>
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<td>Boost Converter with a Reconfigurable Inductor for Photovoltaic Power Processing</td>
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**DC-DC Converters: Isolated Converters, Chair: Intel Annabelle Pratt, Room: Salon I**

- **10:30AM**  
  *Tri-modal Half-Bridge Converter for Three-Port Interface*  
  Hussam Al-Atrash, Justin Reese and Issa Batarseh  
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- **10:55AM**  
  *Performance Analysis of an Isolated ZVT Boost Converter with Primary-Parallel-Secondary-Series (PPSS) Structure*  
  Wuhua Li, Jianjiang Shi, Jun Liu, Jiande Wu and Xiangning He  
  1709

- **11:20AM**  
  *New Cost-Effective Single Switch Isolated Converter*  
  Ki-Bum Park, Chong-Eun Kim, Gun-Woo Moon and Myung-Joong Youn  
  1715

- **11:45AM**  
  *Key Issues of Clamping Diodes in DCM Phase-Shift Full-Bridge Converter*  
  Lanlan Yin, Qianhong Chen, Bo Peng, Jian Wang and Xinbo Ruan  
  1721

**DC-AC Inverters: Control and Analysis, Chair: Vanner Technology Alexander Isurin, Room: Salon II**

- **10:30AM**  
  *Distributed Parallel Operation of Modified Deadbeat Controlled UPS Inverters*  
  Meng Wang, Fangzheng Li, Yadong Liu and LiPei Huang  
  1727

- **10:55AM**  
  *Generalized Theory of Boundary Control for Single-phase Multilevel Inverter using Second-order Switching Surface*  
  Ka Wai Paul Chan, Shu Hung Henry Chung and Shu Yuen Ron Hui  
  1733

- **11:20AM**  
  *Common-Mode Ripple-Current Estimator for Parallel Three-Phase Inverters*  
  Tsung-Po Chen  
  1740

- **11:45AM**  
  *A Generalized Control Strategy of Per-Phase DC Voltage Balancing for Cascaded Multilevel Converter-based STATCOM*  
  Chong Han, Alex Huang, Yu Liu and Bin Chen  
  1746

**Passive Components I, Chair: University of Illinois-Urbana-Champaign Patrick Chapman and Dartmouth College Charles Sullivan, Room: Salon III**

- **10:30AM**  
  *Design and Fabrication of Low-Loss Toroidal Air-Core Inductors*  
  Charles R. Sullivan, Satish Prabhakaran, Weidong Li and Shanshan Lu  
  1754

- **10:55AM**  
  *Design Algorithm for High-Current Gapped Foil-Wound Inductors in Low-to-Medium Frequency DC-DC Converters*  
  Brendan Lyons, John Hayes and Michael Egan  
  1760

- **11:20AM**  
  *Core Materials for High Frequency VRM Inductors*  
  Sean Kelly, Christina Collins, Maeve Duffy, Fernando Rhen and Saibal Roy  
  1767

- **11:45AM**  
  *30-MHz Power Inductor Using Nano-Granular Magnetic Material*  
  Shanshan Lu, Yuqin Sun, Marissa Goldbeck, Donald R. Zimmamck and Charles R. Sullivan  
  1773

**Motor Drives: SR Motors, Chair: Georgia Institute of Technology Ron Harley, Room: Salon VI**

- **10:30AM**  
  *A New Random Switching Technique for the Single Phase Switched Reluctance Motor Drives*  
  Minh Khai Nguyen, Duck-Shick Shin, Young-Gook Jung and Young-Cheol Lim  
  1778

- **10:55AM**  
  *Instantaneous Torque Control of SRM with a Modified Torque Sharing Method*  
  Dong-Hee Lee, Zhen-Guo Lee and Jin-Woo Ahn  
  1784

- **11:20AM**  
  *A Modified Multi-Level Converter for Low Cost High Speed SR Drive*  
  Huijun Wang, Dong-Hee Lee and Jin-Woo Ahn  
  1790

- **11:45AM**  
  *Adaptive Iterative Learning Control of Switched Reluctance Motors for Minimum Energy Conversion Loss and Torque Ripple*  
  Shun-Chung Wang, Yi-Hua Liu, Shun-Jih Wang, Yih-Chien Chen and Shou-Zhuang Lin  
  1796
Modeling, Analysis and Simulation I, Chair: University of Illinois-Chicago Sudip Mazumder, Room: Salon VII

10:30AM  Modeling and Controller Design of the Z-Source Inverter with inductive Load
Miaosen Shen, Qingsong Tang and Fang Peng  1804

10:55AM  Analytical Modelling of Voltage Balance Dynamics for a Flying Capacitor Multilevel Converter
Brendan McGrath and Grahame Holmes  1810

11:20AM  A new perspective in power converters modeling: complementarity systems
Francesco Vasca, Luigi Iannelli and Kanat Camlibel  1817

11:45AM  A Quantitative Analysis and Comparison of In-phase Control and Energy-Optimized Control for Series Power Quality Controllers
Xinming Huang, Jinjun Liu and Hui Zhang  1824

Alternative and Renewable Energy III, Chair: Whirlpool Company Song Chi, Room: Salon VIII

10:30AM  Power Quality and Dynamic Performance Improvement of Wind Farms Using a STATCOM
Wei Qiao and Ronald Harley  1832

10:55AM  Evaluation of Voltage Sag Ride-Through of a Doubly Fed Induction Generator Wind Turbine with Series Grid Side Converter
Patrick Flannery and Giri Venkataramanan  1839

11:20AM  An Instantaneous Current Control Strategy and Its Digital Implementation for PWM Converter in Variable-Speed WECS
Ning Zhu, Hui Liang and Jiuchun Jiang  1846

11:45AM  A Novel Control System for Current Source Converter Based Variable Speed PM Wind Power Generators
Jingya Dai, Dewei Xu and Bin Wu  1852

Tuesday, June 19, 1:30PM-3:10PM

DC-DC Converters : Topology I, Chair: Linear Technology Johan Strydom, Room: Salon I

1:30PM  Unipolar Bidirectional Current Source (UBiCS) Converter
Dirk Hirschmann, Daniel van Tweek, Klaus Rigbers and Rik De Doncker  1859

1:55PM  A Novel Three-Phase Buck Converter with Bootstrap Driver Circuit
Abe Kosuke, Nishijima Kimihiro, Harada Kosuke, Nakano Tadao and Nabeshima Takashi  1864

2:20PM  High Power Density Voltage Divider and Its Application in Two-Stage Server VR
Julu Sun, Ming Xu, Fred Lee and Yucheng Ying  1872

2:45PM  A Family of Four-Quadrant PWM DC-DC Converters
Yefim Berkovich, Boris Axelrod, Sam Tapuhi and Adrian Ioinovici  1878

DC-AC Inverters: PWM Control, Chair: Monash University Grahame Holmes, Room: Salon II

1:30PM  Non-Symmetrical Selective Harmonic Elimination PWM Techniques: The Unipolar Waveform
Mohamed Dahidah and Vassilios Agelidis  1885

1:55PM  Extension of the Nearest-Three Virtual-Space-Vector PWM to the Four-Level Diode-Clamped dc-ac Converter
Sergio Busquets-Monge, Josep Bordonau and Joan Rocabert  1892

2:20PM  A Novel Carrier-based PWM Method for 3-Level NPC Inverter Utilizing Control Freedom Degree
Jun Li, Qin Huang, Zhaoming Qian and Huijie Zhao  1899

2:45PM  Modulation Schemes of Multi-phase Three-Level Z-Source Inverters
Feng Gao, Poh Chiang Loh, Frede Blaabjerg and Remus Teodorescu  1905

Power Semiconductor Devices II, Chair: Vishay Michael Choi and National Semiconductor David Anderson, Room: Salon III

1:30PM  Gate Voltage Pattern Analyzer for Short-Circuit Protection in IGBT Inverters
JunBae Lee and DongSeok Hyun  1913
1:55PM  *Improving the Emitter Turn-Off Thyristor for Parallel Operation*
Bin Chen, Xigen Zhou and Alex Huang 1918

2:20PM  *Failure mechanisms of Trench IGBT under various short-circuit conditions*
Adel Bennamoun, Stephane Azzopardi, Jean-Christophe Martin and Eric Woirgard 1923

2:45PM  *Physics-based Model for Emitter Turn-Off Thyristor (ETO)*
Bin Chen, Xigen Zhou and Alex Huang 1930

**Motor Drives: Diagnostics and Control I, Chair: Georgia Institute of Technology Tom Habtler, Room: Salon VI**

1:30PM  *On the short-circuiting fault detection in a PMSM by means of stator current transformations*
Javier Alveiro Rosero, Luis Romeral, Jordi Cusido, Antoni Garcia and Juan Antonio Ortega 1936

1:55PM  *Fault Tolerant Operations in Adjustable-Speed Drives and Soft Starters for Induction Motors*
Chia-Chou Yeh and Nabeel Demerdash 1942

2:20PM  *Identification of AC-Machines with LC-Filters by Utilising the Non-Parametric Models*
Piotr Szczupak and Mario Pacas 1950

2:45PM  *Comparison of different types of neural networks and autonomous online learning methods for self commissioning of speed sensorless controlled induction machines*

**Modeling, Analysis and Simulation II, Chair: University of South Carolina Antonello Monti, Room: Salon VII**

1:30PM  *Modelling of Single Stage Three Level Resonant AC/DC Converters Operating with Variable Frequency Phase Shift Modulation*
Mohammed Agamy and Praveen Jain 1962

1:55PM  *Black-Box Terminal Characterization Models for the Analysis and Simulation of Distributed Power Systems*
Luis Arnedo, Dushan Boroyevich, Rolando Burgos and Fred Wang 1968

2:20PM  *Advantages of The Symmetric-On Time Modulator In Multiple-sampled Digitally Controlled DC-DC Converters*
Luca Corradini, Elisabetta Tedeschi and Paolo Mattavelli 1974

2:45PM  *Input Impedance Modeling and Analysis of Line-Commutated Rectifiers*
Zhongbing Bing, Kamari Karimi and Jian Sun 1981

**Automotive Applications, Chair: Illinois Institute of Technology Ali Emadi and Oak Ridge National Lab Laura Marlin, Room: Salon VIII**

1:30PM  *A Reduced-Part, Triple-Voltage DC-DC Converter for Electric Vehicle Power Management*
Gui-Jia Su, Joseph Cunningham and Lixin Tang 1989

1:55PM  *A Reconfigurable and Flexible Experimental Footprint for Control Validation in Power Electronics and Power Systems Research*
Leiwei Qian, Li Liu and David Cartes 1995

2:20PM  *High-Performance Control of Two Three Phase Permanent Magnet Synchronous Machines in an Integrated Inverter For Automotive Applications*
Lixin Tang and Gui-jia Su 2001

2:45PM  *Multi-Level DC/DC Power Conversion System with Multiple DC Sources*
Miaosen Shen, Fang Peng and Leon Tolbert 2008

**Tuesday, June 19, 3:30PM-5:10PM**

**DC-DC Converters : VRM Control II, Chair: Virginia Tech Dushan Boroyevich and Intel Lilly Huang, Room: Salon I**

3:30PM  *Dynamic PWM Ramp Signal to Improve Load Transient in DCM and Mode Hoping Operation*
Osama Abdel-Rahman and Issa Batarseh 2016
Native AVP Control Method for Constant Output Impedance of DC Power Converters
Jian Rong Huang, Sophia Chien-Hui Wang, Chia Jung Lee, Eddie Kuo-Lung Tseng and Dan Chen 2023

Sensorless Current Sharing Analysis and Scheme for Multiphase Converters
Jaber Abu Qahouq, Lilly Huang and Doug Huard 2029

Load dependent Dead Time Controller Based on Minimized Duty cycle technique in DC-DC Buck Converters
Ke-Horng Chen, Hong-Wei Huang, Chun-Yu Hsieh and Sy-Yen Kuo 2037

DC-AC Inverters: Space Vector Modulation, Chair: National Technical University of Athens Manias Stefanos and Zhejiang University Zhaoqing Qian, Room: Salon II

A Space Vector Modulation Approach for a Back-to-Back Connected Four-Level Converter
Maryam Saeedifard, Reza Iravani and Josep Pou 2043

A Generalized Space Vector Classification Technique for Six-Phase Inverters
Davood Yazdani, Sayed Ali Khajehoddin, Alireza Bakhshai and Geza Joos 2050

A Generalized Three-phase Multilevel Current Source Inverter with Carrier Phase-Shifted SPWM
Zhihong Bai, Zhongchao Zhang and Yao Zhang 2055

Optimal Predictive Control of Three-Phase NPC Multilevel Inverter: Comparison to Robust Sliding Mode Controller
J. Dionisio Barros and J. Fernando Silva 2061

Passive Components II, Chair: Virginia Tech Jason Lai, Room: Salon III

Eddy Current Modeling with Order Reduction in Dynamic Magnetic Equivalent Circuits
Ali Davoudi and Patrick L. Chapman 2069

Superconducting Inductors for Ultra-High Frequency Power Conversion
Waseem Roshen 2075

Extraction of Dynamic, Low-Order Models for Magnetic Devices Based on Finite Element Analysis with Hysteresis
Liyan Qu and Patrick Chapman 2082

Design and Testing of a Power-Electronic-Based Synthetic Inductor
Cheng Luo, Matthew Whitehead and Heath Hofmann 2089

Motor Drives: Induction Motors II, Chair: Delphi Tomy Sebastian, Room: Salon VI

Control of a Novel Dual Stator-Winding Induction Generator for wide speed-range operation
Yong Li, Yuwen Hu and Lingshun Liu 2096

Parameter-Insensitive Sensorless Decoupled P-Q Controller For Doubly-Fed Induction Machine
Baikie Shen and Boon-Teck Ooi 2102

A Study on an Optimal Torque for Power Regeneration of an Induction Motor
Kaoru Inoue, Kenji Ogata and Toshiji Kato 2108

A Non-Standard Robust Adaptive Stator Current Control Strategy for Induction Motor Drives

Modeling, Analysis and Simulation III, Chair: Motorola Mikkel Hoyerby, Room: Salon VII

Wave Analysis of Multilayer Absorptive Low-Pass Interconnects
Kylie De Jager, Luca Dalessandro, Ivan Hofsajer and Willem Odendaal 2121

Modeling, Analysis and Simulation of "AC Inductor" Based Converters
Ilya Zeltser and Sam Ben-Yaakov 2128

Computer-Aided Average-Value Modeling of Peak Current-Mode Controlled Dc-Dc Converters Considering Parasitics
Ali Davoudi, Juri Jatskevich and Patrick L. Chapman 2135

Thermal impedance extraction method for power MOSFETs
Toni Lopez and Reinhold Elferich 2140
Aerospace Applications, Chair: Sandia National Labs Brandon Witcher and NASA Chris Iannello, Room: Salon VIII

3:30PM  A 100 kHz SiC Sparse Matrix Converter
Thomas Friedli, Simon Round and Johann Kolar 2148

3:55PM  Analysis and Design of a Novel Three-Level LLCC Inverter Supplying an Airborne Piezoelectric Brake Actuator
Rongyuan Li, Norbert Froehleke and Joachim Boecker 2155

4:20PM  Three-Phase Ac Buck Rectifier using Normally-On SiC JFETs at 150 kHz Switching Frequency
Callaway Cass, Rolando Burgos, Fred Wang and Dushan Boroyevich 2162

4:45PM  Large-Signal Stability Assessment of AC/DC Systems with Multi-Pulse Rectification and DC-Fed PWM Motor Drives
Sebastian Rosado, Rolando Burgos, Fred Wang and Dushan Boroyevich 2168

Tuesday, June 19, 5:30PM-7:00PM

Panel Session: Digital power supplies - Trend or fad?, Chair: Milan Jovanovic, Room: Salon I

Panel Session: State of the art servo drives fulfill >95% of current industrial needs. Is this, Chair: Ralph Kennel, Room: Salon II

Panel Session: In today's globally competitive environment, how can academia provide more value, Chair: Rik DeDoncker, Room: Salon VI

Panel Session:, Room: Salon VII

Wednesday, June 20, 8:30AM-10:10AM

DC-DC Converters: Buck Converters, Chair: J.C. Balda .......... University of Arkansas and Fairchild Semiconductor Alan Elbanhawy, Room: Salon I

8:30AM  Comparative Study of Lateral and Trench Power MOSFETs in Multi-MHz Buck Converter Applications
Yali Xiong, Xu Cheng, David Okada and John Shen 2175

8:55AM  Design Considerations for Small Signal Modeling of DC-DC Converters Using Inductor DCR Current Sensing Under Time Constants Mismatch Conditions
Lei Hua and Shiguo Luo 2182

9:20AM  Critical Parameters in the Transient Response of Synchronous Buck Converters
Martin Ordenez, John Quaicoe and Tariq Iqbal 2189

9:45AM  Robust Relay-Feedback Based Autotuning For DC-DC Converters
Luca Corradini, Paolo Mattavelli and Dragan Maksimovic 2196

DC-AC Inverters: Special Techniques, Chair: Ryerson University Bin Wu, Room: Salon II

8:30AM  A Voltage Balancing Method and its Stability Boundary for Five-Level Diode-Clamped Multilevel Converters
Sayed Ali Khajehoddin, Afireza Bakhshai and Praveen Jain 2204

8:55AM  Commutation in a High Power IGBT Based Current Source Inverter
Muhammad Abu-Khaizaran and Patrick Palmer 2209

9:20AM  An Analysis on the Influence of Input Filters to SVG systems and Corresponding Design Considerations
Guopeng Zhao, Jinhoon Liu, Kuang Li and Zhaohan Wang 2216

9:45AM  New Single Sustaining Driver for AC-PDP employing Voltage Stress Reduction Technique
Ki-Bum Park, Chong-Eun Kim, Gun-Woo Moon and Myung-Joong Youn 2223
### Integration, Packaging and Modules II, Chair: Virginia Tech Khai Ngo, Room: Salon III

8:30AM  *Pressure Contact Packaging for Hybrid Electric Vehicle Drive*
Lianghua Zhang, Xu Yang, Fei Wang and Zhaohan Wang  

8:55AM  *Survey on High-Temperature Packaging Materials for SiC-Based Power Electronics Modules*
Luísa Coppola, Daniel Huff, Fei Wang, Rolando Burgos and Dushan Boroyevich  

9:20AM  *Compact Inverter Designed for High Temperature Operation*
Cyril Buttay, Jeremy Rashid, C. Mark Johnson, Florin Udrea and Gehan Amarutunga  

9:45AM  *Modelling and Simulation Techniques for Multilayer Integrated Passive Structures in the Time Domain*
Cornelia Oberholzer and Ivan Hofsjäer  

### Motor Drives: PM Motors II, Chair: Ford Motor Company Allen Gale, Room: Salon VI

8:30AM  *Novel Scheme of Driving Single Phase PM AC Motor in Uni-Direction*
John Kim  

8:55AM  *A High Performance Permanent Magnet Synchronous Motor Drive by using a Robust Adaptive Control Strategy*

9:20AM  *Effect of Side Permanent Magnets for Reluctance Interior Permanent Magnet Machines*
John Hsu, Seong-T Lee, Randy Wiles, Chester Coomer and Kirk Lowe  

9:45AM  *Online Particle Swarm Optimization Design of Speed Controller considering Anti-windup for PMSM Drive System*
Shuai Yan, Dianguo Xu, Xianguo Gui, Ming Yang and Bingbing Li  

### Modeling, Analysis and Simulation IV, Chair: Queen's University Praveen Jain, Room: Salon VII

8:30AM  *Iterative Behavioral Modeling of Charge-Pump Based Electronic Ballast - Fluorescent Lamp System*
P.W. Tam, H.S.H. Chung and S.Y.R. Hui  

8:55AM  *Dynamic Behavior Verification of Potential Concepts for Mobile Generator Sets*
Jan Leuchter, Vladimir Rerucha, Pavol Bauer and Zdenek Krupka  

9:20AM  *A generalized instantaneous method for harmonics, positive and negative sequence detection/extraction*
Rodrigo Cutri and Lourenço Matakas Jr.  

9:45AM  *High-Order Switching Surface for Boundary Control of Inverters*
Julian Y. C. Chiu, Kelvin K. S. Leung and Henry S. H. Chung  

### Alternative and Renewable Energy IV, Chair: Tennessee Tech. University Joseph Ojo, Room: Salon VIII

8:30AM  *Online grid impedance estimation for single-phase grid-connected systems using PQ variations*
Mihaí Ciobotaru, Remus Teodorescu, Pedro Rodriguez, Timbus Adrian and Frede Blaabjerg  

8:55AM  *Boost-Integrated Phase-Shift Full-Bridge Converters for Three-Port Interface*
Hussam Al-Atrash and Issa Batarseh  

9:20AM  *Control of Neutral-Point-Clamped Converter in Distributed Power Generation to fulfil Low Voltage Ride-Through Requirements*
Salvador Alepuz, Sergio Busquets, Josep Bordouan, Jorge Pontt and Cesar Silva  

9:45AM  *Grid Interconnected Z-Source PV Inverter*
Richard Badin, Yi Huang, Fang Peng and Heung-Geun Kim  

### Wednesday, June 20, 10:30AM-12:10PM

**DC-DC Converters : Topology II, Chair: Arizona State University Rajapandian Ayyanar, Room: Salon I**

10:30AM  *A Family of Interleaved DC/DC Converters Deduced from a Basic Cell with Winding-Coupled Inductors for High Step-Up/Step-Down Conversions*
Wuhua Li, Jiande Wu, Dong Wang, Yan Deng and Xiangning He  

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10:55AM  A Novel Turn-On/Off Snubber for Interleaved Boost Converters  
Tseng S. -Y., Shiang J. -Z., Chang H. H., Jwo W. -S. and Hsieh C. -T.  

11:20AM  Voltage Doubler/Tripler Current-Mode Charge Pump Topology with simple "Gear Box"  
Gerhard Thiele and Erich Bayer  

11:45AM  Voltage Scalable Switched Capacitor DC-DC Converter for Ultra-Low-Power On-Chip Applications  
Yogesh Ramadass and Anantha Chandrakasan  

DC-AC Inverters: Multi Level Inverters II, Chair: ABB Srinivas Ponnaluri, Room: Salon II  

10:30AM  Modulation Extension Control of Hybrid Cascaded H-bridge Multilevel Converters with 7-level Fundamental Frequency Switching Scheme  
Zhong Du, Burak Ozpineci and Leon Tolbert  

10:55AM  Capacitor Voltage Balancing Schemes in Flying Capacitor Multilevel Inverters  
Anshuman Shukla, Arindam Ghosh and Avinash Joshi  

11:20AM  Level-shifted PWM for Cascaded Multilevel Inverters with Even Power Distribution  
Mauricio Angulo, Pablo Lezana, Samir Kouro, Jose Rodriguez and Bin Wu  

11:45AM  Current Control of a Voltage Source Inverter connected to the Grid via an LCL Filter  
Anthony Papavasiliou, Stavros Papathanassiou, Stefanos Manias and Georgios Demetriades  

Synchronous Rectifier Converters, Chair: UPM Jose Cobos, Room: Salon III  

10:30AM  Twisted Core Coupled Inductors for Microprocessor Voltage Regulators  
Yan Dong, Fred C. Lee, Jinghai Zhou, Shuo Wang and Ming Xu  

10:55AM  Non-isolated Half Bridge Buck Based Converter for VRM application  
Majd Batarseh, Xiangcheng Wang and Issa Batarseh  

11:20AM  Mixed Signal Synchronous Rectification Scheme for Current-Type Resonant Converters  
Darryl Tschirhart and Praveen Jain  

11:45AM  1MHz High Efficiency LLC Resonant Converters with Synchronous Rectifier  
Dianbo Fu, Bing Lu and Fred C. Lee  

Motor Drives: Induction Motors III, Chair: University of Akron Malik Elbuluk, Room: Salon VI  

10:30AM  Using Mechanical Vibration to Estimate Rotor Speed in Induction Motor Drives  
Dezheng Wu and Steve Pekarek  

10:55AM  Improved Design for Driving Characteristics in Single Phase Induction Motor with Concentrated Winding  
Tae-Uk Jung, Cheol-Ho Yun, Hyun-Rok Cha, Myung-Gi Chae and Hyung-Mo Kim  

Won-Sang Kim, Kyo-Beum Lee, Sung-hoi Huh and Freda Blaabjerg  

11:45AM  MRAS Speed Estimation and Full-Order Flux Observer for Dual Stator Winding Induction Motor Drives  
Olorunfemi Ojo, Zhiqiao Wu and Gan Dong  

Power Quality and Utility Applications I, Chair: North Carolina State University Subhashish Bhattacharya, Room: Salon VII  

10:30AM  On Control of Static Synchronous Series Compensator for SSR Mitigation  
Massimo Bongiorno, Jan Svensson and Lennart Angquist  

10:55AM  Modeling and Control of the Static Synchronous Series Compensator under Different Operating Modes  
Fernando Mancilla-David and Giri Venkataramanan  

11:20AM  Magnetic Saturation in Transformers used for a 48-pulse Voltage-Source Converter based STATCOM under Line to Line System Faults  
Zhengping Xi and Subhashish Bhattacharya  

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11:45AM  A Z-source inverter based flexible DG system with P+resonance and repetitive controllers for power quality improvement of a weak grid
Chandana Jayampathi Gajanayake, Don Mahinda Vilathgamuwa, Poh Chiang Loh, Frede Blaabjerg and Remus Teodorescu 2457

Alternative and Renewable Energy V, Chair: Norwegian University of Science Tore Undeland and Technology, Room: Salon VIII

10:30AM  Improved Performance and Control of Hybrid Cascaded H-bridge Inverter for Utility Interactive Renewable Energy Applications
Hui Li, Kaiyu Wang, Da Zhang and Wei Ren 2465

10:55AM  Stability Improvement of Micro-grids with Coordinate Control of Fuel Cell and Ultracapacitor
Jun Liang and Chunmei Feng 2472

11:20AM  Complex-Space Recursive Least Squares Power System Identification
Santiago Cobreses, Pedro Rodriguez, Daniel Pizarro, Francisco J. Rodriguez and Emilio J. Bueno 2478

11:45AM  A Novel Three-phase High power Current-fed DC/DC Converter with Active clamp for Fuel cells
Hanju Cha and Prasad Enjeti 2485

Wednesday, June 20, 1:30PM-3:10PM

DC-DC Converters: Control I, Chair: Queen's University Yanfei Liu, Room: Salon I

1:30PM  Feedback for Low Frequency Ripple Attenuation in DC Transformer
Annabelle Pratt and Sen Dou 2491

1:55PM  Experimental Apparatus for Testing the DC/DC Converter Dynamics
Federico Belloni, Piero G. Maranesi and Marco Riva 2498

2:20PM  Explicit Hybrid Model Predictive Control of the dc-dc Boost Converter
Giovanni Becutti, Georgios Papafotiou, Roberto Frasca and Manfred Morari 2503

2:45PM  A Monolithic CMOS 5V/1V Switched Capacitor DC-DC Step-down Converter
Andrabadu Viraj and Gehan Amaratunga 2510

Matrix Converters, Chair: Impact Technologies Antonio Ginart, Room: Salon II

1:30PM  A Current Source Matrix Converter for High-Power Applications
Hassan Nikkhajoei 2516

1:55PM  Illustration of Relation between Load and Supply Current Distortions in Direct and Indirect Matrix Converters
Matti Jussila and Heikki Tuusa 2522

2:20PM  Avoiding Regeneration with a Matrix Converter Drive
Imayavaramban Munuswamy and Wheeler Patrick 2529

2:45PM  Application of Matrix Converter for Large Induction Machines
Hassan Nikkhajoei and Reza Iravani 2535

Soft Switching and Resonant Converters I, Chair: Georgia Institute of Technology Deepak Divan, Room: Salon III

1:30PM  A ZCS Isolated Full-Bridge Boost Converter with Multiple Inputs
Andrew S. W. Leung, Henry S. H. Chung and Tony Chan 2542

1:55PM  Gain-adjustment Technique for Resonant Power Converters with Piezoelectric Transformer
Joung-hu Park, Sungjin Choi, Sangmin Lee and Bo H. Cho 2549

2:20PM  Double Ended ZVS Half-Bridge Zeta Converter
Ki-Bum Park, Chong-Eun Kim, Gun-Woo Moon and Myung-Joong Youn 2554

2:45PM  A Novel Dual-LTC Resonant Soft Switching Converter for Super High Frequency Induction Heating Power Supplies
Zhengshi Wang, Zhenli Lou and Huiming Chen 2561
Motor Drives: PM Motors III, Chair: Technology University of Delft Sjoerd de Haan, Room: Salon VI

1:30PM  Analysis of Cogging Torque and its Effect on Direct Torque Control (DTC) in a Segmented Interior Permanent Magnet Machine
Rukmi Dutta, Saad Sayeef and M. F Rahman 2568

1:55PM  Research on a Novel Speed Closed Loop Control Technique of Brushless DC Motor
Qingbo Hu, Zhengyu Lu and Zhaoming Qian 2575

2:20PM  A Novel Sliding Mode Observer with Adaptive Feedback Gain for PMSM Sensorless Vector Control
Song Chi, Zheng Zhang and Longya Xu 2579

2:45PM  Comparative Study of an Adaptive Sliding Observer and an EKF for Speed Sensor-less DTC IPM Synchronous Motor Drives
Zhuang Xu, Fazlur Rahman and Dianguo Xu 2586

Power Quality and Utility Applications II, Chair: Xian Jiaotong University Jinjun Liu, Room: Salon VII

1:30PM  A New Three Phase Hybrid Passive Filter to Damp Resonances and Compensate Harmonics and Reactive Power for Any Type of Load under Distorted Source Conditions
Abdelhamid Hamadi, Salem Rahmani and Kamal Al-Haddad 2594

1:55PM  Soft Phase Locked Loop for Active Power Filter Applied in Small Rating Stand-Alone Power System
Longhui Wu, Fang Zhuo and Zhaon Wang 2600

2:20PM  A Stochastic Simulation of Battery Sizing for Demand Shifting and Uninterruptible Power Supply Facility
Chee Wei Tan, Tim C. Green and Carlos A. Hernandez-Aramburo 2607

2:45PM  Analysis of Power Quality (PQ) Signals by Continuous Wavelet Transform
Malabika Basu and Biswajit Basu 2614

Alternative and Renewable Energy VI, Chair: National University of Ireland Galway Gerard Hurley, Room: Salon VIII

1:30PM  Analysis of DC-DC Conversion for Energy Harvesting Systems Using a Mixed-Signal Sliding-Mode Controller
Nathaniel Guilar, Rajeevan Amirtharajah and Paul Hurst 2620

1:55PM  A Systematic Approach to Synthesizing Multi-Input DC/DC Converters
Yuan-Chuan Liu and Yaow-Ming Chen 2626

2:20PM  A Modular Fuel Cell, Modular DC-DC Converter Concept for High Performance and Enhanced Reliability
Leonardo Palma and Enjeti Prasad 2633

2:45PM  High Speed Turbine - Induction Generator System for Utilization of Renewable and Waste Energies
Rafael Jordan and Istvan Nagy 2639

Wednesday, June 20, 3:30PM-5:10PM

DC-DC Converters: Control II, Chair: Intronics Power Arthur Pfaelzer, Room: Salon I

3:30PM  Optimizing the Transient Behavior and Frequency Response of Constant Frequency One Cycle Control: The Charge Control Modulator
Victor Anunciada, Beatriz Borges and Hugo Marques 2647

3:55PM  Current-Mode Control for a Quadratic Boost Converter with a Single Switch
Ma. Guadalupe Ortiz-Lopez, Jesus Leyva-Ramos, Luis Humberto Diaz-Saldierena, Juan Manuel Garcia-Ibarra and Enrique Eduardo Carbajal-Gutierrez 2652

4:20PM  A Novel Current Sharing Technique for Interleaved Boost Converter
Byung Sun Min, Nam Ju Park and Dong Seok Hyun 2658

4:45PM  Hysteresis-based mixed-signal voltage-mode control for dc-dc converters
Daniele Trevisan, Stefano Saggini and Paolo Mattavelli 2664
Other AC-AC Converters, Chair: ETH Zurich Simon Round, Room: Salon II

3:30PM  Z-Source AC-AC Converters Solving Commutation Problem
        Yu Tang, Chaohua Zhang and Shaojun Xie  2672

3:55PM  Voltage Synthesis Using Dual Virtual Quadrature Sources- A New Concept in AC Power Conversion
        Deepak Divan and Jyoti Sastry  2678

4:20PM  A Novel Three-phase Three-leg AC/AC Converter Using Nine IGBTs
        Congwei Liu, Bin Wu, Navid Zargari and David Xu  2685

4:45PM  Three-Level AC-DC-AC Z-Source Converter Using Reduced Passive Component Count
        Poh Chiang Loh, Feng Gao, Pee Chin Tan and Frede Blaabjerg  2691

Soft Switching and Resonant Converters II, Chair: MIT Juan Rivas, Room: Salon III

3:30PM  A New Full Bridge Three Level Resonant Single Stage AC/DC Converter
        Mohammed Agamy and Praveen Jain  2699

3:55PM  A high-frequency resonant inverter topology with low voltage stress
        Juan Rivas, Yehui Han, Olivia Leitermann, Anthony Sagneri and David Perreault  2705

4:20PM  Very High Frequency Resonant Boost Converters
        Robert Pilawa-Podgurski, Anthony Sagneri, Juan Rivas, David Anderson and David Perreault  2718

4:45PM  A Novel Family of PWM Converters Based on Improved ZCS Switch Cell
        Ling Qin, Shaojun Xie and Hui Zhou  2725

Motor Drives: Diagnostics and Control II, Chair: Eaton Corporation Bin Lu and Rolls-Royce

Timothy Alt, Room: Salon VI

3:30PM  Current Sensor Fault Detection and Reconfiguration for a Doubly Fed Induction Generator
        Kai Rothenhagen and Friedrich Fuchs  2732

3:55PM  Robust BDCM Sensorless Control With Position-Dependent Load Torque
        Chih-Kai Huang, Pei-Yu Yu and Hung-Chi Chen  2739

4:20PM  Direct-start of the flexible power conditioner with back-to-back converters
        Daocheng Huang, Yang Zhao, Xudong Zou, Xinmin Liu and Fengxiang Cao  2745

4:45PM  Disturbance Observer for Speed-Controlled Process with Non-Deterministic Time Delay of Feedback Information
        Markku Jokinen, Antti Kosonen, Markku Niemela, Jero Ahola and Juha Pyrhonen  2751

Power Quality and Utility Applications III, Chair: Toshiba Mitsubishi-Electric Industrial Systems Corp. Ruben Inzunza, Room: Salon VII

3:30PM  Determining IEEE 519 Compliance of a Customer in a Power System
        Joy Mazumdar and Ronald Harley  2758

        Warit Wichakool, Al-Thaddeus Avestruz, Robert W. Cox and Steven B. Leeb  2765

4:20PM  Balanced Power Aggregation of Asymmetric Single-phase Systems
        Sandeep Bala and Giri Venkataramanan  2772

4:45PM  Experimental Results on Contact-less Power Transmission System for the High-speed Trains
        Atsuo Kawamura, Gen Kuroda and Chi Zhu  2779

Energy Storage and Harvesting, Chair: Zhejiang Univesity Mark Dehong Xu, Room: Salon VIII

3:30PM  Novel Autonomous Low Power VLSI System Powered by Ambient Mechanical Vibrations and Solar Cells for Portable Applications in a 0.13um Technology
        Jordi Colomer, Jordi Brufau, Pere Lluis Miribel, Albert Saiz and Manel Puig  2786

3:55PM  Maximum Energy Harvesting Control for Oscillating Energy Harvesting Systems
        John Elmes, Venceslav Gaydarzhiev, Adje Mensah, Khalid Rustom and Z. John Shen  2792

4:20PM  The State and Parameter Estimation of an Li-Ion Battery Using a New OCV-SOC Concept
        S. J. Lee, J. H Kim, J. M Lee and Bo H. Cho  2799
Wednesday, June 20, 6:30PM-8:00PM

Special Session: , Room: Salon IV and V (Exhibition)

Thursday, June 21, 8:30AM-10:10AM

DC-DC Converters: Control III, Chair: Intel Shamala Chickamahalli, Room: Salon I

8:30AM  A novel control method of interleaved two-transistor forward converter
        Hongyang Wu, Xiao Chen, Min Zhou, John Zeng and Jianping Ying  

8:55AM  Quality factor in resonant gate drivers
        Toni Lopez and Reinhold Elferich  

9:20AM  Analysis of a single switch split dc-rail boost converter operated under steady-state unbalanced load conditions in discontinuous conduction
        John Salmon and Jeff Ewanchuk  

9:45AM  Design of an All-SiC Radio-frequency Controlled Parallel Dc-Dc Converter Unit
        Sudip Mazumder, Chuen-Ming Tan and Kaustuva Acharya  

Rectifiers, Chair: University of Nottingham Christian Klumpner, Room: Salon II

8:30AM  Space Vector Sequence Investigation and Synchronization Methods for PWM Modulation of a High Power Current Source Rectifier
        Yun Wei Li, Bin Wu, David Xu and Navid Zargari  

8:55AM  Power Quality Improvements in Isolated Twelve-Pulse AC-DC Converters Using Delta/Double-Polygon Transformer
        Bhim Singh, Sanjay Gairola, Ambrish Chandra and Kamal Al-Haddad  

9:20AM  A New Three-phase Rectifier for Regenerative Braking Application
        Lihua Li, Keyue Smekley and Taotao Jin  

9:45AM  Space vector modulation for Vienna-type rectifiers based on the equivalence between two and three-level converters: a carrier-based implementation
        Rolando Burgos, Rixin Lai, Yunqing Pei, Fred Wang and Dushan Boroyevich  

EMI-EMC I, Chair: Taiwan National University Dan Chen and University of Padova Paolo Mattavelli, Room: Salon III

8:30AM  Predistorted Pulse Width Modulation Technique for Switching Signal Spectrum Management
        Xin Geng and Philip Krein  

8:55AM  An Investigation into Electric Field Coupling for Parasitic Effect Minimisation
        Ivan Hofsajer  

9:20AM  Common Mode DC-Bus Filter Design for Variable Speed Drive System with Transfer Ratio Measurements
        Dongsheng Zhao, Braham Ferreira, Henk Polinder and Sjoerd de Haan  

9:45AM  Negative Capacitance and Its Applications on Parasitic Cancellation for EMI Noise Suppression
        Shuo Wang and Fred C. Lee  

Power Factor Correction I, Chair: Rensselaer Polytechnic Institute Jian Sun and APECOR Khalid Rustom, Room: Salon VI

8:30AM  Comparative Study of Two Average-Model-Based PWM Control Schemes for a Sheppard-Taylor PFC
        Hadi Kanaan, Alfred Hayek and Kamal Al-Haddad  

8:55AM  Novel Duty Phase Control For Single-Phase Boost-Type SMR
        Hung-Chi Chen  

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9:20AM  Interleaving Control Scheme for Critical-Mode Boost PFC  
J.-R. Tsai, T.-F. Wu, Y.-M. Chen and M.-C. Lee  
2905

9:45AM  Investigation of Key Technique for High Efficiency and High Power Density, Single-Stage Power Factor Correction AC/DC Converter  
Lijun Hang, Liu Xinwei, Lu Zhengyu, Yang Yuefeng and Qian Zhaoming  
2912

**Active Filtering, Chair: MIT David Perreault, Room: Salon VII**

8:30AM  Voltage and Current Unbalance Compensation Using a Parallel Active Filter  
Yan Xu, Leon Tolbert and John Kueck  
2919

8:55AM  Inverter-Less Active Filters - A New Concept in Harmonic and VAR Compensation  
Jyoti Sastry and Deepak Divan  
2926

9:20AM  A Novel Real-Time Detection Method of Active and Reactive Currents for Single-Phase Active Power Filters  
Toshihiko Tanaka, Yasushi Omura, Eiji Hiraki, Norio Ishikura and Masayoshi Yamamoto  
2933

9:45AM  LCL Type Supply Filter for Active Power Filter - Comparison of an Active and a Passive Method for the Resonance Damping  
Mikko Routimo and Heikki Tuusa  
2939

**Lighting and Flat Panel Display I, Chair: City University of Hong Kong Ron Hui, Room: Salon VIII**

8:30AM  Sequential Color LED Backlight Driving System for LCD Panels with Area Control  
Tsai-Fu Wu, Chien-Chih Chen, Chang-Yu Wu, Po-Chang Lu and Yu-Ren Chen  
2947

8:55AM  Low Cost IGBT-Based Single-Sided Plasma Display Panel Driver  
Jacobo Aguilpon-Garcia and Gun-Woo Moon  
2953

9:20AM  A new dual sustaining driver using two-different energy recovery circuits for a large-sized plasma display panel (PDP)  
Kang Hyun Yi, Seong Wook Choi and Gun Woo Moon  
2958

9:45AM  Novel LCD Backlight Inverter using a Simple Control Circuit  
Gang-Youl Jeong  
2964

**Thursday, June 21, 10:30AM-12:10PM**

**Other Power Electronics Applications, Chair: Infineon AG Manfred Schlenk, Room: Salon I**

10:30AM  A Comparative Study of Analog Voltage-mode Control Methods for Ultra-fast Tracking Power Supplies  
Mikkel Hoyerby and Micael Andersen  
2970

10:55AM  An Optimized Converter for Battery-Supercapacitor Interface  
Giuseppe Guidi, Tore M. Undeland and Yoichi Hori  
2976

11:20AM  Frequency Locked Phase Estimation Under Harmonically Distorted Conditions  
A. W. Krieger and J.C. Salmon  
2982

11:45AM  Solid-state Marx generator design with an energy recovery reset circuit for output transformer association  
Luis Redondo, Jose Silva, Pedro Tavares and Elmano Margato  
2987

**Rectifiers and AC-AC Converters: Applications, Chair: Aalborg University Frede Blaabjerg, Room: Salon II**

10:30AM  Novel Three-Phase Current-Fed Z-Source AC-AC Converter  
Xupeng Fang and Fangzheng Peng  
2993

10:55AM  DFT-based Repetitive Control of a Series Active Filter Integrated with a 12-pulse Diode Rectifier  
Abraham le Roux, Hendrik Mouton and Hirofumi Akagi  
2997

11:20AM  A Favorable Conditioning of the Harmonic Distortion Generated by a PDM Ac/ac Converter with Three-Phase Diode Rectifier  
Abdelhalim Sandali, Ahmed Cheriti and Pierre Sicard  
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<td>Jun-ichi Itoh and Ken-ichi Nagayoshi</td>
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<td><em>Reduction Methods of Conducted EMI Noise on Parallel Operation for AC Module Inverters</em></td>
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