2015 IEEE 11th International Conference on Power Electronics and Drive Systems

(PEDS 2015)

Sydney, Australia 9-12 June 2015

Pages 1-608



IEEE Catalog Number: ISBN:

CFP15PEL-POD 978-1-4799-4401-9

Technical Paper and Presentation Schedule

Plenary Session

Date/Time: Wednesday, 10 June 2015/09:30 – 12:30 hrs

Venue: Stateroom @ Level 2

Session Chair: Sanjib K. Panda, National University of Singapore, Singapore

330 Gallium Nitride Power Electronic Devices and Circuits: A Review....1

Graham E. Town

Department of Engineering, Macquarie University, Australia

67 Analysis and Simulation of the Proactive Hybrid Circuit Breaker....4

Oliver Cwikowski, Mike Barnes, Roger Shuttleworth and Bin Chang The University of Manchester, UK

An optimization-based control strategy for modular multilevel converters: design and implementation....12

Nikola Stanković (1), Gilbert Bergna(2), Amir Arzandé (1), Erik Berne(3), Philippe Egrot(3), Jean-Claude Vannier(1)

(1) GeePs Laboratory, CentraleSupélec, France

(2)SINTEF Energy Research, Trondheim, Norway

(3)Laboratory of Electrical Equipment, EDF R&D, France

228 Photovoltaic Based Active Generator: Energy Control System Using Stateflow Analysis....18

Aimie Nazmin Azmi (1, 2), Mohan Lal Kolhe (1),

(1) Faculty of Engineering & Science, University of Agder, Norway

(2) Fakulti Kejuruteraan Elektrik, Universiti Teknikal Malaysia Melaka, Malaysia

Session APEHIA-I: Applications of Power Electronics in Home Appliance, Industry, Aerospace & Automotive Systems I

Date/Time: Wednesday, 10 June 2015/13:30 – 15:00 hrs

Venue: Room 2 @ Level 2

Session Chair: Don Mahinda Vilathgamuwa, Queensland University of Technology, Australia

29 Model Predictive Control of Six-Phase Variable Frequency Electrically Excited Starter Generator for More Electric Aircraft....23

Mohammed Alnajjar and Dieter Gerling

Universität der Bundeswehr München, Germany

192 Electrolytic Capacitor-less Single-stage Boost Three-phase Inverter for Variable-speed AC motor System....29

Yufei Zhou(1), Feng Hong(1), Chenghua Wang(1), Wenxin Huang(2)

(1) Key Laboratory of Radar Imaging and Microwave Photonics, Ministry of Education,

(2) College of Automation Engineering, Nanjing University of Aeronautics and Astronautics, China

220 An Energy Efficient 48Vdc Bipolar ELVDC LED Lighting System in a High-Rise Building....35

S. H. Chew (1), K. J. Tseng (1, 2), Hoan Thong Nguyen (2)

(1) School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore

258 Proportional-Resonant Controlled NPC Converter for More-Electric-Aircraft Starter-Generator....41

Hossein Dehghani Tafti(1), Ali I. Maswood(2), Ziyou Lim(3), Gabriel H. P. Ooi(4) and Pinkymol Harikrishna Raj(5)

(1, 2, 4, 5)School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore

(3) Energy Research Institute, Interdisciplinary Graduate School, Nanyang Technological University, Singapore

418 Research on Phase-shifted Full-bridge Converter Applied in the Anode-supply of Hall Electric Propulsion....47

Xiaobin He, Yu Dong, Chong Lu, Tao Liu, Ke Gao and Shichao Liu Shanghai Institute of Space Power-Sources, Shanghai, China

Session DGSG-I: Distributed Generation and Smart-Grid I

Date/Time: Wednesday, 10 June 2015/13:30 – 15:00 hrs

Venue: Room 5+6 @ Level 2

Session Chair: Mohan Lal Kolhe, University of Agder, Norway

26 Circuit Analysis Approach for determining Voltage Stability Index....52

Syed Ali Abbas Kazmi (1), Syed Faraz Hasan (2) and Dong Ryeol Shin (1) (1) College of Information and Communication Engineering Sungkyunkwan University, South Korea

(2) School of Engineering and Advanced Technology Massey University, New Zealand

202 Dynamic Power Demand Allocation and Battery Energy Compensation Control Of a Mobile Microgrid System....56

J. Jiang(1), M.L. Aung(1), H. Wang(1), H. Jiang(1), D. Y. C. Chan(2), R. W. O. Kwok(3) (1)Singapore Polytechnic

(2) University of Melbourne

(3)ST Kinetics Ltd

Emulation of Synchronous Machine for Frequency Stability Improvement in Microgrids....59

*Pablo F. Frack, Rik W. De Doncker, **Pedro E. Mercado, Marcelo G. Molina

*Institute for Power Generation and Storage Systems E.ON ERC, RWTH Aachen University, Germany

**Instituto de Energa Elctrica Universidad Nacional de San Juan, Argentina

326 Impact of Grid Background Harmonics on Inverter-Based Islanding Detection Algorithms....67

M. A. Elgendy, D. J. Atkinson, M. Armstrong and S. M. Gadoue School of Electrical and Electronic Engineering - Newcastle University, Newcastle Upon Tyne, UK

383 Overload Management of Autonomous Microgrids....73

Ehsan Pashajavid, Farhad Shahnia, and Arindam Ghosh Department of Electrical and Computer Engineering, Curtin University, Australia

Session PEET-I: Power Electronic Emerging Technologies I

Date/Time: Wednesday, 10 June 2015/13:30 – 15:00 hrs

Venue: Room 3 @ Level 2

Session Chair: Dylan Lu, University of Sydney, Australia

218 An Isolated DC Power Supply Free Compact GaN Inverter Module....84

Yasufumi Kawai, Shuichi Nagai, Osamu Tabata, Hideaki Fujiwara, Noboru Negoro, Hiroaki Ueno, Masahiro Ishida, and Nobuyuki Otsuka Automotive & Industrial Systems Company, Panasonic Corporation, 3-1-1 Yagumo-nakamachi, Moriguchi City, JAPAN

288 Loss Estimation and Validation of the SCALDO Implementation....89

Kosala Gunawardane(1), Nihal Kularatna(2), D. Alistair Steyn-Ross(2) School of Engineering, Auckland University of Technology, Auckland, New Zealand(1) School of Engineering, The University of Waikato, Hamilton, New Zealand(2)

A Modified Cascaded Multilevel Converter Topology for High Power Bidirectional Inductive Power Transfer Systems With The Reduction Of Switching Devices and Power Losses....93

Bac Xuan Nguyen (1, 3), Don Mahinda Vilathgamuwa (2), Gilbert Foo (1), Peng Wang (1, 3), Andrew Ong (1)

- (1) School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore
- (2) School of Electrical Engineering and Computer Science, Queensland University of Technology, Brisbane, Australia
- (3) Energy Research Institute @ NTU, Nanyang Technological University, Singapore

376 A Simple Open-Circuit Fault Detection Method for a Fault-Tolerant DC/DC Converter....98

John Long Soon and Dylan Dah-Chuan Lu School of Electrical and information Engineerin, The University of Sydney, Australia

Session PSPC-I: Power Semiconductors, Power Integrated Circuits and Passive Components I

Date/Time: Wednesday, 10 June 2015/13:30 – 15:00 hrs

Venue: Room 4 @ Level 2

Session Chair: Yen Kheng Tan, Singapore University of Technology and Design, Singapore

173 Wide-Supply-Voltage-Range Buck-Boost Single-Inductor Dual-Output DC-DC Converter with Pulse-Frequency-Modulation Control....104

Liang-Hong Lin, Hung-Hsien Wu and Chia-Ling Wei Department of Electrical Engineering National Cheng Kung University, Taiwan

247 A New Enhanced Noise Tolerance Technique for a 600V High Voltage IC....108

Masaharu Yamaji(1), Akihiro Jonishi(1), Takahide Tanaka(1), Hitoshi Sumida(1) and Yoshio Hashimoto(2) (1)Fuji Electric Co. Ltd. (2)Shinshu University.

A Systematic Comparison of Various Thermal Interface Materials for Applications with Surface-Mounted (DirectFETTM) MOSFETs....112

Georges Engelmann, Tizian Senoner, Hauke van Hoek, Rik W. De Doncker Institute for Power Electronics and Electrical Drives, RWTH Aachen University Germany

387 Partial Discharge Inception Voltage of Pressurized Gas Insulation Encapsulation Used for High-Temperature and High-Voltage Power Module....118

Hiroshi Mitsudome, Keisuke Koyanagi, Akihiro Imakiire, Masahiro Kozako, Masayuki Hikita and Zarel Valdez-Nava, Sorin Dinculescu, Thierry Lebey Department of Electrical and Electronics Engineering Kyushu Institute of Technolog, Japan Universite de Toulouse; UPS, INPT; LAPLACE CNRS; LAPLACE, France

446 A New Super-Junction VDMOS Realizing Fast Reverse Recovery....122

Bo Yi, Xinjiang Lyu, Xingbi Chen State Key Laboratory of Electronic Thin Films and Integrated Devices, University of Electronic Science and Technology of China, UESTC Chengdu, China

Session PS-I: Poster Session I

Date/Time: Wednesday, 10 June 2015/16:00 – 17:00 hrs

Venue: Poster display area @ Level 4

Session Chair: Yung C. Liang, National University of Singapore, Singapore

20 PMU based Islanding Detection Method for Large Photovoltaic Power Station....126 Qian Cao, Furong Liu, Guorong Zhu, Wei Chen Automation, Wuhan University of Technology, China

27 Modelling of LCRC Adaptive Impedance Matching Circuit in Narrowband Power Line Communication....132

Pin Rui Chin, Arthur Kok Ming Wong, Kiing Ing Wong and Nader Barsoum Department of Electrical and Computer Engineering Curtin University Sarawak, Malaysia Department of Electrical and Electronic Engineering University Malaysia Sabah

45 A Simple Control Scheme for a Single Stage Flyback with Low Harmonic Distortion....136 Sen-Tung Wu, Jian-Min Wang, Pang-Jung Liu National Taiwan University of Science and Technology, Taiwan National Formosa University, Taiwan Department of Electrical Engineering, National Taipei University of Technology, Taiwan

53 Matrix Converter Control Study of Doubly-fed Induction Wind Turbine Generator System....139

Xinyan Zhang (1), Weiqing Wang (1), Dagui Liu (1), Haiyun Wang (1), Xuan Cao (2), Shan He (1)

- (1) Electrical Engineering School of Xinjiang University of China
- (2) Electronic Information Schoool of China Civil Aviation University, China

57 Development of Mixed Signal ESC System on chip....143

Jaehyun Park, Kyeongchan Ra, Younggwon Lee, Sungjoon Park Hyundai MOBIS R&D Center

92 Cogging Torque Estimation of IPMSMs with Concentrated Winding Based on Spatial Distribution in Inductance....148

Takumi Kakimoto, Masaru Hasegawa and Atsushi Matsumoto Dept. of Electrical Chubu University, Japan

101 Model Characterization and Automatic Parameters Testing of High Frequency Transformers....158

Yuang-Shung Lee and Tzu-Heng Shao

3D Temperature Field Calculation of Mine-used Flame-proof Integrative Variablespeed System....164

Jie DING (1, 2), Ping ZHANG (1), Jianghong LI (2)

- (1) College of Civil Engineering and Mechanics, Xiangtan University, P. R. China
- (2) CSR Research of Electrical Technology & Material Engineering, P.R. China

108 Simulation and Optimization of an Eddy Current Position Sensor....171

Josef Passenbrunner*, Gerald Jungmayr*, Martin Panholzer†, Siegfried Silber‡ and Wolfgang Amrhein*

*Institute for Electrical Drives and Power Electronics, Johannes Kepler University, Austria †Center for Surface- and Nanoanalytics, Johannes Kepler University, Austria ‡Linz Center of Mechatronics GmbH, Austria

117 Hardware-in-loop Simulation and Application for High-power AC-DC-AC Rolling Mill Driving System....177

Yu Zhang, Juan Tan, Jian Wang, Jianghong Li CSR Zhuzhou Institute Co., Ltd., P.R.China

Low Frequency Noise Measurements as a Characterization Tool for Reliability Assessment in AlGaN/GaN High-Electron-Mobility Transistors (HEMTs)....181

Miao Zhao, Xinyu Liu, Ke Wei, Zhi Ji

Microwave devices and integrated circuits department, Key Laboratory of Microelectronics Device & Integrated Technology, Institute of Microelectronics of the Chinese Academy of Sciences

Wide Range Dimmable LED Lighting System with Fault Compensation Protocol....184

Zhaocong Ang and Yung C. Liang

Department of Electrical and Computer Engineering, National University of Singapore, Singapore

National University of Singapore (Suzhou) Research Institute, China

Development of a Switch Mode Assisted Linear Amplifier for Use as a High Fidelity Voltage Source....188

Shawn D. Nielsen, Geoffrey R. Walker and Michael L. Bailey Queensland University of Technology

157 AlGaN/AlN/GaN MOS-HEMTs with Al₂O₃ Gate Dielectric Formed by Using Ozone Water Oxidation Technique....194

C. S. Lee(1), H. Y. Liu(1), W. C. Hsu(2), T. T. Wu(1), H. S. Huang(1), S. F. Chen(1), Y. C. Yang(1), B. C. Chiang(1), and H. C. Chang(1)

- (1) Department of Electronic Engineering, Feng Chia University, Taiwan (2) Institute of Microelectronics, Department of Electrical Engineering, National Cheng-Kung University, Tainan
- 165 Improvement of Power Density Spoke Type Permanent Magnet Generator....197
 R. N. Firdaus (1, 2), R. Suhairi (1, 2, 3), S. Farina (1, 2), K. A. Karim (1, 2), Z. Ibrahim (1, 2)
 (1)Faculty of Electrical Engineering, Universiti Teknikal Malaysia Melaka, Malaysia
 (2)Electrical Machine Design, Power Electronics and Drives Research Group, CeRIA,
 UTeM

(3)Electrical Technology Section, Universiti Kuala Lumpur-British Malaysian Institute, Malaysia

170 Soft Switching Hybrid Converter with Low Circulating Current....202

Bor-Ren Lin, Hui-Ru Chen and Yu-Bin Nian Department of Electrical Engineering, National Yunlin University of Science and Technology, Taiwan

181 Magnitude Detection and Phase Synchronization of Unbalanced and Distorted Grid Voltage with Novel Extended PLL Loop Filter....208

Mian Wang, Dongchang Qu, Zhaohui Sun and Guozhu Chen College of Electrical Engineering, Zhejiang University, Hangzhou, China

An Improved DC-Bus Signaling Control Method in A Distributed Nanogrid Interfacing Modular Converters....214

Dongchang Qu, Mian Wang, Zhaohui Sun and Guozhu Chen College of Electrical Engineering, Zhejiang University, China

186 An Improved Nearest-Level-Modulation of Modular Multilevel Converter - TATCOM....219

Wenjian Zhao, Kun Yang and Guozhu Chen College of Electrical Engineering, Zhejiang University, China

190 FPGA Control and Implementation of a Multiphase-Interleaved PWM Inverter for a Segmented PMSM....224

Hsung-Hao Hsu and Ying-Yu Tzou Institute of Electrical and Control Engineering National Chiao Tung Univ. Taiwan

191 Modeling of Five-Phase Dual Stator-Winding Induction Generator with Third Harmonic Injection....231

Haozhe Liu, Feifei Bu, Wenxin Huang, Haijun Xu, Feng Hong and Yufei Zhou Nanjing University of Aeronautics and Astronautics

196 Flux Weakening Control of IPMSM Used for xEV Traction....235

Qian Weizhe and Chen Qi Infineon Integrated Circuit (Beijing) Co. Ltd. Infineon Technologies Australia Pty. Ltd.

287 Control of DC-DC Converter in Photovoltaic System using Time-Delay Estimation....245

Jinwook Kim, Chulsang Hawng, Gilsung Byeon, Gyeong-Hun Kim and Engsang Kim Korea Electrotechnology Research Institute (KERI), South Korea

Session PS-II: Poster Session II

Date/Time: Wednesday, 10 June 2015/17:00 – 18:00 hrs

Venue: Poster display area @ Level 4

Session Chair: Yung C. Liang, National University of Singapore, Singapore

211 Investigation on Transmission Efficiency for Magnetic Materials in a Wireless Power Transfer System....249

Huiqing Wen and Chi Zhang

Department of Electric and Electrical Engineering, Xi'an Jiaotong-Liverpool University, Suzhou, China

214 Performance Comparison of LVRT Techniques for DFIG Wind Turbine Under Asymmetrical Voltage Sags....254

Aimeng Wang, Wenyuan Xi (1) and Yazan Alsmadi (2)

(1) State Key Laboratory of Alternate Electrical Power, System with Renewable Energy Sources, North China Electric Power University, Baoding, China

(2) Electrical and Computer Engineering Department, The Ohio State University, Columbus

Novel Parallel ZVS Converters with Shared Power Switches for Medium Power Applications....259

Bor-Ren Lin, Sheng-Zhi Zhang and Chung-Wei Chu Department of Electrical Engineering, National Yunlin University of Science and Technology, Taiwan

Force Control for the Fingers of the Piano Playing Robot— A Gain Switched Approach....265

Yen-Fang Li and Chun-Wei Huang

Dept. of Elec. Eng., Ming-Hsin University of Science and Technology, Taiwan

The Study of The Output Voltage Characteristics Using Delta-Sigma Modulation Full Bridge Inverter with Sampling Interval Non-Uniformity....271

Atsushi Hirota (1), Saad Mekhilef (2) and Mutsuo Nakaoka (3)

- (1) National Institute of Technology, Akashi College, Japan
- (2) University of Malaya, Kuala Lumpur, Malaysia
- (3) The Electric Energy Saving Research Center, University of Malaya / Kyungnam University, Kuala Lumpur, Malaysia / Masan, Korea-South

253 Analysis of Induction Motor Drives under Sensor Faults with Mine Hoist Load Diagram....274

Thanga Raj Chelliah, Arun Dominic and Radha Thangaraj Department of Water Resources Development and Management, Indian Institute of Technology Roorkee, India

Design and Analysis of Hybrid Solar-Wind Energy System Using CUK & SEPIC Converters for Grid Connected Inverter Application....278

Sajib Chakraborty, S M Salim Reza, Wahidul Hasan

Department of Electrical & Electronic Engineering, University of Science & Technology Chittagong, Bangladesh

Faculty of Science & Technology, Bangladesh University of Professionals (BUP), Mirpur Cantonment, Dhaka, Bangladesh

Department of Electrical & Electronic Engineering, Independent University Bangladesh, Dhaka, Bangladesh

294 Quasi Z-source Inverter with Improved Incremental Conductance MPPT for Rapidly Varying Solar Irradiation....284

U.Shajith Ali and V.Kamaraj

Department of Electrical and Electronics Engineering, SSN College of Engineering, Chennai, India

305 Research and Implement of PMSM Regenerative Braking Strategy based on Controllable Rectification....289

Hui Qi, Yixiao Zhang and Ningyuan Gao

College of Electronic Information and Control Engineering Beijing University of Technology Beijing, China

329 Speed Control of PMSM with Hall Sensors using DSP TMS320F2812....295

Hrishikesh Mehta, Vrunda Joshi, Ujjwala Thakar (1), Madhav Kuber, Pradeep Kurulkar (2) (1)Pune Vidyarthi Griha's College of Engg. and Tech. University of Pune, India (2)Electrical Systems Group, R&DE (E), Dighi, Pune, India

Harmonic Reduction for 12-Pulse Four Star Thyristor Rectifier with Active Auxiliary Circuit....301

Jingfang Wang, Shiyan Yang, Wei Yang Department of Electrical Engineering and Automation Harbin Institute of Technolog Harbin, China

337 Commutation Torque Ripple Reduction in Brushless DC Motor using Modified SEPIC Converter....307

A.Ramya, V.Srinath, S.Samyuktha, R.Vimal, Dr. M. Balaji Department of Electrical Engineering, SSN College of Engineering, Chennai, Tamil Nadu, India

Analog Controller for Home Application of Photovoltaic System using Interleaved DC-DC Converter and Single-phase Inverter....313

Tarek Ahmed, Katsumi Nishida and Mutsuo Nakaoka E & E Dept., Assiut University, Assiut, Egypt Ube National College of Technology, Japan Kyungnam University Masan, Kyungnam, South Korea

Analysis of Two Phase Switched Reluctance Motor with Flux Reversal Free Stator....320 S.Prabhu (1), M.Balaji (2), V.Kamaraj (3)

(1) Arunai Engineering College, Thiruvannamalai, India (2, 3) Department of EEE, SSN college of Engineering, Chennai, India

Control of PMSG Wind Turbines Based on Reduced Order Resonant Controllers Under Unbalanced Grid Voltage Conditions....326

Shuhui Dong, Yonggang Li, Aimeng Wang, Wenyuan Xi State Key Laboratory of Alternate Electrical Power System with Renewable Energy Sources, North China Electric Power University, Baoding, China

364 Design Methodology of P-Res Controllers with Harmonic Compensation Technique for Modular Multilevel Converter Fed from Partially Shaded PV Array....330

Ramya G, Ramaprabha R SSN College of Engineering, Kalavakkam, Chennai, India

Switching Loss and THD analysis of Modular Multilevel Converter with different Switching Frequency....336

Ramya G and Ramaprabha R SSN College of Engineering, Kalavakkam, Chennai, India

366 A Static PV Array Architecture to Enhance Power Generation under Partial Shaded Conditions....341

S. Malathy and R. Ramaprabha

Department of Electrical and Electronics Engineering, SSN College of Engineering, Rajiv Gandhi Salai, Kalavakkam, Chennai, India

373 Robust Control of Parallel Buck Fed Buck Converter Using Hybrid Fuzzy PI Controller....347

S. Vinod, Dr. M. Balaji, Dr. M. Prabhakar

Research scholar, Jerusalem college of engineering, Anna University, India,

Faculty SSN College of Engineering, Anna University, India,

Faculty VIT University, India.

391 Enforcement of ELC using Reduced Dump Load for Micro Hydropower Plant with the **Interpretation of Switching Transients and Vibrations....352**

Ramraj Panda, R. Raja Singh and Thanga Raj Chelliah

Department of Water Resources Development & Management, Indian Institute of Technology Roorkee, India

401 Analysis of Energy Optimal Controlled Induction Motor Drives under Sensor fault....358

Arun Dominic D and Thanga Raj Chelliah

Department of Water Resources Development and Management, Indian Institute of Technology Roorkee, India

404 **Evolutionary Algorithm Based In-Situ Efficiency Determination on Induction Motors** for the Implementation of Energy Conservation Schemes....363

Radha Thangaraj and Thanga Raj Chelliah

Department of Water Resources Development and Management, Indian Institute Technology Roorkee, India

410 Pseudo Open Drain IO Standards Based Energy Efficient Solar Charge Sensor Design on 20nm FPGA....367

K. Kalia, B. Pandey, K. Nanda, S. Malhotra, A. Kaur and D. M. A. Hussain

Department of Electronics and Communication Engineering, Chitkara University, Chandigarh, India

Department of Energy Technology, Aalborg University, Denmark

456 Neuro-fuzzy State Space Controller for Drive with Elastic Joint....373

Marcin Kaminski and Krzysztof Szabat

Faculty of Electrical Engineering, Wroclaw University of Technology, Wroclaw, Poland

Session APEHIA-II: Applications of Power Electronics in Home Appliance, Industry, Aerospace & Automotive Systems II

Date/Time: Thursday, 11 June 2015/09:00 – 10:30 hrs

Venue: Room 1 @ Level 4

Session Chair: Shantha Gamini Jayasinghe, University of Tasmania, Australia

66 A novel control method to improve the reliability of traction inverters for permanent magnet synchronous machines....379

Julian Wölfle, Oliver Lehmann, Jörg Roth-Stielow

Institute for Power Electronics and Electrical Drives, University of Stuttgart, Germany

The Effects of Thermal Cycling on Aging of Neodymium-Iron-Boron Magnets....389 297

Daniel Huger and Dieter Gerling

Institute for Electrical Drives and Actuators University of the Armed Forces Munich, Germany

434 Analysis of Operation Modes and Limitations of Dual Active Bridge Phase Shift Converter....393

Mohammad Jafari, Zahra Malekjamshidi and Jian Guo Zhu Faculty of Engineering and Information Technology, University of Technology Sydney, Australia

436 Simulation of Electric Vehicle Inductive Charging Systems....399

Shuo Wang and David Dorrell School of Engineering, University of Technology, Sydney, Australia

Session DGSG-II: Distributed Generation and Smart-Grid II

Date/Time: Thursday, 11 June 2015/09:00 – 10:30 hrs

Venue: Room 2 @ Level 4

Session Chair: Geoffrey Walker, Queensland University of Technology, Australia

125 Impact of Electric Energy Storage Scheduling on Reliability of Distribution System....405A. Narimani, G. Nourbakhsh, G.F. Ledwich and G.R. Walker School of Electrical Engineering and Computer Science, Science and Engineering Faculty, Oueensland University of Technology, Brisbane, Australia

342 Development of an Effective Control Scheme for a DC Microgrid with Energy Storage System....409

Chul-Sang Hwang, Minwon Park, and In-Keun Yu Department of Electrical Engineering, Changwon National University, Republic of Korea

435 Modeling of Magnetic Flux in Multi-Winding Toroidal Core High Frequency Transformers Using 3D Reluctance Network Model....413

Mohammad Jafari, Zahra Malekjamshidi, Md. Rabiul Islam and Jianguo Zhu Faculty of Engineering and Information Technology, University of Technology Sydney, Australia

439 Grid Emulator Requirements for a Multi-Megawatt Wind Turbine Test-Bench....419 Nurhan Rizqy Averous, Marco Stieneker and Rik W.De Doncker Institute for Power Generation and Storage Systems, E.ON Energy Research Center, RWTH Aachen University, Aachen, Germany

445 A Microcontroller Based SHE Inverter for Maximum Power Point Operation....427 Sraddhanjoli Bhadra and Hirak Patangia University of Arkansas at Little Rock

Session PSPC-II: Power Semiconductors, Power integrated circuits and Passive Components II

Date/Time: Thursday, 11 June 2015/09:00 – 10:30 hrs

Venue: Room 3 @ Level 4

Session Chair: Yen Kheng Tan, Singapore University of Technology and Design, Singapore

39 Dual-Path Frequency Compensation for Current-Mode Buck Converters....432 Pang-Jung Liu, Shang-Ru Hsu and Tzu-Hsuan Chen Department of Electrical Engineering, National Taipei University of Technology, Taiwan

203 Design and Fabrication of Low Voltage Silicon Trench MOS Barrier Schottky Rectifier for High Temperature Applications....437

Mohd Rofei Mat Hussin(1,2), Muhamad Amri Ismail(1), Sharaifah Kamariah Wan Sabli(1), Nurafizah Saidin(1), H.Y. Wong(2), Mukter Zaman(2) (1)MIMOS Berhad, TPM Bukit Jalil, Malaysia (2)Faculty of Engineering (FOE), Multimedia University, Malaysia

347 A Flexible Test Bench for Power Semiconductor Switching Loss Measurements....442

Jan Gottschlich, Murat Kaymak, Martin Christoph and Rik W. De Doncker

Institute for Power Electronics and Electrical Drives – RWTH Aachen University Germany

402 Active EMI-Filter using the Gate-Drivers Power Supply....449

Matthias Biskoping, Martin Rosekeit and Rik W.De Doncker Institute for Power Electronics and Electrical Drives, RWTH Aachen University, Aachen, Germany

431 A Programmable Gate Driver for Power Semiconductor Switching Loss Characterization....456

Jan Gottschlich and Rik W. De Doncker Institute for Power Electronics and Electrical Drives – RWTH Aachen University, Germany

Session WBGD-I: Wide Bandgap Power Semiconductor Devices and Technologies I

Date/Time: Thursday, 11 June 2015/09:00 – 10:30 hrs

Venue: Room 4 @ Level 4

Session Chair: Graham Town, Macquarie University, Australia

25 Evaluating 4H-SiC Based Commercial MOSFETs Power Modules....462

Muhammad Nawaz and Nan Chen ABB Corporate Research, Vasteras, Sweden

243 Analysis of Capacitive Losses in GaN Devices for an Isolated Full Bridge DC-DC Converter....467

Rakesh Ramachandran and Morten Nymand Maersk Mc-Kinney Moller Institute, University of Southern Denmark, Odense, Denmark

300 A Holistic Approach to Optimise the Power Density of a Silicon Carbide (SiC) MOSFET based Three-Phase Inverter....473

Ian Laird, Xibo Yuan and Neville McNeill Department of Electrical and Electronic Engineering, University of Bristol, Bristol, U.K.

106 High Temperature and High CMR Gate Driver Circuit for Wide-Band-Gap Power Semiconductors....479

N. Langmaack, G. Tareilus and M. Henke Institute for Electrical Machines, Traction and Drives Technische Universität Braunschweig

127 Gate Driver Optimization to Mitigate Shoot-through in High-speed Switching SiC Half Bridge Module....484

Shan Yin(2), K. J. Tseng(2), C. F. Tong(1), R. Simanjorang(3), C. J. Gajanayake(3), A. Nawawi(1), YitaoLiu(1), Yong Liu(2), K. Y. See (2), A.Sakanova (2), Kai Men (2), A. K. Gupta (3)

(1)Rolls-Royce@NTU Corporate Lab, Nanyang Technological University, Singapore

(2) School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore

(3) Advanced Technology Centre, Rolls-Royce Singapore Pte. Ltd, Singapore

Session APEHIA-III: Applications of Power Electronics in Home Appliance, Industry, Aerospace & Automotive Systems III

Date/Time: Thursday, 11 June 2015/11:00 – 12:30 hrs

Venue: Room 1 @ Level 4

Session Chair: R.T. Naayagi, Newcastle University, Singapore

Enhanced Operating Strategy for a Three-Phase Dual-Active-Bridge Converter Including Frequency Variation....492

Hauke van Hoek, Keijo Jacobs, Markus Neubert and Rik W. De Doncker Insitute for Power Electronics and Electrical Drives (ISEA), RWTH Aachen University, Germany,

325 Selection of Power Semiconductor Devices for the DAB DC-DC Converter for Aerospace Applications....499

R. T. Naayagi

Newcastle University, School of Electrical and Electronic Engineering, Singapore

Analysis of Electric Vehicle Driving Cycles for Inverter Efficiency Improvement at Partial Load....503

Eva Knischourek and Dieter Gerling Universitaet der Bundeswehr Muenchen, Neubiberg, Germany

508 A Single-Switch High Voltage Quasi-Resonant DC-DC Converter for a Pulsed Plasma Thruster....509

Bingyin Kang and Kay-Soon Low

Satellite Research Centre (SaRC) School of Electrical and Electronic Engineering Nanyang Technological University, Singapore

Performance Analysis of Extended Phase-Shift Control of DAB DC-DC Converter for Aerospace Energy Storage System....514

R. T. Naayagi and A. J. Forsyth, R. Shuttleworth School of Electrical and Electronic Engineering Newcastle University, Singapore School of Electrical and Electronic EngineeringThe University of Manchester, UK

Session DGSG-III: Distributed Generation and Smart-Grid III

Date/Time: Thursday, 11 June 2015/11:00 – 12:30 hrs

Venue: Room 2 @ Level 4

Session Chair: Daming Zhang, University of New South Wales, Australia

167 NPC Photovoltaic Grid-Connected Inverter with Ride-Through Capability under Grid Faults....518

Hossein Dehghani Tafti(1), Ali I. Maswood(2), Ziyou Lim(3), Gabriel H. P. Ooi(4) and Pinkymol Harikrishna Raj(5)

(1, 2, 4, 5)School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore

(3) Interdisciplinary Graduate School, Nanyang Technological University, Singapore

A New Method for Operating Microgrid with the Capability of Coping with Switch-in and Switch-off of Large Percentage of Real and Reactive Power....528

Daming Zhang and MY Liao

University of New South Wales, Sydney, Australia

264 Intelligent Power Allocation and Load Management of More Electric Aircraft....533

- *Alireza Barzegar, Rong Su, Changyun Wen, Leila Rajabpour, Yicheng Zhang
- **Amit Gupta, Chadnana Gajanayake, Meng Yeong Lee
- *School of Electrical and Electronic Engineering Nanayang Technological University, Singapore
- **Rolls-Royce Corporate, Singapore

Analyze and Reduce the Impact of Sampling Delay on LCL Converter with Capacitor Current Feedback Active Damping....539

Zhiqiang Wan, Jian Xiong, Ji Lei, Chen Chen

State Key Laboratory of Advanced Electromagnetic Engineering and Technology,

Huazhong University of Science and Technology, Wuhan, Hubei, China

Session PEET-II: Power Electronic Emerging Technologies II

Date/Time: Thursday, 11 June 2015/11:00 – 12:30 hrs

Venue: Room 3 @ Level 4

Session Chair: Yen Kheng Tan, Singapore University of Technology and Design, Singapore

210 Study on A Boost Motor Driver with Low-Capacitance Charge-Pump Circuit....546

H. Matsumoto and Y. Neba

Fukuoka University

353 A Constant-on-Time Based Buck Controller with Active PFC for Universal Input LED System....551

Hongjia Wu (1), Yongliang Zhang (2), Menglian Zhao (1), Hongfeng Shen (1) and Xiaobo Wu (1)

- (1)Institute of VLSI Design, Zhejiang University Hangzhou, China
- (2) Changzhou TOPIC Semiconductor Technology Co. Ltd., China

412 Control Integrated Finite State Machine Design for Photovoltaic Module Integrated Converter....557

Wei Jiang (1), Shiqi Kan (1), Nailu Li (1), Zhengyu Lin (2), Barry W. Williams (3), Seiji Hashimoto (4)

- (1) Yangzhou University, China
- (2) Aston University, UK
- (3) University of Strathclyde, UK
- (4) Gunma University, Japan

414 Wireless Power Charger for Light Electric Vehicles....562

Wei Jiang (1), Song Xu (1), Nailu Li (1), Zhengyu Lin (2), Barry W. Williams (3)

- (1) Yangzhou University, China
- (2) Aston University, UK
- (3) University of Strathclyde, UK

504 Advanced Building Energy Monitoring Using Wireless Sensor Integrated EnergyPlus Platform for Personal Climate Control....567

Lan Lan and Yen Kheng Tan

Session WBGD-II: Wide Bandgap Power Semiconductor Devices and Technologies II

Date/Time: Thursday, 11 June 2015/11:00 – 12:30 hrs

Venue: Room 4 @ Level 4

Session Chair: King-Jet Tseng, Nanyang Technological University, Singapore

Temperature-Dependent Electrical Performance of AlGaN/GaN MOS-HEMT with Ultrasonic Spray Pyrolysis Deposited Al₂O₃....575

Han-Yin Liu(3), Wei-Chou Hsu(1, 2), Bo-Yi Chou(1), Ching-Sung Lee(3), Wen-Ching Sun(4), Sung-Yen Wei(4), and Sheng-Min Yu(4)

- (1)Institute of Microelectronics, Department of Electrical Engineering, National Cheng Kung University, Taiwan
- (2) Advanced Optoelectronics Technology Center, National Cheng Kung University, Taiwan (3) Department of Electronic Engineering, Feng Chia University, Taiwan
- (4) Material and Chemical Research Laboratories, Industrial Technology Research Institute, Taiwan

AlGaN/GaN MOS-HEMTs with TiO₂ Gate Dielectric by Using Non-Vacuum Ultrasonic Spray Pyrolysis Deposition....578

H. Y. Liu(1), C. S. Lee(1), W. C. Hsu(2), T. T. Wu(1), H. S. Huang(1), S. F. Chen(1), Y. C. Yang(1), B. C. Chiang(1), and H. C. Chang(1)

(1) Department of Electronic Engineering, Feng Chia University, Taiwan, R.O.C.

(2)Institute of Microelectronics, Department of Electrical Engineering, National Cheng-Kung University, Taiwan, R.O.C.

290 High Output Swing Monolithic Inverter with E-D Mode MIS-HEMTs for GaN Power Integrated Circuits....585

Yun-Hsiang Wang(1,5), Yung C. Liang(1,2), Ganesh S. Samudra(1), Bo-Jhang Huang(3), Ya-Chu Liao(3), Chih-Fang Huang(3), Wei-Hung Kuo(4) and Guo-Qiang Lo(5) (1)Dept. of Electrical and Computer Engineering, National University of Singapore, Singapore;

- (2) Advanced Microelectronic Centre, National University of Singapore (Suzhou) Research Institute, China;
- (3) Dept. of Electrical Engineering, National Tsing Hua University, Taiwan;
- (4) Industrial Tech. Research Institute, Taiwan;
- (5) A*Star Institute of Microelectronics, Singapore

71 Modeling the Effect of Acceptor-Type Traps on Internal Electric Field of a GaN-pin Device Phenomenon....589

Shao-Yen Chiu (1), Yu-Teng Tseng (2), Wei-Chen Yang (2), Keh-Yung (Norman) Cheng (2) (1)Episil Technologies Inc., Hsinchu, Taiwan (1)National Tsing Hua University, Republic of China

Session APEHIA-IV: Applications of Power Electronics in Home Appliance, Industry, Aerospace & Automotive Systems IV

Date/Time: Thursday, 11 June 2015/13:30 – 15:00 hrs

Venue: Room 1 @ Level 4

Session Chair: Dylan Lu, University of Sydney, Australia

317 Power Loss Analysis of a Single-Switch Non-isolated DC/DC Converter....592

Le An and Dylan Dah-Chuan Lu

School of Electrical and Information Engineering, The University of Sydney, Australia

368 Current-Source ZCS High-Frequency Resonant Inverter based on Time-Sharing Frequency Doubler Principle and Induction Heating Applications....598

Tomokazu Mishima, Kyohei Konishi (1), Mutsuo Nakaoka (2)

(1) Graduate Sch. of Maritime Sci., Dept. of Marine Eng., Kobe University

(2) Dept. of Electrical Eng., University of Malaya, Kuala Lumpur, Malaysia

379 Adaptive Slope Compensation for High Bandwidth Digital Current Mode Controller....604

Fazel Taeed and Morten Nymand

Maersk Mc-Kinney Moller Institute, University of Southern Denmark

462 Characteristics of Quasi Variable Capacitors for Induction Heating....614

Sachio Kubota and Masami Fukushima

National Institute of Technology, Toba College

Session APEPSG-I: Applications of Power Electronics in Power System and Generation/FACTS I

Date/Time: Thursday, 11 June 2015/13:30 – 15:00 hrs

Venue: Room 2 @ Level 4

Session Chair: Shantha Gamini Jayasinghe, University of Tasmania, Australia

The Doubly Fed Permanent Magnet Synchronous Machine as a Highly Efficient Drive System for Constant Speed Applications....620

Alexander Stock, Johannes Teigelkötter, Stefan Staudt, and Thomas Kowalski University of Applied Sciences Aschaffenburg, Germany

A New Method for Grid-Tie Inverters Synchronization Based on RDFT with Linear Approximation....626

Ali Al-Omari, M. Z. Ahmed, Darren T. Bearne School of Computing and Mathematics, University of Plymouth, United Kingdom

441 Analysis of Direct Matrix Converter Operation under Various Switching Patterns....630

Zahra Malekjamshidi*, Mohammad Jafari*, Dan Xiao** and Jianguo Zhu*

- * Faculty of Engineering and Information Technology, University of Technology Sydney
- ** Electrical Engineering and Telecommunications, University of New South Wales

442 Analysis and Comparison of Direct Matrix Converters Controlled by Space Vector and Venturini Modulations....635

Zahra Malekjamshidi, Mohammad Jafari and Jianguo Zhu Faculty of Engineering and Information Technology, University of Technology Sydney, Australia

Multirate Strong Tracking Extended Kalman Filter and Its Implementation on Lithium Iron Phosphate (LiFePO4) Battery System....640

J. Jia (1), P. Lin (1,3), C.S. Chin (2), W.D. Toh (1), Z. Gao (1), H. Lyu (1,3), Y.T. Cham (1), and E. Mesbahi (2)

- (1) School of Engineering, Temasek Polytechnic, Singapore
- (2) School of Marine Science and Technology, Newcastle University, Singapore
- (3) School of Electrical Engineering, Southwest Jiaotong University, China

Session MDMC-I: Motion Drives and Motion Control I

Date/Time: Thursday, 11 June 2015/13:30 – 15:00 hrs

Venue: Room 3 @ Level 4

Session Chair: Wolfgang Gruber, Johannes Kepler Universität Linz, Austria

On the self-sensing technique based on the interlink voltage of two serially connected phase coils....646

Wolfgang Gruber, Markus Stöckler Institute for Electrical Drives and Power Electronics Johannes, Kepler University, Austria

91 Extremely Precise Position Estimation in Sensorless Control of Permanent Magnet Synchronous Motors Using All-pass Filter....652

Ken-ichiro Tanaka, Masaru Hasegawa and Atsushi Matsumoto Dept. of Electrical Chubu University, Japan

97 FPGA Based Controller Drive of BLDC Motor Using Digital PWM Technique....658

A. Tashakori, M. Hassanudeen and M. Ektesabi Swinburne University of Technology, Australia

Adaptive Nonlinear Speed Control of IPMSM with Increased Linear Modulation Range for Natural Sampling....663

Garin Schoonhoven and M. Nasir Uddin Lakehead University, Thunder Bay, ON, Canada

281 An electromagnet model comprehending eddy current and end effects....668

Sebastian Fizek (1,2), Martin Reisingery (2), Siegfried Silbery (2) and Wolfgang Amrhein(3) (1)JKU HOERBIGER Research Institute for Smart Actuators, Johannes Kepler University, Austria

(2)Linz Center of Mechatronics (LCM), Austria

(3)Institute for Electrical Drives and Power Electronics, Johannes Kepler University,, Austria

Session WBGD-III: Wide Bandgap Power Semiconductor Devices and Technologies III

Date/Time: Thursday, 11 June 2015/13:30 – 15:00 hrs

Venue: Room 4 @ Level 4

Session Chair: Yung C. Liang, National University of Singapore, Singapore

310 Temperature measurements of GaN FETs by means of average gate current sensing....673

(1) Philipp Marc Roschatt, Richard A. McMahon, (2) Stephen Pickering

- (1)Department of Engineering University of Cambridge
- (2) Jaguar LandRover Ltd. Whitley, Coventry

357 A Novel Implant Masking Processes for Double Self-Aligned 4H-SiC DMOSFETs....678

Jheng-Yi Jiang, Ting-Fu Chang and Chih-Fang Huang

Institute of Electronic Engineering, National Tsing Hua University, Taiwan, R.O.C

362 Threshold Voltage Instability in AlGaN/GaN HEMTs....681

Ting-Fu Chang (1), Tsung-Chieh Hsiao (1), Szu-Han Huang (1), Chih-Fang Huang (1), Yun-Hsiang Wang (2), Ganesh S. Samudra (2), and Yung C. Liang (2) (1)Institute of Electronics Engineering, National Tsing Hua University, Hsinchu, Taiwan, R. O. C.

(2) Department of Electrical and Computer Engineering, National University of Singapore, Singapore

382 Control of Transconductance in High Performance AlGaN/GaN FinFETs....684

Young-Woo Jo, Dong-Hyeok Son, Chul-Ho Won, V. Sindhuri, Ji-Hyun Kim, Jae Hwa Seo, In Man Kang, and Jung-Hee Lee

School of Electronics Engineering, Kyungpook National University, Korea

Session APEHIA-V: Applications of Power Electronics in Home Appliance, Industry, Aerospace & Automotive Systems V

Date/Time: Thursday, 11 June 2015/15:30 – 17:00 hrs

Venue: Room 1 @ Level 4

Session Chair: R.T. Naayagi, Newcastle University, Singapore

130 Integration of Bi-Directional DC-DC Converter and Highly Efficient Boost Converter for Electric Vehicles Applications....687

Md. Mizanur Rahman*, M. Nasir Uddin*and Md. Khurshedul Islam**

*Department of Electrical Engineering Lakehead University, Canada

** Department of Electrical & Electronic Engineering International Islamic University Chittagong (IIUC) Chittagong, Bangladesh

413 Application of an Integrated Transformerless Buck-boost Converter in Photovoltaic MPPT Systems....692

Xiaobin He, Xinghao Zhang, Huiying Liu and Huahui Zhang Shanghai Institute of Space Power-Sources, Shanghai, China

421 Comparison of Push-Pull and Half-bridge Resonant Inverters for Cold Cathode Fluorescent Lamps....696

Yueh-Ru Yang

Ming Chi University of Technology, New Taipei City, Taiwan

284 Characterization of Contactless Power Transfer System and Investigation of Core Shape for AGV Application....703

(1) Takahiro Kojima, Hayato Tanabe, Akihiro Imakiire, Kiyotaka Fuji, Masahiro Kozako, Masayuki Hikita, (2) Yutaka Imoto, Keiichi Honda

(1)Department of Electrical Engineering, Kyushu Institute of Technology, Kitakyushu, Fukuoka, Japan

(2) HEADS Co., Ltd., Fukuoka, Japan HICS Department

419 Comparison Performance of Si-IGBT and SiC-MOSFET Used for High Efficiency Inverter of Contactless Power Transfer System....707

Hayato Tanabe, Takahiro Kojima, Akihiro Imakiire, Kiyotaka Fuji, Masahiro Kozako, Masayuki Hikita

Department of Electrical and Electronics Engineering, Kyushu Institute of Technology, Fukuoka, Japan

Session APEPSG-II: Applications of Power Electronics in Power System and Generation/FACTS II

Date/Time: Thursday, 11 June 2015/15:30 – 17:00 hrs

Venue: Room 2 @ Level 4

Session Chair: Shantha Gamini Jayasinghe, University of Tasmania, Australia/Yen Kheng Tan,

Singapore University of Technology and Design, Singapore

142 Ultra-Low Power Boost DC-DC Converter with Integrated MEMS Resonator....711

Yuan-Ta Hsieh, Sheng-Hsiang Tseng, Chiao-Li Fang, Jian-Fu Wu, Hann-Huei Tsai, and Ying-Zong Juang

National Chip Implementation Center, Taiwan

149 Suggestion of a Novel PHILS Method for Operation Analysis of a Thyristror Controlled Series Capacitor....715

Minh-Chau Dinh, Sang-Min Park, Sung-Kyu Kim, Minwon Park, and In-Keun Yu Department of Electrical Engineering, Changwon National University, Korea

268 Investigation on Active Method for Stabilization of LC Input Filter and DC/DC Buck Converter under Voltage Mode Control....721

Mingfei Wu and Dylan D.C. Lu School of Electrical and Information Engineering, The University of Sydney Sydney, Australia

433 A Comprehensive Power Analysis of Induction Heating Power Supply System Using Multilevel Neutral Point Clamped InverterWith Optimum Control Algorithm....727

Bashar Mohammed Flayyih, Mohammed Zaki Ahmed, Stuart Mac Veigh Mathematical and Computer Science, Plymouth University, Plymouth, UK

518 Hybrid Cascaded Multilevel Inverter with Supercapacitor Energy Storage for Grid Integration of Renewable Energy Systems....732

S. D. G. Jayasinghe and D. M. Vilathgamuwa Australian Maritime College, University of Tasmania, Launceston, Australia Queensland University of Technology, Brisbane, Australia

Session MDMC-II: Motion Drives and Motion Control II

Date/Time: Thursday, 11 June 2015/15:30 – 17:00 hrs

Venue: Room 3 @ Level 4

Session Chair: Robert Lorenz, University of Wisconsin-Madison, USA

217 A Modified Hysteresis-based DTC Strategy for Synchronous Reluctance Motors in High Speed Range....740

Xiang Shuguang, Zhang Xinan and Gilbert Foo Hock Beng, School of Electrical and Electronic Engineering, Nanyang Technological University

267 Loss Minimization for Dynamic Load Trajectories on Induction Machine Drives without Torque Performance Degradation....746

Yuying Shi, Yukai Wang, Robert D. Lorenz WEMPEC, University of Wisconsin-Madison, USA

313 Influence of an FPGA-based Switching Angle Dithering on Acoustics in Single-Pulse Controlled Switched Reluctance Machines....754

Daniel Scharfenstein, Bernhard Burkhart and Rik W. De Doncker Institute for Power Electronics and Electrical Drives, RWTH Aachen University, Germany

324 Average Torque Control with Current-Peak Regulation in Switched Reluctance Motors....762

Nuwantha Fernand, Mike Barnes School of Electrical and Computer Engineering, RMIT University, Melbourne, Australia

367 Reduced Torque Ripple and Switching Frequency using Optimal DTC Switching Strategy for Open-End Winding of Induction Machines....767

M. Khairi Rahim, Fazlli Patkar, Auzani Jidin, M. Z. R. Z. Ahmadi, R.N. Firdaus, Wahidah Abd. Halim, Atikah Razi

Power Electronics and Drives Research Group, CeRIA/FKE, Universiti Teknikal Malaysia Melaka (UTeM), Hang Tuah Jaya, Durian Tunggal, Malacca, Malaysia

Session RET-I: Renewable Energy Technologies I

Date/Time: Thursday, 11 June 2015/15:30 – 17:00 hrs

Venue: Room 4 @ Level 4

Session Chair: Don Mahinda Vilathgamuwa, Queensland University of Technology, Australia

323 Maximum Power-point Tracking of High Altitude Wind Power Generating System Using Optimal Vector Control Technique....773

Jeevan Adhikari, I V Prasanna, S K Panda

Department of Electrical and Computer Engineering, National University of Singapore, Singapore

341 MOSFET Loss Evaluation for a Low-Power Stand-Alone Photovoltaic-LED System....779

Maria C. Mira, Arnold Knott, Michael A. E. Andersen

Dept. Electrical Engineering Technical University of Denmark Oersteds Plads, 349. Kongens Lyngby, Denmark

350 Interleaved DC-DC Converter with Lead-acid Storage Batteries for Power Regulation of Gridconnected Variable-speed Wind Turbine....786

Tarek Ahmed, Katsumi Nishida, Mutsuo Nakaoka

E & E Dept., Assiut University, Assiut, Egypt

Ube National College of Technology, Ube City, Yamaguchi, Japan

Kyungnam University, Masan, Kyungnam, South Korea

426 A New MPPT Technique for the Maximization of Overall System Output in Solar Generation....791

Huaqian Wang, Lokesh Vinayagam, Hao Jiang, ZhiQiang Cai, Qiang Ni and Hongqun Li EEE School, Singapore Polytechnic, Singapore Singapore PowerGrid, Singapore

519 Dual Inverter System with Integrated Energy Storage for Grid Connected Photovoltaic Systems....796

S. D. G. Jayasinghe and D. M. Vilathgamuwa Australian Maritime College, University of Tasmania, Launceston, Australia Queensland University of Technology, Brisbane, Australia

Session ADEM-I: Analysis & Design of Electrical Machines I

Date/Time: Friday, 12 June 2015/09:00 - 10:30 hrs

Venue: Room 1 @ Level 4

Session Chair: King-Jet Tseng, Nanyang Technological University, Singapore

73 Proposal of Pancake Axial-Air-Gap-Type Self-Excited Wound-Field Synchronous Motor....804

Masahiro Aoyama and Toshihiko Noguchi

Department of Environment and Energy System, Shizuoka University, Japan Department of Electrical and Electronics Engineering, Japan

Development of a compact and low cost axial flux machine using soft magnetic composite and hard ferrite....810

R. Kobler*, D. Andessner, G. Weidenholzer* and W. Amrhein†

*Linz Center of Mechatronics GmbH, Austria

†Institute for Electrical Drives and Power Electronics, Johannes Kepler University, Austria

198 Influence of Magnet Arrangement on Torque Characteristics of Dual-Rotor PMSMs....816 Shunsuke Fujiwara, Shigeo Morimoto, Masayuki Sanada, and Yukinori Inoue

Graduate School of Engineering Osaka Prefecture University, Japan

The Closed-Loop Design of Inverse Class-E Power Amplifier for Wireless Energy Transmission System....822

Hongfeng Shen (1), Wenxiao Gu (1), Yongliang Zhang (2), Menglian Zhao (1), Hongjia Wu

(1), and Xiaobo Wu (1)

(1)Institute of VLSI Design, Zhejiang University, Hangzhou, China

(2) Changzhou TOPIC Semiconductor Technology Co. Ltd. Changzhou, China

A preliminary Study of the Effect of Saturation and Cross-Magnetization on the Inductances of a Fractional-Slot Concentrated-Wound Interior PM Synchronous Machine....828

A. Pouramin, R. Dutta, M. F. Rahman, J. E. Fletcher and D. Xiao School of Electrical Engineering and Telecommunications, The University of New South Wales

Session HSSS-I: Hard-Switching and Soft-Switching Static Power Converters and UPS I

Date/Time: Friday, 12 June 2015/09:00 – 10:30 hrs

Venue: Room 2 @ Level 4

Session Chair: Mohan Lal Kolhe, University of Agder, Norway

104 Design of A Cascade High Gain Soft-Switching Boost Converter....834

Yuang-Shung Lee, Wei-Chiao Lin and Ling-Chia Yu

Department of Electrical Engineering Fu Jen Catholic University, Taiwan

384 Smooth Filtering DC Link Type Soft-Switching Two-Stage Power Conditioner....841

Srawouth Chandhaket, Koki Ogura and Mutsuo Nakaoka

Department of Electrical Engineering Walailak University

Kawasaki Heavy Industry Kobe, Japan

Department of Electrical EngineeringUniversity of Malaya, Malaysia

New Conceptual High Efficiency Sinewave PV Power Conditioner with Partially-Tracked Dual Mode Step-up DC-DC Converter....847

Koki Ogura, Srawouth Chandhaket, Saad Mekhilef and Mutsuo Nakaoka

Kawasaki Heavy Industries, Ltd., Japan

Walailak University, Thailand

University of Malaya, Malaysia

415 ZCS Interleaved Boost Converter with Saturable Inductors for Reverse-Recovery Reduction....855

Wilmar Martinez, Jun Imaoka and Masayoshi Yamamoto

Session MDMC-III: Motion Drives and Motion Control III

Date/Time: Friday, 12 June 2015/09:00 - 10:30 hrs

Venue: Room 3 @ Level 4

Session Chair: Sanjib K. Panda, National University of Singapore, Singapore

107 Multiple-Pole Multilevel Diode Clamped Inverter for Permanent Magnet Synchronous Motor Drive....862

Pinkymol Harikrishna Raj, Ali I. Maswood, Gabriel H. P. Ooi and Hossein Dehghani Tafti School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore

137 Stator reference frame approach for DC injection-based stator resistance estimation in electric drives....867

Giovanni Zanuso, Luca Peretti, Paul Sandulescu ABB Corporate Research, Department of Electrical Systems, Sweden

278 Rapid Demodulation of Rotor Position for High Frequency Voltage Injection Based IPM Machine Sensorless Control....873

Tianhao Wang, John Xu University of Nottingham Ningbo, China

Necessary Calculations of Ultra-Light Overhead Conveyor Systems for In-House Transportation....880

Batin Latif Aylak (1), Cyril Alias (1), Hermias C.N. Hendrikse (2), Bernd Noche (1) (1) Department of Transport Systems and Logistics, University of Duisburg-Essen, Duisburg, Germany

(2) ESTEQ Engineering (Pty) Ltd, Pretoria, South Africa

339 Reduction of DC Link Capacitor Stress for Double Three-phase Drive Unit through Shifted Control and Phase Displacement....887

Bruno Basler, Thomas Greiner and Peter Heidrich Pforzheim University Pforzheim, Germany

Session RET-II: Renewable Energy Technologies II

Date/Time: Friday, 12 June 2015/09:00 – 10:30 hrs

Venue: Room 4 @ Level 4

Session Chair: Dylan Lu, University of Sydney, Australia

The Impact of Traveling Waves on HVDC Protection....890

Oliver Cwikowski, Mike Barnes, Roger Shuttleworth The University of Manchester

102 A LIN Inspired Optical Bus for Signal Isolation in Multilevel or Modular Power Electronic Converters....898

Mark A. H. Broadmeadow and Geoffrey R. Walker School of Electrical Engineering and Computer Science Queensland University of Technology Brisbane, Australia

346 Three-phase Four-leg Type PCS with Individual Phase Control Algorithm for Compensating Unbalance Loads using ESS....903

Chang-Soon Kim (1), Minwon Park (1), In-Keun Yu (1), Gyeong-Hun Kim (2), and Chul-Sang Hwang (2)

(1) Changwon National University

(2)Korea Electrotechnology Research Institute

453 On Modular Multilevel Converters-based Batteries Energy Storage Systems....908

A.Lachichi

ABB Corporate Research Centre, Sweden

Session ADEM-II: Analysis & Design of Electrical Machines II

Date/Time: Friday, 12 June 2015/11:00 – 12:30 hrs

Venue: Room 1 @ Level 4

Session Chair: King-Jet Tseng, Nanyang Technological University, Singapore

183 DSP-based 3D Printed Resolver-to-Digital Conversion System....913

Chung-Chuan Hou and Han-Wei Lin Chung Hua University, Taiwan, R.O.C.

193 Design and Optimization of a Special Magnetic Levitated Drive with Unbalance Robustness....917

Andreas J. Pröll, Gerald Jungmayr, Edmund Marth and Wolfgang Amrhein Institute for Electrical Drives and Power Electronics, Johannes Kepler University, Austria

197 Investigations on Permanent Magnetic Materials to be used in Explosion-protected Permanent Magnet Synchronous Machines....923

Nijan Yogal (1), Christian Lehrmann (1) and Markus Henke (2)

(1) Explosion-protected Electrical Drive Systems, Physikalisch-Technische Bundesanstalt, Germany

(2)Institute for Electrical Machines, Traction and Drives, Technische Universität Braunschweig, Germany

311 Characterisation and Modelling of Automotive Lundell Alternators....928

Dimitrios Sarafianos, Richard A. McMahon, Timothy J. Flack(1), Stephen Pickering(2) (1)Department of Engineering, University of Cambridge, Cambridge, United Kingdom (2)Jaguar Land Rover Ltd.Coventry, United Kingdom

408 An Improved Dynamic Model for a Single-Phase Generator based on Three-Phase Cage Rotor Induction Machine....934

Diana Liyanage and Sumedha Rajakaruna Department of Electrical and Computer Engineering, Curtin University Perth, Australia

Session HSSS-II: Hard-Switching and Soft-Switching Static Power Converters and UPS II

Date/Time: Friday, 12 June 2015/11:00 – 12:30 hrs

Venue: Room 2 @ Level 4

Session Chair: Yung C. Liang, National University of Singapore, Singapore

51 A Novel Single-Switch Series Resonant Converter for Low Power DC/DC Energy Conversion Applications....940

Ying-Chun Chuang, Hung-Shiang Chuang, Chun-Hsiang Yang, Yung-Shan Wang Department of Electrical Engineering, Kao Yuan University, Taiwan Mechanical and System Research Laboratories Industrial Technology Research Institute, Taiwan

236 Phase Accumulated Carrier Pulse Width Modulation....948

Geoffrey R. Walker, Mark A. H. Broadmeadow, and Gerard F. Ledwich School of Electrical Engineering and Computer Science, Queensland University of Technology, Brisbane, Australia

250 Comparison and Evaluation of Sub-Module Configurations in Modular Multilevel Converters....958

Georgios Konstantinou (1), Jiaqi Zhang (1), Salvador Ceballos (2), Josep Pou (1), (3) and Vassilios G. Agelidis (1)

- (1) UNSW Australia, Sydney, NSW, Australia
- (2) Tecnalia Innovation and Research, Spain,
- (3) Technical University of Catalonia, Catalonia, Spain,

334 Highly Efficient ZCS Boost Converter Used in Rechargeable Batteries....964

Ying-Chun Chuang, Hung-Shiang Chuang, Chun-Hsiang Yang and Jung- Fang Chou Department of Electrical Engineering, Kun Shan University, Taiwan, R.O.C Department of Electrical Engineering, Kao Yuan University, Taiwan, R.O.C Mechanical and System Research Laboratories, Industrial Technology Research Institute, Taiwan, R.O.C

369 Switching Period Randomisation for Multilevel Converter Modulation....975

Geoffrey R. Walker and Gerard F. Ledwich School of Electrical Engineering and Computer Science Queensland University of Technology, Brisbane, Australia

Session MDMC-IV: Motion Drives and Motion Control IV

Date/Time: Friday, 12 June 2015/11:00 – 12:30 hrs

Venue: Room 3 @ Level 4

Session Chair: Wolfgang Gruber, Johannes Kepler Universität Linz, Austria

An Open-Loop Operation Strategy for Induction Motors Considering Iron Losses and Saturation Effects in Automotive Applications....981

Oliver Wallscheid (1), Michael Meyer (2), Joachim Böcker (1) (1)Power Electronics and Electrical Drives, University of Paderborn, Germany (2)Volkswagen AG, Baunatal, Germany

Drive system loss minimizing trajectories using constrained non-linear optimization....986Frederic Blank, Tobias Röser, Jörg Roth-Stielow Institute of Power Electronics and Electrical Drives, University of Stuttgart, Germany

A Computationally Efficient FS-PTC for IM with Minimum Voltage Vectors....992 Md. Habibullah (1), Dylan Dah-Chuan Lu (1), Dan Xiaoand (2) M.F. Rahman (2) (1)School of Electrical and Information Engineering, The University of Sydney, Sydney, NSW, Australia (2)School of Electrical Engineering and Telecommunications, The University of New South Wales, Sydney, NSW, Australia

399 Real Time Maximum Power Conversion Tracking and Resonant Frequency Modification for High Power Piezoelectric Ultrasound Transducer....998

Negareh Ghasemi, Geoffrey R. Walker and Mark A. H. Broadmeadow

School of Electrical Engineering and Computer Science Queensland University of Technology Brisbane, Australia

443 A Simple Potential Balancing Strategy for Neutral-Point-Clamped Inverter Fed Direct Torque Control Induction Machines....1002

N. Faezah Alias, Auzani Jidin, Huzainirah Ismail, R.N. Firdaus, M. Khairi Rahim, Atikah Razi, Wahidah Abd. Halim

Power Electronics and Drives Research Group, CeRIA/FKE Universiti Teknikal Malaysia Melaka, Malaysia

Session PQHS-I: Power Quality Issues, Harmonic Problems and Solutions I

Date/Time: Friday, 12 June 2015/11:00 – 12:30 hrs

Venue: Room 4 @ Level 4

Session Chair: Don Mahinda Vilathgamuwa, Queensland University of Technology, Australia

212 A Novel Control Strategy for Multi-modular Shunt Active Power Filter System....1007 Ounwei Xu and Guozhu Chen

College of Electrical Engineering, Zhejiang University, Hangzhou, China

An Analytical Inductor Design Procedure for Three-phase PWM Converters in Power Factor Correction Applications....1013

Alireza Kouchaki, Farideh Javidi. N, Frerk Haase, Morten Nymand Maersk Mc-Kinney Moller Institute, University of Southern Denmark

A Comparison between Boundary and Continuous Conduction Modes in Single Phase PFC Using 600V Range Devices....1019

Juan C. Hernandez, Lars P. Petersen, Michael A. E. Andersen Dept. Electrical Engineering Technical University of Denmark Oersteds Plads, 349. Kongens Lyngby, Denmark

377 Electromagnetic and Thermal Characterisation of PCB Planar Transformer....1024

Lew Andrew R. Tria, Daming Zhang, John E. Fletcher School of Electrical Engineering and Telecommunications, University of New South Wales, Australia

481 Implementation of Sector Change Detection Schemes for Current Error Space Phasor Hysteresis Controller Based Shunt Active Power Filters....1029

P. N. Tekwani and Siddharthsingh K. Chauhan

Department of Electrical Engineering, Institute of Technology, Nirma University, Sarkhej-Gandhinagar Highway, Ahmedabad, Gujarat, India.

Department of Electrical Engineering, Marwadi Education Foundation's Group of Institutions, India

Session ADEM-III: Analysis & Design of Electrical Machines III

Date/Time: Friday, 12 June 2015/13:30 – 15:00 hrs

Venue: Room 1 @ Level 4

Session Chair: King-Jet Tseng, Nanyang Technological University, Singapore

291 Comparison of Stator Flux Linkage Estimators for PWM-Based Direct Torque Controlled PMSM Drives....1035

Atsushi Shinohara, Yukinori Inoue, Shigeo Morimoto, Masayuki Sanada Osaka Prefecture University

314 Efficiency Analysis of a 42- pole/54-slot Fractionalslot Concentrated-wound Interior Permanent Magnet Synchronous Machine....1041

R.M.H.M.Rathnayake, R.Dutta, J. E. Fletcher, K. Ahsanullah, D.Xiao The University of New South Wales, Kensington, Sydney,, Australia

374 A New Version of Phase-Variable Modeling of an Induction Motor Using PSIM....1047

Ming-Fa Tsai, Chung-Shi Tseng, Yu-Yuan Chen*, and Wen-Yang Peng* Department of Electrical Engineering, Minghsin University of Science and Technology, Taiwan, ROC

*Industrial Technology Research Institute of Taiwan, ROC

395 Acoustics of a 6-Phase Transversal Flux Outer-Rotor Switched Reluctance Drive....1053

Martin Harries, Andreas Hofmann, Rik W. De Doncker

Insitute for Power Electronics and Electrical Drives RWTH Aachen University, Germany

450 Methods of reducing the computational complexity of predictive controller with induction motors....1060

K. Wróbel, P. Serkies and K. Szabat

Department of Electrical Machines, Drives and Measurements Wroclaw University of Technology Wroclaw, Poland

Session MDMC-V: Motion Drives and Motion Control V

Date/Time: Friday, 12 June 2015/13:30 – 15:00 hrs

Venue: Room 3 @ Level 4

Session Chair: Sanjib K. Panda, National University of Singapore, Singapore

87 Simulation Based Improved Analysis of BLDC Motor by Coupling FEM Motor Model with Various Switching Patterns....1064

Yosub Sim, Noboru Niguchi and Katsuhiro Hirata

Department of Adaptive Machine Systems, Graduate School of Engineering, Osaka University

122 Integrated high-speed PMSM Drive with IMS PCB-Technology for Mobile Applications....1070

M.Sc. Florian Ludwig, Dr. Ing. Tobias Heidrich, PD Dr. Ing. habil. Andreas M^{*} ockel Technische Universit^{*} at Ilmenau Institute for Electric Power and Control Engineering Ilmenau, Germany

180 Torque Control of IPMSM to Avoid Voltage Saturation....1074

Taketo Sugiyama*, Kazuki Morishita*, Takaharu Takeshita*, Shizunori Hamada†
*Department of Computer Science and Engineering Nagoya Institute of Technology, Japan
†MEIDENSHA CORPORATION Research & Development Group, Japan

482 A Novel Design of Rotor Position Estimator for Sensorless Control of SPMSM Operating at Medium and High Speeds....1080

Zhao-Oin Guo and Sanjib Kumar Panda

Department of Electrical and Computer Engineering National University of Singapore Singapore

Session PQHS-II: Power Quality Issues, Harmonic Problems and Solutions II

Date/Time: Friday, 12 June 2015/13:30 – 15:00 hrs

Venue: Room 4 @ Level 4

Session Chair: Geoffrey Walker, Queensland University of Technology, Australia

21 Application of Power Electronics in Improving Power Quality and Supply Efficiency of AC Traction Networks....1086

Igor Perin, Peter F Nussey, Dr Umberto M Cella, Truc V Tran and Prof. Geoffrey R Walker Aurizon, Brisbane, Australia

Queensland University of Technology, Brisbane, Australia

289 Comparing Total Harmonic Distortion for Cascade HBridge Multilevel Active frontend Converters with Low Carrier Ratio....1095

Chung-Chuan Hou and Chih-Hsiang Yang Chung Hua University, Hsinchu, Taiwan, R.O.C.

393 Common-mode Noise Analysis, Modeling and Filter Design for a Phase-shifted Fullbridge Forward Converter....1100

Ishtiyaq Ahmed Makda and Morten Nymand Maersk Mc-Kinney Moller Institute University of Southern Denmark

400 A Control Strategy for Dynamic Voltage Restorer....1106

Dinh Thanh Viet, Nguyen Huu Hieu, Nguyen Le Hoa and Ngo Minh Khoa University of Science and Technology – The University of Danang, Vietnam Quynhon University, Vietnam

316 Case Study: Simulation of a Thin Controllable Network Transformer on the Eastern Australian Transmission Network....1111

Hayden Wittig and John Fletcher School of EE&T, UNSW Australia, Sydney, Australia

Session MSPE-I: Modelling & Simulation in Power Electronics I

Date/Time: Friday, 12 June 2015/15:30 – 17:00 hrs

Venue: Room 1 @ Level 4

Session Chair: Dilip Battul, Singapore Polytechnic, Singapore

72 Fatigue Life Prediction of IGBT Module for Metro Vehicle Traction Converter Based on Traction Calculation....1116

Jie DING (1,2), Ping ZHAN(1), Jianghong LI(2)

- (1) College of Civil Engineering and Mechanics, Xiangtan University, China;
- (2) CSR Research of Electrical Technology & Material Engineering, China

94 High-Current Test-Bench for Thyristor-Based Semiconductors....1122

Johannes Voss, Garrikoitz Sarregui, Fabian Rossbach, Rik W. De Doncker and Ander Ubillos

PGS - Institute for Power Generation and Storage Systems RWTH Aachen University, Germany

University of Mondragon Mondragon, Spain

345 Performance Analysis of an Analytical Calculation Tool for Dual-Active-Bridge Converters....1130

Hauke van Hoek, Keijo Jacobs and Rik W. De Doncker Insitute for Power Electronics and Electrical Drives (ISEA), RWTH Aachen University, Germany

448 A Clamped Feedback Based Digital Versatile Optimal Bidirectional Battery Charger for HEV/PHEV....1138

Varun Chitransh, Amit Singh and R.K.Singh

Department of Electrical Engineering, Indian Institute of Technology (BHU), U.P. India

Session MDMC-VI: Motion Drives and Motion Control VI

Date/Time: Friday, 12 June 2015/15:30 – 17:00 hrs

Venue: Room 3 @ Level 4

Session Chair: Sanjib K. Panda, National University of Singapore, Singapore

273 Redundancy of Angular Speed Sensors in a Double Induction Machine Rear Drive for EV....1144

Michael Schubert and Rik W. De Doncker

ISEA - Institute for Power Electronics and Electrical Drives, RWTH Aachen University,

Germany

Estimation of the Mechanical State Variables of Two-Mass System Using Adaptive Kalman Filter....1152

Marcin Kamiński, Krzysztof Drózdz and Krzysztof Szabat

Faculty of Electrical Engineering Wroclaw University of Technology Wroclaw, Poland

451 Performance Evaluation Of Clamping Position Variation On Advanced Bus Clamping Strategies: Experimental Investigation....1156

Meenu D Nair, G Vivek, Mukti Barai

Department of Electrical Engineering, NIT Calicut, India

Damping of Torsional Vibrations of Two-Mass System Using Adaptive Low Computational Cost Fuzzy PID Controller....1162

Piotr Derugo and Krzysztof Szabat

Faculty of Electrical Engineering Wroclaw University of Technology Wroclaw, Poland

Session PQHS-III: Power Quality Issues, Harmonic Problems and Solutions III

Date/Time: Friday, 12 June 2015/15:30 – 17:00 hrs

Venue: Room 4 @ Level 4

Session Chair: Daming Zhang, University of New South Wales, Australia

A Universal Controller for Grid-tied DC/AC Converters for Harnessing PV Panel based Solar Energy and PMSG based Wind Energy....1166

Daming Zhang (1) and Kingjet Tseng (2)

- (1) University of New South Wales, Sydney, Australia
- (2) Nanyang Technological University, Singapore

280 Optimized Design of Wide-Area PSS for Damping of Inter-Area Oscillations....1172

N.P. Patidar(1), M.L. Kolhe(2), N.P. Tripathy(3), B. Sahu(3), A. Sharma(4), L.K. Nagar(5), A.N. Azmi(2)

- (1) National Institute of Technical Teachers' Training and Research, Bhopal, India
- (2) University of Agder, Faculty of Engineering & Science, Grimstad, Norway
- (3) National Institute of Science and Technology, Berhampur, India
- (4) University Institute of Technology, RGPV, Bhopal, India
- (5) Oriental Institute of Science and Technology, Bhopal, India

422 Integrated Three-Level NPC Based DSTATCOM Topology Using MISCT Control....1178 Algorithm for Load Compensation with Non-Stiff Source

S. P. Gawande and M. R. Ramteke

Yeshwantrao Chavan College of Engineering, Nagpur, India Visvesvaraya National Institute of Technology, Nagpur, India

427 Magnetically Levitated Rotor Spinning Drive System with high System Stability....1184

Martin Reisinger, Siegfried Silber, Jirí Sloupensky, Milan Moravec, Wolfgang Amrhein and Peter Dirnberger

Linz Center of Mechatronics GmbH, Austria,

Rieter CZ s.r.o, Czech Republic

Institute of Electrical Drives and Power Electronics Johannes Kepler University Linz, Austria