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P225	<i>A Three-Phase Buck Rectifier with High-Frequency Isolation by Single-Stage</i> Diego Greff, Rodrigo Silva, Samir Ahmad Mussa, Arnaldo Jose Perin and Ivo Barbi	1129
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P228	<i>Analysis and Suppression of Conducted EMI Emissions for Front-end LLC Resonant DC/DC Converters</i> Dianbo Fu, Pengju Kong, Shuo Wang, Fred C. Lee and Ming Xu	1144
P229	<i>Design and Analysis of Buck Converter with Pulse-Skipping Modulation</i> Sitthipong Angkititrakul and Haitao Hu	1151
P230	<i>Using Standard Peak-Current-Mode Controllers in High-Power-Factor Rectifiers Based on Up-Down Switching Converters</i> Diego G. Lamar, Sebastian Javier, Manuel Arias, Miguel Rodriguez and Alberto Rodriguez	1157
P231	<i>Analysis of High and Low Voltage Grid Failure Propagation in large Wind Farms considering Transformers, Cables and VAR- Compensators</i> Ralf Lohde and Friedrich W. Fuchs	1164
P232	<i>Stress analysis and lifetime estimation on Power MOSFETs for automotive ABS systems</i> Antonio Testa, De Caro Salvatore, Patane Salvatore, Panarello Saverio and Letor Romeo	1169
P233	<i>Hierarchical EMC Analysis Approach for Power Electronics Applications</i> Dongsheng Zhao, Braham Ferreira, Anne Roc'h and Frank Leferink	1176
P234	<i>Hybrid Direct Power Control using p-q-r Power Theory Applied on 3-Phase 4-Wire Active Power Filter</i> Tri Desmana Rachmildha, Ana Llor, Maurice Fadel, Pekik Argo Dahono and Yanuarsyah Haroen	1183
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P236	<i>Analysis of 2-Level Random Aperiodic PWM Schemes for DC-DC Converters</i> Yash Shrivastava, Swamidoss Sathiakumar and Vassilios G. Agelidis	1196
P237	<i>Three-Phase Grid-Connected Photovoltaic System With Active and Reactive Power Control Using dq0 Transformation</i> Mateus Felzke Schonardie and Denizar Cruz Martins	1202
P238	<i>d-q Equivalent Circuit Representation of Three-Phase Flux Reversal Machine with Full Pitch Winding</i> D. S. More, Hari Kalluru and Baylon Fernandes	1208

Tuesday, June 17, 7:00AM-8:00AM

**Special Session: Author's Breakfast, Chair: The University of Sydney, Australia V.G. Agelidis,
Room: Oceanis Restaurant**

Tuesday, June 17, 8:30AM-10:10AM

**Switched Reluctance Motors & Drives - Chair: D. Patterson, University of Nebraska, USA -
Room: Colossos A**

- 8:30AM *Four-Quadrant Smooth Torque Controlled Switched Reluctance Machine Drives*
Christos Mademlis and Iordanis Kioskeridis 1216
- 8:55AM *A Novel High Torque and Low Weight Segmented Switched Reluctance Motor*
Naresh Vattikuti, Vandana Rallabandi and Baylon Fernandes 1223
- 9:20AM *Nonlinear Current Control Technique for High Performance Switched Reluctance Machine Drives*
Iakovos Manolas, Athanasios Kaletsanos and Stefanos Manias 1229
- 9:45AM *A Switched Reluctance Motor Drive for Home Appliances with High Power Factor Capability*
Mario Cacciato, Alfio Consoli, Giuseppe Scarcella and Giacomo Scelba 1235

**Digital Control I - Chair: P.T. Krein, University of Illinois at Urbana-Champaign, USA -
Room: Colossos B**

- 8:30AM *Time-Optimal, Parameters-Insensitive Digital Controller for DC-DC Buck Converters*
Alessandro Costabeber, Luca Corradini, Paolo Mattavelli and Stefano Saggini 1243
- 8:55AM *Adaptive Tuning of Digitally Controlled Switched Mode Power Supplies based on Desired Phase Margin*
Jeffrey Morroni, Regan Zane and Dragan Maksimovic 1250
- 9:20AM *N-Phase Sensor-less Current Sharing Digital Controller*
Jaber Abu Qahouq and Lilly Huang 1257
- 9:45AM *Hybrid Digital Adaptive Control for Synchronous Buck DC-DC Converters*
Amir Babazadeh and Dragan Maksimovic 1263

**Fuel Cell Energy Conversion Systems II - Chair: S. Choi, Seould National University of Technology,
South Korea - Room: Colossos C**

- 8:30AM *A New Three-Phase Interleaved Isolated Boost Converter with Active Clamp for Fuel Cells*
Hanju Cha, Jungwan Choi and Byung-moon Han 1271
- 8:55AM *High Voltage Ratio non-isolated DC-DC Converter for Fuel Cell Power Source Applications*
Bin Huang, Jean-Philippe Martin, Serge Pierfederici, Bernard Davat and Ahmed Shahin 1277
- 9:20AM *Consideration for Input Current-Ripple Reduction on a Novel Pulse-link DC-AC Converter for Fuel Cells*
Kentaro Fukushima, Tamotsu Ninomiya, Masahito Shoyama, Isami Norigoe and Yosuke Harada 1284
- 9:45AM *A Three-Phase ZVZCS DC-DC Converter for Fuel Cell Applications*
Hyungjoon Kim, Changwoo Yoon and Sewan Choi 1290

PFC Technologies I - Chair: D.D.C. Lu, The University of Sydney, Australia - Room: lalysos

- 8:30AM *Quantization Effects and Limit Cycling in Digitally Controlled Single-Phase PFC Rectifiers*
Barry Mather and Dragan Maksimovic 1297
- 8:55AM *A Novel Bridgeless Buck-Boost PFC Converter*
Wei Wang, Hongpeng Liu, Shigong Jiang and DianGuo Xu 1304
- 9:20AM *An Improved Bridgeless PFC Boost Doubler Rectifier with High Efficiency*
Woo-Young Choi, Bong-Hwan Kwon and Jung-Min Kwon 1309

9:45AM *Modeling and Control of a PFC Regulator with Reduced Redundant Power Processing*
R. Loera-Palomo, Jorge Alberto Morales-Saldana and E. E. Carbajal-Gutierrez 1314

Electric Vehicle Technologies I - Chair: J. Sun, Rensselaer Polytechnic Institute, USA - Room: Lindos

8:30AM *Introducing a Silicon Carbide Inverter for Hybrid Electric Vehicles*
Antonios Antonopoulos, Mats Alakula, Hans Bangtsson and Stefanos Manias 1321

8:55AM *Comparison of two different Electrical Power Architectures for Electric Vehicles applications based on Fuel Cell and Ultracapacitors*
Carmen Raga, Andres Barrado, Isabel Quesada, Antonio Lazaro and Carlos Anocibar 1326

9:20AM *Power System Structure and Control Strategy for Fuel Cell Hybrid Vehicle*
J. M. Lee and Bo-Hyung Cho 1331

9:45AM *Electrical Battery Model for Use in Dynamic Electric Vehicle Simulations*
Ryan Kroeze and Philip Krein 1336

Space Vector Modulation I - Chair: S. Bernet, Dresden University of Technology, Germany - Room: Marika A

8:30AM *Control Strategies for Mutually Commutated Converter Systems without Cycloconverter Turn-off Capability*
Stephan Meier, Staffan Norrga and Hans-Peter Nee 1344

8:55AM *Space Vector Modulation Based on a Multidimensional Approach for Multiphase Inverters with an Odd Number of Phases*
Domenico Casadei, Filippo Milanese, Giovanni Serra, Angelo Tani and Luca Zarri 1351

9:20AM *Synchronous Space Vector Pulsewidth Modulation Based Close Loop Flux Control of a Grid Connected Cascaded Multilevel Inverter*
Amit K Gupta and Ashwin M. Khambadkone 1358

9:45AM *Synchronization Analysis of Space Vector PWM Converters with Distributed Control*
Mingyao Ma, Xiangning He, Rongxiang Zhao and Dong Wang 1365

STATCOM Technologies - Chair: H. Akagi, Tokyo Institute of Technology, Japan - Room: Marika D

8:30AM *Inverter-Less STATCOMs*
Deepak Divan and Jyoti Sastry 1372

8:55AM *A new current control for the STATCOM based on secondary order generalized integrators*
Abnery J. Ortiz, Mauricio Aredes, Luis Guilherme Rolim, Emilio Bueno and Pedro Rodriguez 1378

9:20AM *Decoupled Control of Capacitor Voltages in a PWM Cascade StatCom*
Diego Soto, Ruben Pena and Patrick W. Wheeler 1384

9:45AM *Improving Distribution System Performance with Integrated STATCOM and Supercapacitor Energy Storage System*
Zhengping Xi, Babak Parkhideh and Subhashish Bhattacharya 1390

Tuesday, June 17, 10:30AM-12:10PM

Resonant Converters II - Chair: A. Bhat, University of Victoria, Canada - Room: Colossos A

10:30AM *High Frequency Resonant SEPIC Converter with Wide Input and Output Voltage Ranges*
Jingying Hu, Anthony Sagneri, Juan M. Rivas, Seth Davis and David J. Perreault 1397

10:55AM *A Small Signal State Space Model of Single Stage Three Level Resonant AC/DC Converters*
Mohammed Agamy and Praveen K. Jain 1407

11:20AM *The Resonant Commutated Twin Pole Inverter*
Frank Hinrichsen and Wolf-Ruediger Canders 1414

11:45AM *Investigation on Topology for Type-4 LLC Resonant Dc-Dc Converter*
Wei Chen and Lu Zhengyu 1421

Rectifier Technologies I - Chair: J.R. Espinoza, Universidad de Concepcion, Chile - Room: Colossos B

10:30AM	<i>Closed Loop Current Control of a Hybrid 12-Pulse Rectifier</i>	Juergen Biela, Hassler Dominik, Schoenberger John and Johann W. Kolar	1427
10:55AM	<i>Harmonics Reduction in Low Switching Frequency Space Vector Modulated Current Source Rectifiers</i>	Maged Naguib and Luiz Lopes	1434
11:20AM	<i>Design and Development of T-Connected Transformer Based 24-Pulse AC-DC Rectifier</i>	Bhim Singh, Sanjay Gairola, Ambrish Chandra and Kamal Al-Haddad	1441
11:45AM	<i>Design of a Plug-in Frequency Domain Based Repetitive Current Controller for Three Phase PWM Boost Rectifier under Distorted and Unbalanced Supply Voltages</i>	Xinhui Wu, Sanjib Kumar Panda and Jianxin Xu	1448

Photovoltaic Energy Systems II - Chair: L. Lopes, Concordia University, Canada - Room: Colossos C

10:30AM	<i>Evaluation of Maximum Power Point Tracking Methods for Grid Connected Photovoltaic Systems</i>	Gustavo Azevedo, Marcelo Cavalcanti, Kleber Oliveira, Francisco Neves and Zaroni Lins	1456
10:55AM	<i>An Integrated Active and Reactive Power Control Scheme for Grid-Connected Photovoltaic Production Systems</i>	Federico Delfino, Gio Battista Denegri, Marco Invernizzi and Renato Procopio	1463
11:20AM	<i>Comparison of Battery Charging Algorithms For Photovoltaic Backup Systems</i>	Sara Armstrong, Margaret Glavin and Gerard Hurley	1469
11:45AM	<i>Photovoltaic Power conditioning and Maximum Power Point Tracking by means of a self commutated Inverter</i>	Yuval Beck, Doron Shmilovitz, Dror Medini and Bishara Bishara	1476

Sensorless Motor Control II - Chair: T. Bruckner, Convertteam GmbH, Germany - Room: lalysos

10:30AM	<i>I-F Starting Method with Smooth Transition to EMF Based Motion-Sensorless Vector Control of PM Synchronous Motor/Generator</i>	Marius Fatu, Remus Teodorescu, Ion Boldea, Gheorghe-Daniel Andreescu and Frede Blaabjerg	1481
10:55AM	<i>Sensorless IPMS Motor Drive Control for Electric Power Steering</i>	Alfio Consoli, Giuseppe Scarcella, Giacomo Scelba, Antonio Testa and Salvatore De Caro	1488
11:20AM	<i>Stationary Frame-Based Sensorless Predictive Current Controller with Zero Steady State Error</i>	Khaled Ahmed, Ahmed M. Massoud, Stephen J. Finney and Barry W. Williams	1495
11:45AM	<i>The sensorless rotor position identification and low speed operation of the axial flux permanent magnet motor controlled by the novel PIPCRM method</i>	Janusz Wisniewski and Wlodzimierz Koczara	1502

PWM Technologies - Chair: D.G. Holmes, Monash University, Australia - Room: Lindos

10:30AM	<i>New Observer-based Source Voltage Unbalance Control Methods in PWM Voltage-Source Converters</i>	Kevin Lee, Thomas Jahns, Thomas Lipo and Vladimir Blasko	1509
10:55AM	<i>Harmonic Cancellation under Interleaved PWM with Harmonic Injection</i>	Troy Beechner and Jian Sun	1515
11:20AM	<i>Combined Synchronized PWM for Symmetrical Split-Phase Drives with Low Switching Frequency</i>	Valentin Oleschuk, Giovanni Griva, Francesco Profumo and Alberto Tenconi	1522
11:45AM	<i>A High Performance PWM Algorithm for Common Mode Voltage Reduction in Three-phase Voltage Source Inverters</i>	Emre Un and Ahmet Hava	1528

Motor Drive Technologies II - Chair: D. Patterson, University of Nebraska, USA - Room: Marika A

10:30AM	<i>A New Wavelet Based Diagnosis and Protection of Faults in Induction Motor Drives</i>	M. Abdesh S. K. Khan and M. A. Rahman	1536
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10:55AM	<i>Minimum Torque Ripple Current Control Strategy in a Dual Fault Tolerant PM AC Motor Drive</i> Jingwei Zhu, Nesimi Ertugrul and Wen Liang Soong	1542
11:20AM	<i>The Instantaneous Reactive Power Approach for Rotor Cage Fault Diagnosis in Induction Motor Drives</i> M'hamed Drif and A. J. Marques Cardoso	1548
11:45AM	<i>An Indirect Rotor Position Estimation Technique for a Fault-Tolerant Brushless PM Motor Drive</i> Jae Sam An, Nesimi Ertugrul, Wen Liang Soong, Jingwei Zhu and Ameen Gargoom	1553

VRM Technologies - Chair: I. Batarseh, University of Central Florida, USA - Room: Marika D

10:30AM	<i>Modeling Digital Control Laws for High-Frequency VRM applications</i> Adan Simon-Muela, Youssef Elbasri, Corinne Alonso, Vincent Boitier and Jean Louis Chaptal	1560
10:55AM	<i>Accurate Performance Predictions of Power MOSFETs in High Switching Frequency Synchronous Buck Converters for VRM</i> Toni Lopez and Reinhold Elferich	1566
11:20AM	<i>Analysis and Experimentation of a New 48V Ultra-fast Resonant Voltage Regulator Module</i> Mohamed Youssef and Mohamed Orabi	1573
11:45AM	<i>A New Two-stage Buck Converter for Voltage Regulators</i> Xiaogao Xie and Zhaoming Qian	1580

Tuesday, June 17, 1:30PM-3:10PM

Semiconductor Device Technologies II - Chair: A. Mantooth, University of Arkansas, USA - Room: Colossos A

1:30PM	<i>Intelligent, Compact and Robust Semiconductor Circuit Breaker Based on Silicon Carbide Devices</i> Karsten Handt, Gerd Griepentrog and Reinhardt Maier	1586
1:55PM	<i>Electro-thermal Simulation of a 100 A, 10 kV Half-Bridge SiC MOSFET/JBS Power Module</i> Tam Duong, Jose M. Ortiz-Rodriguez, R. N. Raju and Allen R. Hefner	1592
2:20PM	<i>Parallel Connection of Integrated Gate Commutated Thyristors and Diodes</i> Robert Hermann, Steffen Bernet, Yongsug Suh and Peter K. Steimer	1598
2:45PM	<i>High Voltage, High Performance Switch using Series Connected IGBTs</i> Giovanni Busatto, Carmine Abbate, Francesco Iannuzzo, Benedetto Abbate and Luigi Fratelli	1606

EMI Technologies I - Chair: S. Ben-Yaakov, Ben-Gurion University of Negev, Israel - Room: Colossos B

1:30PM	<i>Integrated EMI Filter Design with Flexible PCB Structure</i> Xiaofeng Wu, Dehong Xu, Yanjun Zhang, Yi Chen, Yasuhiro Okuma and Kazuaki Mino	1613
1:55PM	<i>A novel Modulation Topology for Power Converters utilizing Multiple Carrier Signals</i> Arnold Knott, Gerhard Pfaffinger and Michael A. E. Andersen	1618
2:20PM	<i>Investigating the Grounding of EMI Filters in Power Electronics Systems</i> Shuo Wang, Yoann Yorrick Maillet, Fred Wang, Rixin Lai and Rolando P. Burgos	1625
2:45PM	<i>Design of a Current-Sense Voltage-Feedback Common Mode EMI Filter for an Off-line Power Converter</i> Krishna Mainali and Ramesh Oruganti	1632

Resonant Converters III - Chair: P. Jain, Queen's University, Canada - Room: Colossos C

1:30PM	<i>Constant Switching Frequency Series Resonant Three-port Bi-directional DC-DC Converter</i> Hariharan Krishnaswami and Ned Mohan	1640
1:55PM	<i>Power Efficiency Analysis of a Multi-Oscillated Current Resonant Type DC-DC Converter</i> Tadahiko Sato, Ryu Araki, Hiroyuki Ota, Nobuhiro Higashi and Yoichi Ishizuka	1646

- 2:20PM *A Novel ZVS Push-Pull Type LLC Series Resonant Dc-Dc Converter for Hybrid Fuel Cell Power Systems*
Wei Chen and Zhengyu Lu 1651
- 2:45PM *A Very High Frequency dc-dc Converter Based on a Class Phi-2 Resonant Inverter*
Juan M. Rivas, Olivia Leitermann, Yehui Han and David J. Perreault 1657

Multilevel Inverter Technologies II - Chair: K. Papastergiou, University of Nottingham, UK - Room: lalysos

- 1:30PM *Five Level Virtual-Flux Direct Power Control for the Active Neutral-Point Clamped Multilevel Inverter*
Leonardo Serpa, Peter Barbosa, Peter K. Steimer and Johann W. Kolar 1668
- 1:55PM *A Novel Digital Modulation Scheme for Multilevel Cascaded H-bridge Inverters*
Mouzhi Dong, Bin Wu, Navid Zargari and Jose R. Rodriguez 1675
- 2:20PM *Natural Capacitor Voltage Balancing for a Flying Capacitor Converter Induction Motor Drive*
Brendan McGrath and Grahame Holmes 1681
- 2:45PM *A Novel Multilevel Inverter Model*
Kambiz Arab Tehrani, Harlin Andriatsioharana, Ignace Rasoanarivo and Francois Michel Sargos 1688

Utility Power Electronics I - Chair: L. Harnefors, ABB Power systems, Sweden - Room: Lindos

- 1:30PM *Thin AC Converters - A New Approach for Making Existing Grid Assets Smart and Controllable*
Deepak Divan, Jyoti Sastry, Anish Prasai and Harjeet Johal 1695
- 1:55PM *A Novel Transformer-less Series Voltage Sag Compensator without Energy Storage Capacitors and Its New Time Optimal Control Strategy*
Zenglu Chen, Pei Zhan, Toshifumi Ise, Yanfang Li and Zhao-an Wang 1702
- 2:20PM *Effects of Phase-Locked-Loop Circuit on a Self-Commutated BTB System under Line Faults*
Phuong Viet Pham, Makoto Hagiwara and Hirofumi Akagi 1708
- 2:45PM *Advanced Phase Shift Control of Capacitor Supported Dynamic Voltage Restorer*
Chang Yuan, Jinjun Liu, Xiaoyu Wang, Zhao-an Wang and Weiwei Gan 1715

Matrix Converter Technologies II - Chair: C. Klumpner, University of Nottingham, United Kingdom - Room: Marika A

- 1:30PM *Carrier-Based Modulation Schemes for Various Three-Level Matrix Converters*
Poh Chiang Loh, Runjie Rong, Frede Blaabjerg, Li Shan and Wang Peng 1720
- 1:55PM *Matrix Converter Over-Modulation Using Carrier-based Control: Maximizing the Voltage Transfer Ratio*
Satish Thuta, Krushna K. Mohapatra and Mohan Ned 1727
- 2:20PM *Design of Matrix Converter Topology and Modulation Algorithms with Shorted and Opened Failure Tolerance*
Sangshin Kwak and Taehyung Kim 1734
- 2:45PM *A Novel Control Strategy for a Combined System Using Both Matrix Converter and Inverter without Interconnection Reactors*
Junichi Itoh and Hiroshi Tamura 1741

Wind Energy Conversion Technologies II - Chair: T. Undeland, Norwegian University of Science and Technology, Norway - Room: Marika D

- 1:30PM *A Hybrid Maximum Power Point Tracking System for Grid-Connected Variable Speed Wind-Generators*
Charalampos Patsios, Antonios Chaniotis and Antonios Kladas 1749
- 1:55PM *Power Quality Enhancement of a Wind-Turbine Generator Under Variable Wind Speeds Using Matrix Converter*
Hassan Nikkhajoei and Robert Lasseter 1755

2:20PM	<i>A Power Electronic Interface for a Battery Supercapacitor Hybrid Energy Storage System for Wind Applications</i>	Wei Li and Geza Joos	1762
2:45PM	<i>Measurement of Wind Farm Harmonic Emissions</i>	S.T. Tentzerakis, N.A. Paraskevopoulou, Stavros Papathanassiou and P. M. Papadopoulos	1769

Tuesday, June 17, 3:30PM-5:30PM

Plenary Poster Session: Poster Session 2 - Room: Marika B & C

P301	<i>Leakage Current Voltage Dependence and Performance of Power Semiconductor Devices in the Breakdown (Avalanche) Region</i>	Vasile Obreja	1777
P302	<i>Interleaved Dual-Edge Modulation Scheme for Double-Input Converter to Minimize Inductor Current Ripple</i>	Li Yan, Yang Dongsheng and Ruan Xinbo	1783
P303	<i>Unbalanced Three-Phase Control using Offset-Voltage for H-Bridge Multilevel Inverter with Faulty Power Cells</i>	Young-Min Park, Han-Seoung Lyoo, Hyun-Won Lee, Myung-Gil Jung and Se-Hyun Lee	1790
P304	<i>Modeling Current-Mode-Controlled Three-Phase Converters for Simulating Multiple-Module Inter-Connected Power Supply Systems</i>	Wang Runxin and Liu Jinjun	1796
P305	<i>Optimized Design of a High Frequency Digital Controller for DVS-enabled adaptive DC-DC Converter</i>	Mukti Barai, Sabyasachi Sengupta and Biswas Jayanta	1801
P306	<i>Dimensioning of the Z-Source Inverter for General Purpose Drives with Three-Phase Standard Motors</i>	Lothar Sack, Bernhard Piepenbreier and Moritz von Zimmermann	1808
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Tuesday, June 17, 6:00PM-9:00PM

Special Session: ABB Hospitality Suite, Room: Marika B & C

Wednesday, June 18, 7:00AM-8:00AM

Special Session: Author's Breakfast, Chair: The University of Sydney, Australia V.G. Agelidis, Room: Oceanis Restaurant

Wednesday, June 18, 8:30AM-10:10AM

LED Technologies I - Chair: I. Shikh, Philips Solid-State Lighting Solution - Room: Colossos A

- 8:30AM *A Proposal of Led lamp driver for universal input using Cuk converter*
Jonas R. Britto, Aziz E. Demian Jr., Luiz Carlos Gomes Freitas, Valdeir J. Farias and Ernane A. A. Coelho 2640
- 8:55AM *Power-Efficient Series-Charge Parallel-Discharge Charge Pump Circuit for LED Drive*
Kang-Ho Lee, Young-Jin Woo, Hee-Seok Han, Kwang-Chan Lee and Chang-Seok Chae 2645
- 9:20AM *Series Input Modular Architecture for Driving Multiple LEDs*
J. Patterson and Regan Zane 2650
- 9:45AM *Design Considerations of a High Power Factor SEPIC Converter for High Brightness White LED Lighting Applications*
Zhongming Ye, Fred Greenfeld and George Liang 2657

Design Techniques - Chair: B. Ferreira, Delft University of Technology, The Netherlands - Room: Colossos B

- 8:30AM *Integrating Reliability into the Design of Fault-Tolerant Power Electronics Systems*
Alejandro Dominguez-Garcia and Philip Krein 2665
- 8:55AM *High Current Inductor Design for MHz Switching*
Maeve Duffy, Collins Christina, Fernando Rhen, Paul McCloskey and Saibal Roy 2672
- 9:20AM *Generalized Methodology for the Analysis and Design of Multiphase Converters with Integrated Magnetics*
Leonardo Laguna, Roberto Prieto, Oscar Garcia, Roberto Gutierrez and Jose Antonio Cobos 2678
- 9:45AM *Improving the Design of Integrated Magnetics for Power Electronics Systems*
Virgilio Valdivia, Jorge Pleite, Pablo Zumel and Carlos Gonzalez 2685

Matrix Converter Applications - Chair: C. Klumpner, University of Nottingham, UK - Room: Colossos C

- 8:30AM *Performance Assessment of Matrix Converter and Two Stage Matrix Converter for EMA in aircraft application*
Andrew Trentin, Pericle Zanchetta, Wheeler Patrick and Jon C. Clare 2692
- 8:55AM *Application of Indirect matrix converter to variable speed Doubly Fed Induction Generators*
Eduardo Reyes, Ruben Pena, Roberto Cardenas, Patrick W. Wheeler and Jon C. Clare 2698
- 9:20AM *Power Modulation Control of a Three Phase to Single Phase Matrix Converter for a Gas Engine Cogeneration System*
Yushi Miura, Shinichiro Kokubo, Daisuke Maekawa, Satoshi Horie and Toshifumi Ise 2704
- 9:45AM *Control of a Wind Energy Conversion System Based on an Induction Generator Fed by a Matrix-Converter*
Roberto Cardenas, Ruben Pena, Jose Ruiz, Jon C. Clare and Patrick W. Wheeler 2711

DFIG Technologies - Chair: G. Papafotiou, ABB Corporate Research-Baden, Switzerland - Room: Ialysos

- 8:30AM *A Digital Active and Reactive Power Control for Doubly-fed Induction Generator*
Alfeu J. Sgurezi Filho, Milton E. Oliveira Filho and Ernesto Ruppert Filho 2718
- 8:55AM *A Novel Position Sensor-less Control Scheme of Doubly Fed Induction Wind Generator Based on MRAS Method*
Yuan Guofeng, Li Yongdong, Chai Jianyuan and Jiang Xinjian 2723
- 9:20AM *Variable Speed Constant Frequency Diesel Power Conversion System Using Doubly Fed Induction Generator (DFIG)*
Tajuddin Waris and Chemmangot V Nayar 2728
- 9:45AM *Online Parameter Identification Methods for Doubly Fed Induction Generators*
Soenke Thomsen, Kai Rothenhagen and Friedrich W. Fuchs 2735

Inverter Technology (Z-sourced) - Chair: D. M. Vilathgamuwa, Nanyang Technological University, Singapore - Room: Lindos

- 8:30AM *Four Quasi-Z-Source Inverters*
Joel Anderson and Fang Zheng Peng 2743
- 8:55AM *Pulse Width Modulation Methods for Bidirectional/High-Performance Z-source Inverter*
Jacek Rabkowski, Roman Barlik and Mieczyslaw Nowak 2750
- 9:20AM *Operational Analysis and Comparative Evaluation of Embedded Z-Source Inverters*
Feng Gao, Poh Chiang Loh, Frede Blaabjerg and Chandana Jayampathi Gajanayake 2757
- 9:45AM *Z-Source Converter Based Zero Voltage Electronic Load*
Fang Zheng Peng, Julio C. Rosas-Caro, Honnyong Cha and Craig Rogers 2764

High Power Converter Technologies - Chair: D. Divan, Georgia Institute of Technology, USA - Room: Marika A

- 8:30AM *High Power Resonant Switched-Capacitor Step-Down Converter*
Oliver Keiser, Peter K. Steimer and Johann W. Kolar 2772
- 8:55AM *Faults Analysis and Remedial Strategies in High Power Neutral Point Clamped Converters*
Paolo Bordignon, Matteo Carpaneto, Mario Marchesoni and Pierluigi Tenca 2778
- 9:20AM *Considerations for a Digital Gate Unit in High Power Applications*
Harald Kuhn, Thies Koeneke and Axel Mertens 2784
- 9:45AM *Characterization of the Dual-Active Bridge Topology for High-Power Applications Employing a Duty-Cycle Modulation*
Georgios Demetriades and Hans-Peter Nee 2791

DC-DC Converter Technologies II - Chair: A. Forsyth, The University of Manchester, UK - Room: Marika D

- 8:30AM *Multi-phase DC-DC Converter with Bi-directional Power Flow Ability for Distributed Generation System*
Haiping Xu, Fang Zheng Peng and Li Kong 2800
- 8:55AM *DC-DC Converters in a Multi-String Configuration for Stand-Alone Photovoltaic Systems*
Johninson Imhoff, Jose Renes Pinheiro, Jumar Luis Russi, Diogo Brum, Roger Gules and Helio Leaes Hey 2806
- 9:20AM *Stability Issue and Corresponding Design Considerations in A System of Cascaded Bidirectional DC-DC Converters*
Hao Wang, Jinjun Liu and Runxin Wang 2813
- 9:45AM *Synthesis of Double-Input DC-DC Converters Using a Single-Pole Triple-Throw Switch as a Building Block*
Karteek Gummi and Mehdi Ferdowsi 2819

Wednesday, June 18, 10:30AM-12:10PM

Sensorless Motor Control III - Chair: H. Zelaya de la Parra, ABB Corporate Research, Sweden - Room: Colossos A

- 10:30AM *A Full Sliding Mode Sensorless Control of Three-Level Inverter-Fed Induction Motors*
Zhang Yongchang, Zhao Zhengming, Zhang Yingchao and Song Gaosheng 2825
- 10:55AM *A Simple Sensorless Control for Medium Voltage Synchronous Motor Drives*
Koichiro Nagata, Haruo Nemoto, Toshio Katayama and Shigetoshi Okamoto 2832
- 11:20AM *PMSM Sensorless Speed Estimation Based on Sliding Mode Observers*
Vasilios Ilioudis and Nikolaos Margaris 2838
- 11:45AM *Identification and compensation of inverter dead-time effect on zero speed sensorless control of AC machines based on voltage pulse injection*
Thomas M. Wolbank, Markus A. Vogelsberger and Michael Riepler 2844

Electronic Ballast Technologies - Chair: H. Chung, City University of Hong Kong, Hong Kong Room: Colossos B

- 10:30AM *Integrated Square Waveform Electronic Ballast with High Efficiency and High Power Factor for High Pressure Sodium Lamps*
Mario Ponce-Silva, Diego Balderrama and Mario A. Juarez 2851
- 10:55AM *Driver for 2.5 MHz Self-Oscillating Electronic Ballast Designed with Descriptive Function*
Ricardo Mateos, Mario Ponce-Silva, Eflen Flores and Abraham Claudio 2857
- 11:20AM *A Novel SEPIC type Single-Stage Single Switch (S4) Electronic Ballast with Very High Power Factor and High Efficiency*
John Lam, Praveen K. Jain and Vineeta Agarwal 2861
- 11:45AM *A Single-Stage High-Power-Factor Electronic Ballast with ZVS Buck-Boost Conversion*
Hung-Liang Cheng, Chin-Sien Moo, Kuo Hsing Lee, Yan Cun Li and Wei Ming Chen 2867

Active Filtering II - Chair: L.A. Moran, Universidad de Concepcion, Chile - Room: Colossos C

- 10:30AM *Hardware Implementation of a Three-Phase Active Filter System with Harmonic Isolation Based on Self-Tuning-Filter*
Mohamed Abdusalam, Philippe Poure and Shahrokh Saadate 2875
- 10:55AM *A Single-Phase Active Filter using an H-Bridge PWM Converter with a Sampling Frequency Quadruple of the Switching Frequency*
Hideaki Fujita 2882
- 11:20AM *A Minimum-Switch Direct-link Drive with Common-mode Voltage Elimination and Active Filtering for Three-phase Open-ended Machines*
Apurva Somani, Ranjan K. Gupta, Krushna K. Mohapatra and Ned Mohan 2889
- 11:45AM *New Control Scheme for Single-Phase Active Power Filters*
Leonardo Limongi, Radu Bojoi, Giovanni Griva and Alberto Tenconi 2894

Multilevel Inverter Technologies III - Chair: S. Norrga, ABB Corporate Research, Sweden - Room: lalysos

- 10:30AM *A PWM Method for Seven-Leg Inverters Supplying Three Three-Phase Motors*
Martin Jones, Drazen Dujic and Emil Levi 2902
- 10:55AM *Quantitative Study on Operation Frequency Limitation of Multi-level High Voltage Power Converters Equipped with Si-IEGT and SiC-PiN Diode*
Tatsuto Kinjo, Kazuto Takao, Yasunori Tanaka, Kyungmin Sung and Hiromichi Ohashi 2909
- 11:20AM *Study and Analysis of a Natural Reference Frame Current Controller for a Multi-Level H-Bridge Power Converter*
Mihai Ciobotaru, Florin Iov, Pericle Zanchetta, Yales Romulo de Novaes and Frede Blaabjerg 2914

11:45AM *Comparison between Symmetrical and Asymmetrical Single Phase Multilevel Inverter with Diode-Clamped Topology*
Alireza Nami, Firuz Zare, Gerard Ledwich and Arindam Ghosh 2921

PFC Technologies II - Chair: J.A. Cobos, Universidad Politecnica de Madrid, Spain - Room: Lindos

10:30AM *A Novel Approach for Link Capacitor Voltage in Single-Stage Power-Factor-Correction (SS-PFC) AC/DC Converter*
Byoung-Hee Lee, Chong-Eun Kim, Ki-Bum Park and Gun-Woo Moon 2928

10:55AM *An Isolated PFC Single-Stage Interleaved Full-Bridge Converter*
Paulo Ficagna and Jose Renes Pinheiro 2934

11:20AM *Improving Balance Technique for High Frequency Common Mode Noise Reduction in Boost PFC converters*
Pengju Kong, Shuo Wang and Fred C. Lee 2941

11:45AM *Feasible Evaluation of Phase-Shifted Feasible Evaluation of a Full-Bridge Inverter for Induction Heating Cooking Appliances with Discontinuous Current Mode PFC Control*
Yuki Kawaguchi, Eiji Hiraki, Toshihiko Tanaka, Mutsuo Nakaoka and Atsushi Fujita 2948

High Power Density Design - Chair: G.D. Demetriades, ABB Corporate Research, Sweden - Room: Marika A

10:30AM *Thermal and Spatial Design of a High Power Density Drive*
Mark Gerber, Jelena Popovic-Gerber and Braham Ferreira 2955

10:55AM *New Medium-Voltage Inverter Design with Very High Power Density*
Thomas Brueckner and Roland Jakob 2962

11:20AM *Integrated Filter in Electrolytic Capacitor Technology for Implementation in High Power Density Industrial Drives*
Jelena Popovic-Gerber, Mark Gerber and Braham Ferreira 2968

11:45AM *Impact of Resonant Tank Structures on Transformer Size for a High Power Density Isolated Resonant Converter*
Honggang Sheng, Yunqing Pei and Fred Wang 2975

Soft-switching Technologies I - Chair: G. Moschopoulos, University of Western Ontario, Canada - Room: Marika D

10:30AM *Active Snubber Network Design and Implementation on the Primary Side of an Isolated CUK-Converter Realizing Soft-switching for Efficiency Improvement*
Pietro Scalia, Giuseppe Capponi, Francesco Catalano and Antonino Riccobono 2983

10:55AM *Soft-Switching Interleaved Bidirectional DC-DC Converter for Advanced Vehicle Applications*
Dong-Gyu Lee, Nam-Ju Park and Dong-Seok Hyun 2988

11:20AM *Soft Switching and Optimal Resonance Conditions of APWM HB Flyback Converter for High Efficiency under High Output Current*
Jee-Hoon Jung and Joong-Gi Kwon 2994

11:45AM *A ZCS Full-Bridge PWM converter with Self-Adaptable Soft-Switching Snubber Energy*
Qian Sun, Huai Wang, River T. H. Li, S. H. Henry Chung and Saad Tapuchi 3001

Wednesday, June 18, 1:30PM-3:10PM

Converter Technologies - Chair: P. Jain, Queen's University, Canada - Room: Colossos A

1:30PM *Steep Conversion Ratio Cuk, Zeta, and Sepic Converters Based on a Switched Coupled-inductor cell*
Boris Axelrod, Yefim Berkovich, Saad Tapuchi and Adrian Ioinovici 3009

1:55PM *A Three-Phase Reduced Switch High Power Factor Buck-Type Converter*
Sondeep Bassan and Gerry Moschopoulos 3015

- 2:20PM *Alternating Stacked Inductor for Mega-Hertz Power Converter and Filtering Applications*
Chi Kwan Lee, Peter C. F. Chan and S. Y. Ron Hui 3021
- 2:45PM *A Novel Two-Switch Active Clamp Forward Converter for High Input Voltage Applications*
Jae-Kuk Kim, Won-Sik Oh and Gun-Woo Moon 3028

FPGA Technologies and Applications - Chair: J. Abu Qahouq, The University of Alabama - Room: Colossos B

- 1:30PM *Segmented Digital Clock Manager- FPGA based Digital Pulse Width Modulator Technique*
Majd Batarseh, Wisam Al Hour, Lilly Huang, Chris Iannello and Issa Batarseh 3036
- 1:55PM *FPGA based Motion Controller with a High Bandwidth Current Regulator*
Eunsoo Jung, Hak-Jun Lee and Seung-Ki Sul 3043
- 2:20PM *Design of Dedicated Processor for AC Motor Control Implemented in a low cost FPGA*
Uffe Jakobsen and Torben Matzen 3048
- 2:45PM *DPWM based on FPGA Clock Phase Shifting with Time Resolution under 100 ps*
Angel de Castro and Elias Todorovich 3054

Permanent Magnet Motor Technologies - Chair: F. Rahman, University of New South Wales, Australia - Room: Colossos C

- 1:30PM *A Real-Time Thermal Model of a Permanent Magnet Synchronous Motor Based on Geometrical Measures*
Georgios Demetriades, Hector Zelaya de la Parra, Erik Andersson and Hakan T. Olsson 3061
- 1:55PM *A Comparative Study of Two Predictive Current Controls for a Permanent Magnet Synchronous Machine Drive*
Florent Morel, Xuefang Lin-Shi, Jean-Marie Retif and Bruno Allard 3068
- 2:20PM *Efficiency Evaluation of Linear Permanent Magnet Synchronous Machines Using the Synthetic Loading Method*
Abdelaziz Abbas and John Fletcher 3074
- 2:45PM *Permanent-Magnet Synchronous Machine and Induction Machine Independently Controlled by Standard Three-leg Inverter*
Euzeli C. dos Santos Jr., Eisenhawer M. Fernandes, Cursino B. Jacobina and Alexandre C. Oliveira 3081

Electric Vehicle Technologies II - Chair: N. Ertugrul, University of Adelaide, Australia - Room: lalysos

- 1:30PM *Bi-Directional DCM DC to DC Converter for Hybrid Electric Vehicles*
Michael Pepper, Keith Mansfield, John Elmes, Khalid Rustom and Rene Kersten 3088
- 1:55PM *High Dynamic Response Control of Induction Motor in High-Speed Region for Electric Vehicle Drive System*
Ke Li, Chenghui Zhang, Naxin Cui, Mingyao Ma and Xiangning He 3093
- 2:20PM *EMI Filters Architectures for Power Electronics in Hybrid Vehicles*
Vittoria Serrao, Alessandro Lidozzi and Augusto Di Napoli 3098
- 2:45PM *Key Technologies of Digital-Current-Controlled Bidirectional DC-DC Converter in the Hybrid Electric Vehicle*
Xiaofeng Zhang, Wei Chen and Zhengyu Lu 3104

Modeling I - Chair: G. Covic, The University of Auckland, New Zealand - Room: Lindos

- 1:30PM *Modelling and High Temperature Characterization of SiC-JFET*
Rami Mousa, Dominique Planson, Herve Morel, Christophe Raynaud and Bruno Allard 3111
- 1:55PM *Nonlinear Magnetics Modeling For Magamp Power Regulation*
Paul Tuinenga, Art Witulski, Jeff Kauppila, Mike McCurdy and Dan Herbison 3118
- 2:20PM *Loss Models for Shaped Foil Windings on Low-Permeability Cores*
Jennifer D. Pollock and Charles R. Sullivan 3122

2:45PM *Transient Thermal Analysis of Power Devices Based on Fourier-series Thermal Model*
Bin Du, Jerry Hudgins, Enrico Santi, Angus Bryant and Patrick Palmer 3129

Rectifier Technologies II - Chair: K. Al-Haddad, ETS-Montreal, Canada - Room: Marika A

1:30PM *Voltage Balance Control of Non-Regenerative Three-Level Boost Rectifier Using Carrier-Based Pulse Width Modulation*
Rixin Lai, Fred Wang, Rolando P. Burgos and Dushan Boroyevich 3137

1:55PM *Application of Optimal and Suboptimal Current Injection in Twelve-Pulse Three-Phase Diode Rectifiers*
Milan Ivkovic, Predrag Pejovic and Zarko Janda 3143

2:20PM *An adaptive direct power control for three-phase PWM rectifier in the unbalanced case*
Gerardo Escobar, Misael F. Martinez-Montejano, Raymundo E. Torres-Olguin and Andres A. Valdez 3150

2:45PM *Multi-Level Single Phase Boost Rectifiers using Coupled Inductors*
John Salmon, Nouman Noor, Jeff Ewanchuk and Andy Knight 3156

High Temperature Power Electronics - Chair: H.-P. Nee, Royal Institute of Technology (KTH), Sweden - Room: Marika D

1:30PM *Silicon-On-Insulator (SOI) Devices and Mixed-Signal Circuits for Extreme Temperature Applications*
Richard Patterson, Ahmad Hammoud and Malik Elbuluk 3165

1:55PM *Design of a High-Temperature Pre-Biased Line Choke for Power Electronics Applications*
Rafal Wrobel, Neville McNeill and Philip Mellor 3171

2:20PM *Towards an airborne high temperature SiC inverter*
Dominique Bergogne, Herve Morel, Dominique Planson, Dominique Tournier and Pascal Bevilacqua 3178

2:45PM *Hard Switched MOSFET Inverter Development for Elevated Temperature Applications*
Shehab Ahmed 3184

Wednesday, June 18, 3:30PM-5:30PM

Plenary Poster Session: Poster Session 3 - Chair: V.G. Agelidis, The University of Sydney, Australia - Room: Marika B & C

P501 *Copper Winding Losses in Matrix Converter-Fed Induction Motors: a Study Based on Skin Effect and Conductor Heating*
Juan Sagarduy and Anthony J Moses 3192

P502 *Double Boost Effect Topology for AC/DC Converter with Unity Power Factor*
Jean-Claude Le Claire and Guillaume Le Borgne 3199

P503 *PCM-controlled Superbuck Converter with Super Performance and Surprises*
Matti Karppanen, Teuvo Suntio and Mika Sippola 3206

P504 *Optimal PWM Method for Electric and Electro-Hydraulic Power Steering Applications*
Dusan Graovac, Benno Koepl, Michael Scheffer, Andreas Kiep and Marco Puerschel 3213

P505 *Application of 3D Direct PWM in Parallel Power Quality Compensators in Three-phase Four-wire Systems*
Ning-Yi Dai, Chi-Seng Lam, Man-Chung Wong and Ying-Duo Han 3220

P506 *The Parallel Active Input Current Shaper Operating in DCM*
Nimrod Vazquez, Alonso Jimenez, Claudia Hernandez, Jaime Arau and Elias Rodriguez 3226

P507 *A Novel Performance Study for Linear Induction Motors Considering End Effects*
Jia Zhao, Zhongping Yang, Jianqiang Liu and Trillion Q. Zheng 3231

P508 *Unified Control Technique for Z-Source Inverter*
Shuitao Yang, Xinping Ding, Fan Zhang, Fang Zheng Peng and Zhaoming Qian 3236

P509 *Pre-Synchronization Control for Parallel Inverters Based on Power Line Communication*
He Zhongyi, Wang Xiaona, Xing Yan and Ma Yundong 3243

P510	<i>3-Phase AC-Drives With Passive Front-Ends With Focus on the Slim DC-Link Topology</i> Henrik Andersen, Ruimin Tan and Cai Kun	3248
P511	<i>A Novel Control Strategy for Current-Source Rectifiers with Space Vector Modulation</i> Jilei Gao, Hu Sun, Xiaojie You and Trillion Q. Zheng	3255
P512	<i>Multi-Channel Semi-Regulated Bus Converter</i> Matti Karppanen, Mika Sippola and Teuvo Suntio	3259
P513	<i>Small-Signal Modeling of DC Converters with Digital Peak-Current-Mode Control</i> Hung-Shou Nien, Dan Chen and Wei-Hsu Chang	3266
P514	<i>Robust Current Assisted Hinf Controller for Boost Converter in the Presence of Uncertainty and Evaluation Using M-analysis</i> George Ioannidis and Stefanos Manias	3272
P515	<i>Simplified Model Predictive Control For a Shunt Active Filter</i> Xiao-Gang Wang, Yun-Xiang Xie and Ding-Xin Shuai	3279
P516	<i>Design and Modeling of a Novel High-Gain Peak Current Control Scheme to Achieve Adaptive Voltage Positioning for DC Power Converters</i> Ching-Jan Chen, Dan Chen, Martin Lee and Eddie Kuo-Lung Tseng	3284
P517	<i>A Novel N+k Fault-Tolerant Hot-Swap DC/AC Inverter Design</i> John Chatzakis and Emmanouel Antonidakis	3291
P518	<i>Comparisons of Two Kinds of Phase-shifted Controlled Full-bridge Mode Inverters with High Frequency Link</i> Lei Li and Qinglong Zhong	3295
P519	<i>Modeling Average-Current-Mode-Controlled Multi-phase Buck Converters</i> Ruqi Li	3299
P520	<i>A Novel Control Approach for LCL-based Shunt Active Power Filter with High Dynamic and Steady-State Performance</i> Zhiling Qiu, Jie Kong and Guozhu Chen	3306
P521	<i>Performance Verification of the Inverse-System Controller for Variable-Speed Variable-Pitch Wind Generation System</i> Hua Geng, Honglin Zhou, Weisong Zhou and Geng Yang	3311
P522	<i>Equal Load Sharing Modulation Technique for Series-Connected H-Bridge Multilevel Converters</i> Ville Naumanen, Julius Luukko, Toni Itkonen, Olli Pyrhonen and Juha Pyrhonen	3315
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P524	<i>Demonstration of Resonant Inverter Circuit for Electrodeless Fluorescent Lamps Using High-Voltage GaN-HEMT</i> Wataru Saito, Tomokazu Doman, Ichiro Omura, Tomohiro Nitta and Yorito Kakiuchi	3324
P525	<i>A Novel High Reliability Dual-Boost Half-Bridge Reversible PWM Rectifier</i> Jie Chen, Jiawei Chen, Chun-ying Gong, Xin Chen and Fang-hua Zhang	3330
P526	<i>An Inductive Down Converter System-in-Package for Integrated Power Management in Battery-Powered Applications</i> HenkJan Bergveld, Ravi Karadi and Kasia Nowak	3335
P527	<i>A Fault Tolerant Three-Leg Shunt Active Filter Using FPGA for Fast Switch Failure Detection</i> Shahram Karimi, Philippe Poure and Shahrokh Saadate	3342
P528	<i>Self Turn-on Loss of MOSFET as Synchronous Rectifier in DC/DC converter in case of a Low Driving Impedance</i> Katsuaki Murata, Koosuke Harada and Tsuyoshi Harimoto	3348
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P530	<i>Interleaved Buck Converter with Variable Number of Active Phases and a Predictive Current Sharing Scheme</i>	
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P643	<i>Describing Function Analysis of the Electric Nonlinear Model of a SRM Autonomous AC Generator</i>	4051
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Wednesday, June 18, 7:00PM-11:00PM

Special Session: Gala Dinner, Chair: SN Manias and VG Agelidis, Room: Lagoon

Thursday, June 19, 7:00AM-8:00AM

Special Session: Author's Breakfast, Chair: The University of Sydney, Australia V.G. Agelidis, Room: Oceanis Restaurant

Thursday, June 19, 8:30AM-10:10AM

Utility Power Electronics II - Chair: D. M.Vilathgamuwa, Nanyang Technological University, Singapore - Room: Colossos A

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|--------|---|------|
| 8:30AM | <i>Zero Energy Sag Corrector with Reduced Device Count</i>
Anish Prasai and Deepak Divan | 4103 |
| 8:55AM | <i>Regulation of Capacitor Voltages in a Direct-like Cascade AC AC Converter for FACTS Controllers</i>
Diego Soto, Ruben Pena, Patrick W. Wheeler and Tim Green | 4110 |
| 9:20AM | <i>A Flexible High Efficiency VSI-based HVDC Transmission System with Reduced Harmonics</i>
Aziza Benaboud and Alfred Rufer | 4117 |
| 9:45AM | <i>On Distributing Multilevel SHE-PWM Waveforms in HVDC Systems Built With Conventional Three-Phase VSC Modules</i>
Nikolas Flourentzou, Mohamed S. A. Dahidah and Vassilios G. Agelidis | 4124 |

DC-DC Converter Technologies III - Chair: A. Ioinovici, Holon Institute of Technology, Israel - Room: Colossos B

- | | | |
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| 8:30AM | <i>Power Architecture Design with Improved System Power Density, Efficiency and EMI</i>
Fred C. Lee, Shuo Wang, Pengju Kong, Chuanyun Wang and Dianbo Fu | 4131 |
| 8:55AM | <i>High Efficient Galvanically Isolated Resonant Multi-Input DC-DC Converter Topology</i>
Klaus Righbers and Rik W. De Doncker | 4138 |
| 9:20AM | <i>Pursuing High Power-Density and High Efficiency in DC-DC Converters for Automotive Application</i>
Martin Pavlovsky, Yukinori Tsuruta and Atsuo Kawamura | 4142 |
| 9:45AM | <i>DC Rails Side Diode Clamped-Active Edge Resonant PWM DC-DC Converters with HF Link</i>
Toshimitsu Doi, Tetsuya Etoh, Keiki Morimoto, Haruhiko Manabe and Kosaku Yamaguchi | 4149 |

Soft-switching Technologies II - Chair: J. Sabaté, GE-Global Research Center, USA - Room: Colossos C

- | | | |
|--------|--|------|
| 8:30AM | <i>Soft-Switching Interleaved Boost Converter with High Voltage Gain</i>
Ranoyca Silva, Gustavo Henn, Paulo Peixoto Praca, Luiz Henrique Barreto and Demercil de Souza Oliveira Jr. | 4157 |
| 8:55AM | <i>A Switched-Mode Power Supply Using A Boost-Flyback Converter And An Interleaved Soft-Switching Forward Topology</i>
Carlos Alberto Gallo, Fernando Lessa Tofoli, Ernane A. A. Coelho, Luiz Carlos de Freitas and Valdeir J. Farias | 4162 |
| 9:20AM | <i>Soft Switched AC-Link AC/AC and AC/DC Buck-Boost Converter</i>
Hamid A. Toliyat, Anand Balakrishnan, Mahshid Amirabadi and William C. Alexander | 4168 |
| 9:45AM | <i>Soft-Switching of a Hybrid Current Source Converter</i>
Maged Naguib and Luiz Lopes | 4177 |

LED Technologies II - Chair: H. Chung, City University of Hong Kong, Hong Kong - Room: Ialysos

- 8:30AM *Reconfigurable and Fault Tolerant Digital Phase Shifted Modulator for Luminance Control of LED Light Sources*
Montu Doshi and Regan Zane 4185
- 8:55AM *High Dimming Ratio LED Driver with Fast Transient Boost Converter*
Xiaoru Xu and Xiaobo Wu 4192
- 9:20AM *Low Cost Self-Oscillating ZVS-CV Driver for Power LEDs*
Edilson Sa, Fernando Luiz Marcelo Antunes and Arnaldo Jose Perin 4196
- 9:45AM *A High Accuracy Current-Balanced Control Technique for LED Backlight*
Chia-Lin Chiu and Ke-Horng Chen 4202

Integration Technologies II - Chair: B. Ferreira, Delft University of Technology, The Netherlands - Room: Lindos

- 8:30AM *New System Integration Concept for High Power Density Drives*
Jelena Popovic-Gerber, Mark Gerber and Braham Ferreira 4208
- 8:55AM *Modeling and analysis of lateral MOS integrated within power VDMOS for functional integration purposes*
Dac-Binh Nguyen and Jean-Christophe Crebier 4215
- 9:20AM *Planar resonant multi-output transformer for printed circuit board integration*
Eberhard Waffenschmidt and Jacobs Joep 4222
- 9:45AM *Monolithic integration of a 3-level DCM-operated low-floating-capacitor buck converter for DC-DC step-down conversion in standard CMOS*
Gerard Villar and Eduard Alarcon 4229

Sensorless Motor Control IV - Chair: S. Bosga, ABB Corporate Research, Sweden - Room: Marika A

- 8:30AM *Sensorless PMSM Control for H-axis Washing Machine Drive*
Peter Balazovic and Roman Filka 4237
- 8:55AM *Improved Rotor Position Estimation employing Voltage Distortion Compensation for Sensorless PMSM Drives at Low Speed*
Shin-Myung Jung, Jin-Sik Park, Hag-Wone Kim and Myung-Joong Youn 4243
- 9:20AM *Tracking Inherent Saliencies of Standard Induction Machines for Zero Speed Sensorless Control using different Signal Processing Methods*
Thomas M. Wolbank and Mohamed Metwally 4249
- 9:45AM *A new hybrid sensorless method using a back EMF estimator and a current model of Permanent Magnet Synchronous Motor*
Jung Hyo Lee, Jae Sung Yu, Tae Woong Kong, Won Chul Lee and Chung Yuen Won 4256

High Frequency Technologies - Chair: I.J. Pitel, Magna-Power Electronics, USA - Room: Marika D

- 8:30AM *Novel High Frequency Transformer Configurations - Amorphous Metal vs. Ferrites*
Christian P. Dick, Dirk Hirschmann and Rik W. De Doncker 4264
- 8:55AM *Evaluation of Magnetic Materials for Very High Frequency Power Applications*
Yehui Han, Grace Cheung, An Li, Charles R. Sullivan and David J. Perreault 4270
- 9:20AM *An Improved Model for the High Frequency Resistance of Non-layered Windings*
Georgios Dimitrakakis, Evangelos Rikos and Emmanuel Tatakis 4277
- 9:45AM *Design of Naturally Cooled High Frequency Integrated Magnetic Component*
Aiman Kerim, Jean-Paul Ferrieux, James Roudet, Gerard Meunier and Stephane Catellani 4283

Thursday, June 19, 10:30AM-12:10PM

Multilevel Inverter Technologies IV - Chair: J.W. Kolar, ETH Zurich, Switzerland - Room: Colossos A

- 10:30AM *Power Losses Analysis and Cooling System Design of Three Topologies of Multilevel Inverters*
Diorge Alex Bao Zambra, Cassiano Rech, Flavio Alessandro Serrao Goncalves and Jose Renes Pinheiro 4290
- 10:55AM *Comparison of State of the Art Multilevel Inverters*
Panagiotis Panagis, Fotis Stergiopoulos, Pantelis Marambeas and Stefanos Manias 4296
- 11:20AM *Real-Time Selective Harmonic Minimization in Cascaded Multilevel Inverters with Varying DC Sources*
Joao Onofre Pinto, Faete Filho, Tiago Mateus, Burak Ozpineci, Leon Tolbert and Helder Maia 4302
- 11:45AM *Comparison of Losses in Multilevel Converters for Aerospace Applications*
Konstantinos D Papastergiou, Patrick W. Wheeler and Jon C. Clare 4307

Contactless Power Transfer Technologies - Chair: R. Hui, City University of Hong-Kong, Hong-Kong - Room: Colossos B

- 10:30AM *Design of a Contactless Rotary Energy Transmission for an Industrial Application*
Dirk Hirschmann, Christian P. Dick, Sebastian A. Richter and Rik W. De Doncker 4314
- 10:55AM *A High Power Coaxial Inductive Power Transfer Pickup*
Stefan Raabe, John Boys and Grant Covic 4320
- 11:20AM *Contactless energy transmission systems with improved coil positioning flexibility for high power applications*
Daniel Kuerschner and Christian Rathge 4326
- 11:45AM *Study of Detachable Transformer using FEM on Contactless Power Transmission System*
Fang Zhuo, Xiang Shen, Yanhui Qiu, Long-hui Wu and Zhao-an Wang 4333

Semiconductor Device Technologies III - Chair: D.J. Perreault, Massachusetts Institute of Technology, USA - Room: Colossos C

- 10:30AM *Modular Regenerative Switching Cell with integrated Voltage-Clamp*
Till Boller, Ralph Kennel and Guenter Schmitt 4338
- 10:55AM *Analysis of IGBT current clamp design for single phase H-bridge converters*
Ion Etxeberria-Otadui, Jon San-Sebastian, Unai Viscarret, Igor Perez-de-Arenaza and Amaia Lopez-de-Heredia 4343
- 11:20AM *Quasi-clamped Inductive Switching Behaviour of Power Mosfets*
Sanjay Havanur 4349
- 11:45AM *Experimental Investigations of Trench Field Stop IGBT under Repetitive Short-Circuits Operations*
Mohand Arab, Stephane Lefebvre, Zoubir Khatir and Serge Bontemps 4355

Sliding Mode Control - Chair: G. Papafotiou, ABB Corporate Research Baden, Switzerland - Room: lalysos

- 10:30AM *Sliding Mode Control of Three-Phase Four-Leg Shunt Active Power Filter*
Nassar Mendalek, Kamal Al-Haddad, Hadi Kanaan and Georges Hassoun 4362
- 10:55AM *A new Sliding Mode Rotor Flux and Torque Control for Induction Motors with Adaptive Switching Table*
Niels Weitendorf and Steffen Bernet 4368
- 11:20AM *A Sliding Mode Control Technique for a Modular Transformerless HVDC Conversion System*
Konstantinos Pavlou, Athanasios Kaletsanos and Stefanos Manias 4375
- 11:45AM *Battery Health Determination by Subspace Parameter Estimation and Sliding Mode Control for an All-Electric Personal Rapid Transit Vehicle - The ULTra*
Chris Gould, Chris Bingham, Dave Stone and Paul Bentley 4381

EMI Technologies II - Chair: D. Maksimovic, University of Colorado at Boulder, USA - Room: Lindos

- 10:30AM *Utilization of a Behavioural Model of Motor Drive Systems to Predict the Conducted Emissions*
Maxime Moreau, Nadir Idir, Philippe Le moigne and Jean-jacques Franchaud 4387
- 10:55AM *EMI Noise Prediction for Electronic Ballasts*
Florian Giezendanner, Juergen Biela, Johann W. Kolar and Stefan Zudrell-Koch 4392
- 11:20AM *An Experimental Study and Comparison of Common Mode and Differential Mode Noise Compensation Characteristic for Active EMI Filter*
Chen Wenjie, Yang Xu and Wang Zhaoan 4399
- 11:45AM *A New Approach to Solve EMI Related Problems When Designing Reliable High Power Converters using Precomputed electromagnetic models*
Handy Fortin Blanchette and Kamal Al-Haddad 4405

Inverter Technologies - Chair: A. Coccia, ABB Corporate research-Baden, Switzerland - Room: Marika A

- 10:30AM *High-Frequency Transformer-Link Three-Level Inverter Drive with Common-Mode Voltage Elimination*
Kaushik Basu, Amod Umarikar, Krushna K. Mohapatra and Ned Mohan 4413
- 10:55AM *Dead-time Compensation on High-Fidelity Voltage Fed Inverter*
Juan Sabate, Luis J Garces, Paul M Szczesny and Wesley Skeffington 4419
- 11:20AM *A Low-cost Single-stage Isolated Differential Cuk Inverter for Fuel-cell Application*
Sudip Mazumder 4426
- 11:45AM *A Control Method for Voltage Source Inverter Without Dc Link Capacitor*
Milton Oliveira, Jonas Gazoli, Alfeu Filho and Ernesto Ruppert Filho 4432

PFC Technologies III - Chair: J. Liu, Xi'an Jiaotong University, P.R. China - Room: Marika D

- 10:30AM *Control of PFC Converter with Inverter Excited Induction Generator for Advanced Wind Power Generation System*
Noriyuki Kimura, Toshimitsu Morizane, Katsunori Taniguchi and Tomoyuki Hamada 4439
- 10:55AM *NIOS II Processor Implemented in FPGA: An Application on Control of a PFC Converter*
Samir Ahmad Mussa, Marcio Silveira Ortmann and Andre Luis Pesco Alcalde 4446
- 11:20AM *General Control for Boost PFC Converters from a Sliding Mode Viewpoint*
Grace Chu, Siew-Chong Tan, Chi K. Tse and Siu-Chung Wong 4452
- 11:45AM *A Single-Phase Boost PFC Voltage-Doubler Self-Controlled Using FPGA*
Samir Ahmad Mussa and Deivis Borgonovo 4457

Thursday, June 19, 12:15PM-1:45PM

Special Session: Award Luncheon, Chair: The University of Sydney, Australia V.G. Agelidis, Room: Marika B &

Thursday, June 19, 2:00PM-3:40PM

Space Vector Modulation II - Chair: M. Marchesoni, University of Genova, Italy - Room: Colossos A

- 2:00PM *Space Vector Modulation for Mutually Commutated Isolated Three-Phase Converter Systems*
Stephan Meier, Maren Kuschke and Staffan Norrga 4465
- 2:25PM *A generalized algorithm of n-level space vector PWM suitable for hardware realization*
Haibing Hu, Wenxi Yao, Yan Xing and Zhengyu Lu 4472
- 2:50PM *Pulsewidth Modulations for the Comprehensive Capacitor Voltage Balance of n-Level Diode-Clamped Converters*
Sergio Busquets-Monge, Salvador Alepuz, Joan Rocabert and Josep Bordonau 4479

3:15PM *Space Vector Modulation Control of a Seven-Level Hybrid Converter*
Peter Barbosa, Maryam Saeedifard, Peter K. Steimer and Christoph Haederli 4487

Rectifier Technologies III - Chair: J.R. Espinoza, Universidad de Concepcion, Chile - Room: Colossos B

2:00PM *A Full Frequency Range Average Model for Vienna-Type Rectifiers*
Rolando P. Burgos, Rixin Lai, Sebastian Rosado, Fred Wang and Dushan Boroyevich 4495

2:25PM *Hybrid Control of Three-Phase Current Source Rectifiers*
Claudio O. Ramirez, Jose R. Espinoza, Johan I. Guzman, Jose R. Rodriguez and Geza Joos 4503

2:50PM *On the Efficiency and Reliability of High Current Rectifiers*
Pablo Aqueveque, Eduardo P. Wiechmann and Rolando P. Burgos 4509

3:15PM *Input Harmonic Estimation and Control Methods in Active Rectifiers*
Kevin Lee, Vladimir Blasko, Thomas Jahns and Thomas Lipo 4517

Wind Energy Conversion Technologies III - Chair: D. Divan, Georgia Institute of Technology, USA Room: Colossos C

2:00PM *Control Design and Experimental Verification of a Series Compensated 50 kW Permanent Magnet Wind Power Generator*
Jan Wiik, Arkadiusz Kulka, Takanori Isobe, Marta Molinas, Kazuhiro Usuki, Taku Takaku, Tore Undeland and Ryuichi Shimada 4525

2:25PM *6 MVA Five-Level Hybrid Converter for Windpower*
Manfred Winkelkemper, Franz Wildner and Peter K. Steimer 4532

2:50PM *Comparative Evaluation of Reactive Power Compensation Methods for a Stand-Alone Wind Energy Conversion System*
Mohab Elnashar, Mehrdad Kazerani, Ramadan El Shatshat and Magdy Salama 4539

3:15PM *Z-source converter based grid-interface for variable-speed permanent magnet wind turbine generators*
Don Mahinda Vilathgamuwa, Xiaoyu Wang and Chandana Jayampathi Gajanayake 4545

Grid-Interacting Technologies - Chair: L. Lopes, Concordia University, Canada - Room: lalysos

2:00PM *Dual Reference Frame Scheme for Distributed Generation Grid-connected Inverter Under Unbalanced Grid Voltage Conditions*
Xianwen Song, Yue Wang and Zhao-an Wang 4552

2:25PM *Correlation Technique Investigation for Islanding Detection of Inverter Based Distributed Generation*
Mamadou Lamine Doumbia, Kodjo Agbossou and Tran Khanh Viet Dung 4556

2:50PM *Digital Boundary Controller for Single-phase Grid-connected CSI*
River T. H. Li, S. H. Henry Chung and W. H. Lau 4562

3:15PM *Accurate and Less-Disturbing Active Anti-Islanding Method Based on PLL for Grid-Connected PV Inverters*
Mihai Ciobotaru, Vassilios G. Agelidis and Remus Teodorescu 4569

Digital Control II - Chair: P. Mattavelli, University of Padova, Italy - Room: Lindos

2:00PM *Analysis of a High-Bandwidth Event-Based Digital Controller for DC-DC Converters*
Luca Corradini, Stefano Saggini and Paolo Mattavelli 4578

2:25PM *Digital Control Law Design using a Novel Load Current Estimator Principle for Improved Transient Response*
Simon Effler, Anthony Kelly, Mark Halton, Tilmann Krueger and Karl Rinne 4585

2:50PM *Multivariable Adaptive Efficiency Optimization Digital Controller*
Wisam Al-Hoor, Jaber Abu-Qahouq, Lilly Huang, Chris Iannello and Wasfy Mikhael 4590

3:15PM *Analysis and Experimental Results of an Adaptive-Step-Size Switching-Frequency Auto-Tuning Digital Controller*
Jaber Abu Qahouq, Wisam Al-Hoor, Wasfy Mikhael, Lilly Huang and Issa Batarseh 4597

Modeling II - Chair: R. Zane, University of Colorado at Boulder, USA - Room: Marika A

- 2:00PM *Multifrequency modeling of a multiple-input dc-dc converter*
Yongxiang Chen, Ali Davoudi and Patrick Chapman 4604
- 2:25PM *Extraction of Dynamic Low-Order Models for Multiwinding Magnetic Devices Based on Finite Element Analysis*
Liyang Qu and Patrick Chapman 4611
- 2:50PM *Estimation of Parameterized Nonlinear Loads: A Time-Domain Approach*
Raphael Souza, Daniel Coutinho, Paulo Ribeiro and Fernando Dos Reis 4617
- 3:15PM *Parameters evolution of an ultracapacitor impedance model with ageing during power cycling tests*
El Hassane El Brouji, Jean-Michel Vinassa, Olivier Briat, Walid Lajnef and Nicolas Bertrand 4624

Active Filtering III - Chair: L.A. Moran, University of Concepcion, Chile - Room: Marika D

- 2:00PM *An Active Filter Used for Harmonic Compensation and power factor correction : a control technique*
Diego Iannuzzi, Luigi Piegari and Pietro Tricoli 4631
- 2:25PM *Selective Active Filtering for Four-Wire Loads: Control and Balance of Split Capacitor Voltages*
Gonzalo Casaravilla, Gabriel Eirea, Gabriel Barbat, Jose Inda and Fernando Chiaramello 4636
- 2:50PM *An Independent Control Approach for Three-Phase Four-Wire Shunt Active Filter Based on Three H-Bridge Topology under Unbalanced Load Conditions*
Vinod Khadkikar and Ambrish Chandra 4643
- 3:15PM *A modified repetitive-based controller for an active filter to compensate harmonics 6l+/-1*
Raymundo E. Torres-Olguin, Gerardo Escobar, Andres A. Valdez and Perla G. Hernandez-Briones 4650

Thursday, June 19, 4:00PM-5:40PM**Motor Drive Technologies III - Chair: C. Sourkounis, Ruhr-Universitat Bochum, Germany - Room: Colossos A**

- 4:00PM *A Novel Converter Topology for Permanent Magnet Drive Systems*
Philip Brockerhoff, Matthias Ebert and Rainer Marquardt 4657
- 4:25PM *Switching Loss Analysis of Modulation Methods Used in Cascade H Bridge Multilevel Converters*
Samir Kouro, Marcelo Perez, Hernan Robles and Jose R. Rodriguez 4662
- 4:50PM *Modular Current Source AC-Drive: a Simple Control Scheme*
Johan I. Guzman, Jose R. Espinoza, Geza Joos, Pedro E. Melin and Ernesto A. Araya 4669
- 5:15PM *Input Power Minimization of an Induction Motor Operating from an Electronic Drive Under Ripple Correlation Control*
Ali Bazzi and Philip Krein 4675

Battery Technologies - Chair: R. Hui, City University of Hong-Kong, Hong-Kong - Room: Colossos B

- 4:00PM *Investigation on Intermittent Discharging for Lead-Acid Batteries*
Kong-Soon Ng, Chin-Sien Moo, Yu-Chao Lin and Yao-Ching Hsieh 4683
- 4:25PM *A Universal Battery Charging Algorithm for Ni-Cd, Ni-MH, SLA, and Li-Ion for Wide Range Voltage in Portable Applications*
Sung-Yeul Park, Hide Miwa, Brian Clark, Danielle Ditzler and Greg Malone 4689
- 4:50PM *A Three-Port Bidirectional Modular Circuit for Li-Ion Battery Strings Charge/Discharge Equalization Applications*
Xiongfei Wang, Shiyan Yang, Nam-Ju Park, Kui-Jun Lee and Dong-Seok Hyun 4695
- 5:15PM *Low Cost Universal Battery Charger for Wide Range Input Voltage and Wide Range Output Voltage in Portable Applications*
Hidekazu Miwa, Sung-Yeul Park, Brian Clark, Danielle Ditzler and Greg Malone 4699

PLL Technologies - Chair: P. Mattavelli, University of Padova, Italy - Room: Colossos C

- 4:00PM *Single-Phase PLL Structure Using Modified p-q Theory for Utility Connected Systems*
Sergio Silva, Rhodolfo Novochadlo and Rodrigo Modesto 4706
- 4:25PM *A Fast and Robust PLL of MCFC PCS under Unbalanced Grid Voltages*
Yun-Hyun Kim, Kwang-Seob Kim, Byung-Ki Kwon and Chang-Ho Choi 4712
- 4:50PM *A Novel Current Control System Using PLL circuit for Interior Permanent Magnet Synchronous Generator*
Katsumi Nishida, Tarek Ahmed and Mutsuo Nakaoka 4717
- 5:15PM *Fixed reference frame phase-locked loop (FRF-PLL) for unbalanced line voltage conditions*
Misael F. Martinez-Montejano, Gerardo Escobar and Raymundo E. Torres-Olguin 4723

Direct Torque Control - Chair: T. Jahns, University of Wisconsin, USA - Room: lalysos

- 4:00PM *Direct Torque Control of Four-Switch Brushless DC Motor with Non-sinusoidal Back-EMF*
Salih Baris Ozturk, William C. Alexander and Hamid A. Toliyat 4730
- 4:25PM *Performance Evaluation of Model Predictive Direct Torque Control*
Jonas Kley, Georgios Papafotiou, Kostas Papadopoulos, Patrick Bohren and Manfred Morari 4737
- 4:50PM *Torque Ripple Reduction in a PMSM driven by Direct Torque Control*
Luis Romeral, Albert Fabrega, Jordi Cusido, Antoni Garcia and Juan Antonio Ortega 4745
- 5:15PM *A Novel Direct Torque Control for Electrically Excited Synchronous Motor Drives with High Power Factor and Low Ripples in Flux and Torque*
Zhou Yangzhong and Hu Yuwen 4752

Silicon Carbide Technologies - Chair: H. Zelaya de la Parra, ABB Corporate research, Sweden - Room: Lindos

- 4:00PM *Modeling of High Voltage 4H-SiC JFETs and MOSFETs for Power Electronics Applications*
Yi Wang, Callaway Cass, Ke Tang, Harsh Naik and Paul Chow 4758
- 4:25PM *An Analysis of Paralleled SiC Bipolar Devices*
Erik Johnson, Osama Saadeh, Juan Balda, Alan Mantooh and Simon Ang 4762
- 4:50PM *Power Factor Correction using an Enhancement-mode SiC JFET*
Robin Kelley, Michael Mazzola, Shane Morrison, Igor Sankin and David Sheridan 4766
- 5:15PM *Thermal Network Component Models for 10 kV SiC Power Module Packages*
Jose M. Ortiz-Rodriguez, Madelaine Hernandez-Mora, Tam Duong, Scott G. Leslie and Allen R. Hefner 4770

Current Sensing Technologies - Chair: D.D.C. Lu, The University of Sydney, Australia - Room: Marika A

- 4:00PM *Magnetically-Coupled Current Sensors Using CMOS Split-Drain Transistors*
Fernando Castaldo, Wilson Mognon and Carlos dos Reis 4777
- 4:25PM *Improving GMR Current Sensor Measurements through Hysteresis Modeling*
Istvan Jedlicska, Roland Weiss and Robert Weigel 4781
- 4:50PM *Precise Current Sensor for Power Electronic Devices*
Florian Richter and Constantinos Dr. Sourkounis 4786
- 5:15PM *Theoretical and Practical Analysis of a Current Sensing Principle that Exploits the Resistance of the Copper Trace*
Silvio Ziegler, Lawrence Borle, Robert Woodward and Herbert Iu 4790

Multilevel Inverter Technologies V - Chair: L.M. Tolbert, The University of Tennessee, USA - Room: Marika D

- 4:00PM *A Transformerless Battery Energy Storage System Based on a Multilevel Cascade PWM Converter*
Laxman Maharjan, Shigenori Inoue, Hirofumi Akagi and Jun Asakura 4798

4:25PM	<i>An Optimized Cascaded Multilevel Static Synchronous Compensator for Medium Voltage Distribution Systems</i>	
	Lucas Encarnacao, Mauricio Aredes and Emanuel van Emmerik	4805
4:50PM	<i>Control Strategy for Cascade Multilevel Inverter based STATCOM with Optimal Combination Modulation</i>	
	Yu Liu, Subhashish Bhattacharya, Wenchao Song and Alex Q. Huang	4812
5:15PM	<i>Comparison of DC-bus voltage balancing strategies for three-phase DSTATCOM based on Cascaded H-Bridge Multilevel Converter</i>	
	Jon Andoni Barrena, Luis Marroyo, Miguel Angel Rodriguez and Jose Ramon Torrealday	4819