Conference Programme
## IEEE PEDS 2017 Conference Programme Schedule

12 – 15 December 2017, Honolulu, Hawaii, USA

### Overall Programme Table

<table>
<thead>
<tr>
<th>Time</th>
<th>12 December (Tue)</th>
<th>13 December (Wed)</th>
<th>14 December (Thu)</th>
<th>15 December (Fri)</th>
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<tr>
<td>1330 – 1510</td>
<td>0900 – 1800</td>
<td>Poster Session I  (301A &amp; 301B)</td>
<td>Tea Break</td>
<td>Tea Break</td>
</tr>
</tbody>
</table>
Conference Venue

Hawaii Convention Center, Level 3
1801 Kalakaua Ave, Honolulu, HI 96815, United States


Conference Social Events

Welcome Reception: 12 December 2017 @ 6:30pm – 8pm Charlot Courtyard
Conference Dinner: 14 December 2017 (Bus leaves at 3:30pm) Paradise Cove
Conference registration desk is located at the Pa Kalihi courtyard. The registration desk opens daily throughout the conference period.
Welcome Message from General Chairs

On behalf of the PEDS'17 Organizing Committee, it is a great honor for me to extend a warm welcome to all the participants taking part in the Twelfth IEEE International Conference on Power Electronics and Drive Systems (PEDS) Conference at the Hawaii Convention Center in Honolulu, Hawaii. The PEDS Conference originated in Singapore and the first PEDS conference was held in Singapore in 1995. The aim of the PEDS Conference is to provide a forum for participants from industries and academia in the area of power electronics, electric drives and energy systems to exchange ideas and interact. All the PEDS conferences are being held in technical co-sponsorship with the IEEE Power Electronics Society and IEEE Industry Applications Society.

This is the 1st time the PEDS conference is going to be held in the island of Hawai. Hawaii being centrally located in the Pacific Ocean attracts many IEEE technical conferences averaging about 11 a year for technologist from the Pacific Rim and rest of the World to gather and discuss various technical issues.

The conference includes a full-day tutorial type of four technical tutorials to be provided by eminent researchers in the afternoon of 12 December 2017, followed by three days of technical paper presentations from 13-15th December 2017. The Technical Program Committee has assembled a program that is outstanding in quality and diversity. There will be more than 200 technical papers presented during the technical sessions, involving authors from many different countries, and 2 additional special sessions.

Besides the technical program spreading over four days, there are many exciting tourist attractions within the island of Hawaii and neighbouring islands for the delegates to explore. We hope the conference delegates would bring their families along to enjoy these attractions during the pre/post-conference period. While in Hawaii, we encourage you to explore the natural beauty of Hawaii by enjoying the beach, snorkelling at Hanauma Bay or Shark's Cove or taking a hike up Diamond Head, Koko Head Crater or the many other tropical trails on Oahu.

Finally, we would like to thank everybody involved in the organization of this event for having brought together an outstanding technical program and wish all the participants a very successful conference with fruitful discussions and enjoyable stay in Hawaii.

Welcome to Hawaii!

John Ogawa Borland and Sanjib Kumar Panda
PEDS 2017 General Chairs
PEDS 2017 Conference Committee

Conference Advisory Board
Norbert Cheung, Hong Kong
Yanuarsyah Haroen, Indonesia
Yung C. Liang, Singapore
Tian-Hua Liu, Taiwan
Sanjib K. Panda, Singapore
Sukumvit Phoomvuthisarn, Thailand
Zainal Salam, Malaysia
Tadashi Suetsugu, Japan
Faz Rahman, Australia

General Chairs
John Ogawa Borland, IEEE Hawaii Section, Hawaii, USA
Sanjib K. Panda, National University of Singapore, Singapore

Organising Chairs
Yen Kheng Tan, Singapore University of Technology and Design, Singapore
Song K. Choi, University of Hawaii, Hawaii, USA

Technical Programme Chair
Yung C. Liang, National University of Singapore, Singapore

Treasurer
Dilip Battul, Singapore Polytechnics, Singapore

Tutorial Chair
King J. Tseng, Singapore Institute of Technology, Singapore

Publicity
Janet Kuwata, Hawaii Visitors & Convention Bureau, Hawaii, USA
Fai Choy Leong, Singapore Polytechnic, Singapore

Publication
Shaoying Huang, Singapore University of Technology and Design, Singapore

Local Arrangement
Natalie Tarce Shiinoki, Hawaii Visitors & Convention Bureau, Hawaii, USA

Committee Member
Tee Hui Teo, Singapore University of Technology and Design, Singapore
PEDS International Panel Members

P. Acarnley, UK
Hirofumi Akagi, Japan
J. Marcos Alonso, Spain
Gehan A. J. Amaratunga, England
Ashoka Bhat, England
D. Boroyevich, USA
B. K. Bose, USA
Ke-Horng Chen, Taiwan
Yaow-Ming Chen, Taiwan
Henry Chung, Hong Kong
J. C. Clare, UK
Francis P. Dawson, Canada
Deepak Divan, USA
Malik E. Elbuluk, USA
Prasad Enjeti, USA
Bulent Ertan, Turkey
A. J. Forsyth, UK
Hideaki Fujita, Japan
T. C. Green, England
Yanuarsyah Haroen, Indonesia
Jung I. Ha, Korea
Boyong He, China
Hiang-Kwee Ho, Singapore
J. Holtz, Germany
Chih-Fang Huang, Taiwan
Qin Huang Alex, USA
R. S. Y. Hui, Hong Kong
John Y. Hung, USA
Iqbal Husain, USA
Thomas M. Jahns, USA
Praveen Jain, UK
Juri Jatskevich, Canada
K. Jezernek, Slovenia
M. K. Kazimierczuk, USA
Ralph Kennel, Germany
J. Kolar, Switzerland
Matsuse Kouki, Japan
Jason Lai, USA
Yen-Shin Lai, Taiwan
Loi Lei Lai, UK
Tsorng-Juu Liang, Taiwan
Yi-Lu Liu, USA
Pascal Lorenz, France
Robert D. Lorenz, USA
Dongsheng Ma, USA
Udaya Madawala, New Zealand
Nobuyuki Matsu, Japan
Ned Mohan, USA
Gabriel Rincón-Mora, USA
M. Nakaoka, Japan
Chem Nayar, Australia
T. Ninomiya, Japan
Shigeru Okuma, Japan
Boon Teck Ooi, Canada
Dr. S. Paramasivam, India
Z. Qian, China
Alex Ruderman, Kazakhstan
Dierk Schroeder, Germany
H. Sekiya, Japan
P. C. Sen, Canada
Jul-Ki Seok, Korea
M. Shoyma, Japan
T. Suetsugu, Japan
Seung-Ki Sul, Korea
Paolo Tenti, Italy
C. K. Michael Tse, Hong Kong
Tore M. Undeland, Norway
Lixiang Wei, USA
Bin Wu, Canada
Tsai-Fu Wu, Taiwan
J. Daan Van Wyk, USA
Dehong Xu, China
Dian Guo Xu, China
Longya Xu, USA
Abdul H B M Yatim, Malaysia
Zhengming Zhao, China
Georges Zissis, France
Sanjeevikumar Padmanaban, South Africa

<table>
<thead>
<tr>
<th>Year</th>
<th>Conference Venue</th>
<th>Organised by</th>
</tr>
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</table>
| 1995 | Singapore        | Ramesh Oruganti  
 *National University of Singapore* |
| 1997 | Singapore        | Yung C. Liang  
 *National University of Singapore* |
| 1999 | Hong Kong        | Norbert C. Cheung  
 *The Hong Kong Polytechnic University* |
| 2001 | Bali             | Yanuarsyah Haroen  
 *Bandung Institute of Technology* |
| 2003 | Singapore        | Sanjib K. Panda  
 *National University of Singapore* |
| 2005 | Kuala Lumpur     | Zainal Salam  
 *Universiti Teknologi Malaysia* |
| 2007 | Bangkok          | Sukumvit Phoomvuthisarn  
 *Chulalongkorn University* |
| 2009 | Taipei           | Tian-Hua Liu  
 *National Taiwan Univ. of Science and Technology* |
| 2011 | Singapore        | Sanjib K. Panda  
 *National University of Singapore* |
| 2013 | Kitakyushu       | Tadashi Suetsugu  
 *Fukuoka University* |
| 2015 | Sydney           | Yung C. Liang  
 *National University of Singapore*  
 David Tien  
 *Charles Sturt University* |
| 2017 | Honolulu         | Yen Kheng Tan  
 *Singapore University of Technology and Design*  
 Song K. Choi  
 *University of Hawaii, Hawaii* |
IEEE PEDS 2017 offers the following tutorial sessions free of charge, provided that you have already registered with the conference technical sessions. The tutorial sessions do not provide any tea breaks or lunch.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Speakers</th>
<th>Title</th>
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</table>
| 12 December| 09:00 AM – 01:00 PM | Prof. Ralph Kennel  
Technical University of Munich, Germany | Predictive Control – A Simple and Powerful Method to Control Power Converters and Drives |
| Tuesday    | 02:00 PM – 06:00 PM | Prof. Ralph Kennel  
Technical University of Munich, Germany | Encoderless Control of Synchronous Machines – State of the Art as well as Realistic and Unrealistic Expectations |
|            | 09:00 AM – 01:00 PM | Prof. Huai Wang  
Prof. Frede Blaabjerg  
Aalborg University, Denmark | Capacitors in Power Electronics Applications — Reliability and Circuit Design              |
|            | 02:00 PM – 06:00 PM | Prof. Longya Xu  
Prof. Jin Wang  
Prof. Yi Huang  
Ohio State University, USA | Electric Machines and Wide Bandgap Power Electronics for High Speed High Performance Electric Machine Drives |

For more details on these tutorial, please view the conference website:  
Technical Sessions

Plenary Session
Date/Time: Wednesday, 13 December 2017/09:00 – 12:30 hrs
Venue: Room 311
Chair: Song K. Choi, University of Hawaii, Hawaii, USA

PL1 How Hawaii Plans to achieve its 100% Renewable Energy Goal
Colton Ching
Hawaiian Electric Company, USA

PL2 Residential Solar Smart Inverter and Control System: Current Status and Future Developments
Ruben Dagstanyan
Tabuchi Electric Co. Ltd., USA

PL3 Solid-State Transformers using Silicon Carbide-based Modular Building Blocks
R. Raju
GE Global Research, Niskayuna NY, USA

PL4 Integration, Interconnection and Interoperability of Energy Resources and Loads – the Growing Role of Power Electronics for Modern Power Systems
King Jet Tseng
Singapore Institute of Technology, Singapore

Poster Session I
Date/Time: Wednesday, 13 December 2017/13:30 – 1510 hrs
Venue: Room 301A and 301B
Chair: Yen Kheng Tan, Singapore University of Technology and Design, Singapore

103 A Proposed Voltage Technique for Inverter Open Fault-Circuit Detection Based on SVM Strategy
Bendiabdellah Azzeddine, Cherif Bilal Djamal Eddine
University of Science and Technology of Oran
Algeria

105 Initial Position Estimation of Small SPMSM for Position Sensorless Control
Yuya Mishuku, Masaru Hasegawa
Chubu University
Japan

109 A Constant Voltage-Frequency Control Strategy Based on Dividing Frequency Complex Virtual Impedance
Yan Li, Xiangyue Shi, Fayun zhou, Yufei Yue, Peng Gou, Xucheng Huang
Central South University, Hunan University
China

120 Reduced Order VSC Model Based on Balanced Truncation
Zheng Yuan, Zhengchun Du, Guiyuan Li, Bo Liu, Pingle Hao
Xi’an Jiaotong University
China

128 Optimized Power Management Circuit for Implantable Rectenna for In-Body Medical Devices
Majdi M. Ababneh, Kavyashree P, A. Qaroot, Samuel Perez, Sylvia Thomas, Yen Kheng Tan
University of South Florida, United States
Singapore University of Technology and Design, Singapore

167 Wide Bandwidth Current Probe for Power Electronics Using Tunneling Magnetoresistance Sensors
Nathan Tröster, Branimir Dominković, Julian Wölfle, Manuel Fischer, Jörg Roth-Stielow
169 Combination of Two Variables in a Junction Temperature Control System to Elongate the Expected Lifetime of IGBT-Power-Modules
Julian Wölfle, Maximillian Nitzsche, Nathan Tröster, Johannes Ruthardt, Martin Stempfel, Jörg Roth-Stielow
University of Stuttgart
Germany

175 An Easily-Installed Hardware-In-the-Loop (HIL) Inverter System for Power Electronics Teaching
Ruiyun Fu, Yucheng Zhang, Sagar Bhatta
Merrill University, Old Dominion University
United States

219 Simple Analytical Design of Lead Compensator for Qube Servo System
Yogesh V. Hote, Satya Prakash Srivastava
Indian Institute of Technology Roorkee
India

248 Back-to-Back Configuration of Multilevel Converters Providing Redundant Operation Mode
Sidney Gierschner, David Hammes, Yves Hein, Felix Kayser, Hans-Gunter Eckel, Dietmar Krug
University of Rostock, SIEMENS AG
Germany

25 A Novel Multiport Converter with an Auxiliary Voltage-Pumping Circuit for Fuel-Cell/Battery Hybrid Energy Sources
Ching-Ming Lai, Yu-Huei Cheng, Yun-Hsiu Li, Hsiu-Chen Chen
National Taipei University of Technology, Chaoyang University of Technology, National Taipei University of Technology
Taiwan

260 Resonant DC Circuit Breaker in MMC-HVDC Transmission System
Ryota Kinjo, Ryoya Ohta, Hidehito Matayoshi, Abdul Motin Howlader, Tomonobu Senjyu
University of the Ryukyus, Japan
University of Hawaii, United States

263 Improved Performance for Half Bridge Cells with Parallel Press-Pack Diode
Fabian Hohmann and Mark-M. Bakran
University of Bayreuth
Germany

276 Performance Comparison of Cascode GaN HEMT and Si MOSFET Based Inverter for Motor Drive Applications
Jennifer Lautner, Bernhard Piepenbreier
Friedrich-Alexander-University
Germany

279 Intelligent Driver Circuit with Robust Serial Interface
Niklas Langmaack, Gunter Tareilus, Markus Henke
Technische Universität Braunschweig
Germany

281 Review of High Efficiency Integrated LED lighting
Mei Yu Soh, Tee Hui Teo, Wen Xian Ng, Kiat Seng Yeo
Singapore University of Technology and Design
Singapore

285 Capacitance Minimization in Modular Multilevel Converters: A Reliable and Computationally Efficient Algorithm to Identify Optimal Circulating Currents and Zero-Sequence Voltages
Christopher Townsend, Galina Mirzaeva, Graham Goodwin
The University of Newcastle
Australia

308 Consideration on Primary Control Reserve Provision by Industrial Microgrids in Grid-Coupled Operation
Thorsten Vogt, Julia Badeda, Joachim Böcker, Dirk Uwe Sauer
Paderborn University, RWTH Aachen University, AEG Power Solutions, Batterie Ingenieure GmbH Germany

323 Switching Sequence for Balancing Heat Generation in Integrated Switched Reluctance Motor Drive Circuit
Kei Hayashi, Tsuyoshi Funaki
Osaka University
Japan

328 Development of Buck-Boost Maximum Power Point Tracking for a Solar Cell Using GaN Semiconductor
Masayoshi Hamanaka, Takanori Matsuyama, Kazuto Yukita, Yasuyuki Goto, Toshiro Matsumura
Aichi Institute of Technology
Japan

34 Cooperative Strategy for Distributed Voltage Control in Active Distribution Feeders
Hongbin Wu, Chenyang Huang, Ming Ding
Hefei University of Technology, State Grid Anhui Economic Research Institute
China

359 A Switchable Cascaded Multi-DC-Branch for Permanent Magnet Synchronous Generator in Wide Speed Range on Wind Energy Conversion System
Feng Guihong, Sun Shaonan, Zhang Bingyi, Guan Xin
Shenyang University of Technology
China

368 Advanced Photovoltaic MPPT Control Method Using an Electromagnetic Relay for Solving the Partial Shade Problem
Ikuo Nanno, Tarek Ahmed, Masayuki Takamori
Ube College, Japan
Assiut University, Egypt

375 Study on Power Interchange for Surplus Electric Power by Distributed Power Supply in Micro Grid
Aichi Institute of Technology
Japan

377 Control Method for Ripple Current Reduction and Grid Current Correction in a Single Phase DC-AC DAB Converter
Jiang You, Mahinda Vilathgamuwa, Negareh Ghasemi, Wynand Malan
Harbin Engineering University, China
Queensland University of Technology, Australia

38 A Novel Charge Balance Insensitivity Power Device Structure
Kaizhou Tan, Zhaohuan Tang, Qiang Fu, Yi Zhong, Yong Liu, Wensuo Chen, Zhikuan Wang, Shengdong Hu, Lei Huang, YongHui Yang, Kunfeng Zhu
Science and Technology on Analog Integrated Circuit Laboratory, China Electronics Technology Group Corporation, Chong Qing University
China

387 LLC Resonant Type Boost Converter for HVDC Interconnection of PV Generation Facility
Ryoya Ohta, Hidehito Matayoshi, Motin Howlader, Tomonobu Senju
405 Optimal Sizing of PV-Wind-Battery Power System Considering Demand Response Programs
Shota Tobaru, Foday Conte, Abdul Motin Howlader, Tomonobu Senjyu, Toshihisa Funabashi
University of the Ryukyus, Nagoya University, Japan
University of Hawaii, United States

407 The Steady Current Characteristics of the Voltage Phase Resolution of Model Predictive Modulated Current Vector Control for PMSM
Masahiro Shimaoka, Shinji Doki
Nagoya University, Japan

409 Mathematical Models on Extended Electromotive Force Exited by High Frequency Signal Injection and Its Robustness for Position Estimation of PMSM
Shota Kondo, Shinji Doki, Mutuwo Tomita
Nagoya University, Japan
National Institute of Technology, Gifu College, Japan

414 Optimization Design and Analysis of a Bearingless Flux-Switching Permanent Magnet Machine
Hongyun Jia, JiaJun Luo, Jun Cai, Zhou Jia, Yongjuan Cao, Ming Cheng
Nanjing University of Information Science and Technology, Southeast University, China

433 Synchronous DC Link Voltage Control for Microinverters with Minimum DC Link Capacitance
Seyed Milad Tayebi, Issa Batarseh
University of Central Florida, United States

77 Current Control of IPMSM to Avoid Voltage Saturation for Changing Frequency and Amplitude of Vibration Torque Reference
Ryohei Matsuura, Taketo Sugiyama, Takaharu Takeshita, Yugo Tadanoy, Shizunori Hamaday, Hajime Kubo
Nagoya Institute of Technology, Meidensha Corporation, Japan

917 The Thermal Model and Thermal Management of High Power IGBT PWM Inverter
Xiaohong Hao, Huimin Wang, Yixiong Wang
University of Electronics Science and Technology of China, China

349 Optimal Control of Film Growth in Dual Lithium-Ion Battery Energy Storage System
Yang Li, D. Mahinda Vilathgamuwa, San Shing Choi, Troy W. Farrell, Ngoc Tham Tran, Joe Teague
Queensland University of Technology, Australia

907 Stability Analysis of Grid-Connected Voltage-Source Converters with Unbalanced Loads
Oumar Diene, Claudio An F. Nascimento, Edson H. Watanabe
Federal University of Rio de Janeiro, Cidade Universitária, Federal University of São Carlos, Brazil

936 Torque Error Compensation of SPMSM Drives Using a Stator Flux Linkage Observer
Chang-Seok Park, Seon-Hwan Hwang, Jae Suk Lee
Chonbuk National University, Kyungnam University, Korea

947 DC Link Voltage Controller for Three Phase Vienna Rectifier with Compensated Load Current and Duty
SeungTae Lee, Jae Uk Lim, Hag Wone Kim, Kwan Yuhl Cho
Korea National University of Transportation
Korea

**Poster Session II**

**Date/Time:** Wednesday, 13 December 2017/15:30 – 1710 hrs  
**Venue:** Room 301A and 301B  
**Chair:** Dilip Battul, Singapore Polytechnics, Singapore

**Position-Sensorless Control Method for Permanent Magnet Synchronous Motor Using Speed Observer and Induced Voltage Caused by Magnetic Saturation**  
Mengyue Wu, Hisao Kubota, Yusuke Shibano, Sari Maekawa  
Meiji University, Toshiba Corporation  
Japan

**Optimization of LCL Filter and Controller Parameters for Grid-Connected Converter Adopting Differential Evolution (DE) Algorithm**  
Kazi Saiful Alam, Lew Andrew R. Tria, Daming Zhang, Dan Xiao, M.F. Rahman  
University of New South Wales, University of Philippine  
Australia

**Study on IPMSM Modeling and Sensorless Control Considering Space Harmonic**  
Ye Jun Oh, Ju Lee, Geochul Jeong, Tae Hoon Kim, Dong-Woo Kang, Wooyoung Ji, Hyungwoo Lee  
Hanyang University, Keimyung University, Korea National University of Transportation  
Korea, Republic Of

**A Soft-Switching Three-Phase Five-Arm Dynamic Voltage Restorer**  
Maoh-Chin Jiang, Min-Lun Tsai  
National Ilan University  
Taiwan

**Analytical Calculation of Air Gap Magnetic Field Distribution in Vernier Motor**  
Hyoseok Shi, Noboru Niguchi, Katsuhiro Hirata  
Osaka University  
Japan

**Protection From Internal Faults in a Special High Power Switching Conversion System for Thermonuclear Fusion Application**  
Loris Zanotto, Mattia Dan, Elena Gaio, Daniel Gutierrez, Hans Decamps, Mauro Perna, Daniele Falchi, Claudio Finotti, Carlo Panizza, Alessandro Premoli  
Università di Padova, Italy  
Fusion For Energy, Spain  
ITER Organization, France

**Offset Voltage Control Scheme for Modular Multilevel Converter Operated in Nearest Level Control**  
Byung Moon Han  
Myongji University  
Korea, Republic of

**DFIG’s Virtual Resistance Demagnetization for Crowbar Less LVRT**  
Andreas Uphues, Kilian Nötzold, Ralf Wegener, Stefan Soter  
Retostronik GmbH, University of Wuppertal  
Germany

**Parameters Optimization of VSC-MTDC Control System to Improve Overall System Stability**  
Guiyuan Li, Zhengchun Du, Zheng Yuan, Chongtao Li  
Xi’an Jiaotong University  
China
164 Modular Bidirectional Full-SiC DC-DC Converter for Automotive Applications
Alexander Sewergin, Arne Hendrik Wienhausen, Karl Oberdieck, Rik W. De Doncker
RWTH Aachen University
Germany

168 Optimization of Low Voltage Synchronous Reluctance Machines Using Different Modulation Schemes
Stefan Staudt, Johannes Teigelkötter, Alexander Stock
University of Applied Sciences Aschaffenburg
Germany

187 Development and Construction of a Measurement Device for Testing and Safe Operation of
Experimental Wireless Electric Vehicle Chargers
Benjamin Klaus, Daniel Barth, Dominik Woll, Thomas Leibfried
Karlsruhe Institute of Technology
Germany

189 Highly Dynamic Analysis of Active Power and Fundamental Component Approximation of Inverter-Fed Applications
Alexander Stock, Johannes Teigelkötter, Stefan Staudt, Thomas Kowalski
University of Applied Sciences Aschaffenburg
Germany

196 LCL–LCCL Voltage Source Inverter with Phase Shift Control for Wireless EV Charger
Nattapong Hatchavanich, Mongkol Konghirun, Anawach Sangswang
King Mongkut’s University of Technology Thonburi
Thailand

201 An Interleaved Soft-Switching AC/DC Converter
Chien-Ming Wang, Chien-Min Lu, Chi-Hsiang Cheng
National Ilan University
Taiwan

204 Research on the Key Technology of Large Capacity UHV Transformer in Performance Improvement
Yongteng Jing, Huan Wang, Yan Li and Xiaoguang Yuan
Shenyang University of Technology
China

205 Research on Radial Stability of Autotransformer Inner Winding under the Short-circuit Condition
Huan Wang, Yan Li, Yongteng Jing, Dexu Zou
Shenyang University of Technology, Yunnan Electric Power Grid Co., Ltd.
China

Mike Böttigheimer, Nejila Parspour, Sebastian Maier
Universität Stuttgart
Germany

212 Efficiency Evaluation of MMSPC/CHB Topologies for Automotive Applications
Christian Korte, Eduard Specht, Marc Hiller, Stefan Goetz
Karlsruhe Institute of Technology, Germany
Duke University, United States

221 New Concept for Fault Tolerant PCB-Based Converters
Florian Kapaun, Christopher Dahmen, Rainer Marquardt
University of the Federal Armed Forces Munich
Germany
Analytical Investigation of Efficiency and Operating Range of Different Modular Multilevel Converters
Christopher Dahmen, Florian Kapaun, Rainer Marquardt
Universität of Bundeswehr Munich
Germany

FPGA Implementation and Examination of Efficiency in a High-Speed PMSM Drive System Based on Direct Torque Control
Kohei Yasumura, Yukinori Inoue, Shigeo Morimoto, Masayuki Sanada
Osaka Prefecture University
Japan

Filter Design for Active Neutral Point Clamped Voltage Source Converter Using High Frequency GaN-FETs
Alireza Kouchaki, Morten Nymand
University of Southern Denmark
Denmark

Reduction of Mechanical Loss of Flywheel Energy Storage System with Spherical Spiral Groove Bearing
Takeo Suzuki, Takumi Masuda, Jun-Ichi Itoh, Noboru Yamada
Nagaoka University of Technology
Japan

Design Considerations on a 36-Slot 28-Pole Permanent Magnet Drive
Boris Dotz, Matthias Ippisch, Dieter Gerling
FEAAM GmbH, Universität der Bundeswehr München
Germany

A Novel Unbalance Loads Compensation Method Based on Ultra-Capacitor
Zhihao Zhang, Yanmin Liu, Xiang Li, Liangzhi Men
Chinese Academy of Sciences
China

A Proposal of Consequent-Pole Type Bearingless Vernier Motor
Kanako Minami, Takahiro Sekine, Kimio Hijikata, Yasuhiro Tanaka
Tokyo City University
Japan

The Optimum Design of the Magnetic Orientation of Permanent Magnets for IPMSM under Hot Environments
Noriyoshi Nishiyama, Hiroki Uemura, Yukio Honda
Panasonic Corporation, Osaka Institute of Technology
Japan

Fault Detection of Three Phase Diode Rectifier Based on Harmonic Ratio of DC-Link Voltage Ripples
Jong Uk Lee, Seung Woo Baek, Kwan Yuhl Cho, Hag Wone Kim, Jaeho Choi
Korea National University of Transportation, Chungbuk National University
Korea, Republic Of

Increase of the Allowable Switching Rate of Wide-Bandgap Semiconductors through Spectral Control in a 12 V to 48 V Gallium-Nitride DC/DC Converter
Jan Kacetl, Tomas Kacetl, Christian Korte, Eduard Specht, Malte Jaensch, and Stefan Goetz
Porsche Engineering Group
Germany

APWM Converter with Primary-Series and Secondary-Parallel Connection for DC Micro-Grid System
Bor-Ren Lin, Y.C. Huang, S.E. Jian
National Yunlin University of Science and Technology
Taiwan
Practical Realization of a Grid-Edge Energy Router for Renewable Integration and Power Quality Support
Pankaj Kumar Bhowmik, Ehab Shoubaki, Somasundaram Essakiappan, Nazmus Sakib, Clint Halsted, Madhav Manjrekar, Aleksandar Vukojevic, Stuart Laval, Jason Handley
University of North Carolina, United States
Duke Energy, United States

Performance Evaluation of a Novel Bearingless PM Vernier Motor
Thomas Stallinger, Elisabeth Göbl, Richard Remplbauer, Wolfgang Gruber
Linz Center of Mechatronics GmbH, Johannes Kepler University Linz
Austria

Research on a Reactive Power Transmission Loss Optimization Modulation Strategy for the Auxiliary Commutation Circuit of Resonant DC Link Inverter
Enhui Chu, Si Li, Huaguang Zhang, Bonan Huang
Northeastern University
China

Control Approaches of Current-source Rectifier: Predictive Control Versus Pwm-based Linear Control
Jan Michalik, Vaclav Smidl, Zdenek Peroutka
University of West Bohemia
Czech Republic

Counter-Current Injection-Assisted IGCT Turn-Off Testing
Rene Sander, Daniel Gmeiner, Michael Suriyah-Jaya, Thomas Leibfried
Karlsruhe Institute of Technology (KIT)
Germany

Reduction of Torque Ripple in Double-Layered IPMSM for Automotive Applications by Rotor Structure Modification
Yuki Shimizu, Shigeo Morimoto, Masayuki Sanada, Yukinori Inoue
Osaka Prefecture University
Japan

Control of MMC-HVDC in Low-Inertia Weak Grids
Suman Debnath, Madhu Chinthavali
Oak Ridge National Laboratory
United States

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**Session S1: Power Semiconductor Devices, IC and Drivers I**

**Date/Time:** Thursday, 14 December 2017/09:00 – 1040 hrs
**Venue:** Room 302A
**Chair:** Yung C. Liang, National University of Singapore, Singapore

126 Highly Efficient Power Inductors for High-Frequency Wide-Bandgap Power Converters
Arne Hendrik Wienhausen, Alexander Sewergin, Stefan P. Engel, Rik W. De Doncker
RWTH Aachen University
Germany

150 Design of High-Voltage and High-Speed Driver
Wen Li, Masami Makuuchi, Norio Chujo
Center for Technology Innovation-Production Engineering, Hitachi, Ltd
Japan

151 Low Thermal Resistance Thermal Pad for Power Converter Modules
Tadej Semenic, Avijit Bhunia, Neil Gollhardt, Garron Morris, Richard Lukaszewski
Teledyne Scientific Company, Rockwell Automation Low-Voltage Standard Drives
A Low On-State Voltage TIGBT with Planar Gate Self-Biased PMOS
Ping Li, Haimeng Huang, Xingbi Chen
UESTC
China

Experimental Comparison of Voltage and Current Source Gate Drivers for IGBTs
Christoph Lüdecke, Georges Engelmann, Karl Oberdieck, David Bündgen, Rik W. De Doncker
RWTH Aachen University
Germany

**Session S2: Special Session 1: Communications Energy Technology**

Date/Time: Thursday, 14 December 2017/09:00 – 1040 hrs
Venue: Room 302B
Chair: King J. Tseng, Singapore Institute of Technology, Singapore

950   A Novel Approach for Achieving ZVS Operation in Class-D ZVS Inverter
Xiuqin Wei, Hiroo Sekiya, Tadashi Suetsugu
Chiba Institute of Technology, Chiba University, Fukuoka University
Japan

951   Improvement of Transient Characteristics of AC-DC Converter Connected with HVDC Bus
Kazuhiro Kajiwara, Satoshi Kuboyama, Fujio Kurokawa
Nagasaki University
Japan

A Study on AC/DC Microgrids Considering Power Exchange
Kazuto Yukita, Daiki Owaki, Toshiro Matsumura, Keiichi Hirose
Aichi Institute of Technology
Japan

Expansion of DC Power from ICT to Smart Solutions,
Keiichi Hirose
NTT Facilities, Inc.
Japan

**Session S3: Renewable Energy Technologies I**

Date/Time: Thursday, 14 December 2017/09:00 – 1040 hrs
Venue: Room 304A
Chair: Jiangsheng Zhu, Aalborg University, Denmark

116   Cost-Effective High-Reliable Power Conditioner for Grid-integration of Multiple Off-Shore Wind Turbines Connected in Series
Tarek Ahmed, Katsumi Nishida, Ikuo Nanno
Assiut University, National Institute of Technology Ube College
Japan

240   Maximum Power Point Tracking Algorithm of SPVA under Inhomogeneous Irradiation Conditions: A Modified Fibonacci Search Based Approach
Malathy Sankar, R. Ramaprabha
SSN College of Engineering
India

290   Implementation of Photovoltaic Fed Single Phase Nine Level Hybrid Cascaded Modular Multilevel Inverter with Reduced Number of Devices
R. Ramaprabha, G. Ramya
SSN College of Engineering, KPR Institute of Engineering and Technology
India
### Session S4: Distributed Generation and Smart Grid I

**Date/Time:** Thursday, 14 December 2017/09:00 – 1040 hrs  
**Venue:** Room 304B  
**Chair:** Kevin Tomas Manez, Technical University of Denmark, Denmark

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<td>The University of Adelaide, Australia</td>
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<td>Yuhao Sun, Xuebing Chen, Shiliang Yang, Rusli, King Jet Tseng, Gehan Amaratunga</td>
<td>Nanyang Technological University, Singapore Institute of Technology, Singapore University of Cambridge, UK University of Adelaide, China</td>
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### Session S5: Design, Modelling and Simulation I

**Date/Time:** Thursday, 14 December 2017/09:00 – 1040 hrs  
**Venue:** Room 305  
**Chair:** Luc-Andre Gregoire, OPAL-RT Technologies Inc., Canada

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232 Knudsen Pump Based on Silicon Etching and Thermal Oxidation Process for On-Chip Vacuum Pumping
Nguyen Van Toan, Naoki Inomata, Nguyen Huu Trung, Takahito Ono
Tohoku University
Japan

274 Improving the Performance of SiC Trench MOSFETs under Hard Switching Operation
Andreas März, Mark-M. Bakran, Teresa Bertelshofer
University of Bayreuth
Germany

284 Evaluation of Impact of Parasitic Magnetic Coupling in PCB Layout on Common Source Inductance of Surface Mounted Package
Kyota Aikawa, Ryunosuke Matsumoto, Kazuhiro Umetani, Akihiro Konishi, Eiji Hiraki
Okayama University
Japan

430 Investigating the Impact of Uneven Magnetic Flux Density Distribution on Core Loss Estimation
Farideh Javidi Niroumand, Morten Nymand, Yiren Wang, Andrew J. Forsyth
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The University of Manchester, UK

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Chair: Andreas Liske, Karlsruhe Institute of Technology, Germany

332 Investigation and Performance-Evaluation of Online Sensor Fault-Compensation for IPM-Drives
Benjamin Grothmann, Dennis Jagosz, Juergen Rieblinger, Nikolaus Reiland, Dieter Gerling
Universitaet der Bundeswehr Muenchen
Germany

336 A New Position Sensorless Control for IPMSM Using FeatureValues Measured at ZeroVoltageVector Based on Pattern Matching Method
Hamin Song, Shinji Doki
Nagoya University
Japan

398 Vector Control and Experimental Verification of Magnetically Modulated Motor for HEV Application
Toshihiko Noguchi, Sawanth Krishna Machavolu, Yuto Motohashi, Masahiro Aoyama
Shizuoka University, Suzuki Motor Corporation
Japan

267 External Mechanical Parameters Identification of The Elastic Two-Mass System with Backlash
Can Wang, Ming Yang, Weilong Zheng, Qinan Ni, Ralph Kennel, Dianguo Xu
Harbin Institute of Technology, China
Technical University of Munich, Delta Electronics Co., Ltd., Germany

305 Sensitivity Analysis of a Permanent Magnet Temperature Observer for PM Synchronous Machines Using the Monte Carlo Method
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Date/Time: Thursday, 14 December 2017/11:00 – 12:40 hrs
Venue: Room 304A
Chair: Katsumi Nishida, Ube National College of Technology, Japan

264  Model Predictive Power Control of Dual-Stator Brushless Doubly-Fed Induction Generator with Reduced Power Ripple
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Southeast University
China

64  Cascaded iH6 Multilevel Inverter with Leakage Current Reduction for Transformerless Grid-Connected Photovoltaic System
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Hangzhou Dianzi University, State Grid Jiangsu Electric Power Company, Nanjing Power Supply Company
China

391  Fault Detection and Isolation for Wind Turbine Electric Pitch System
Jiangsheng Zhu, Kuichao Ma, Zhe Chen
Aalborg University
Denmark

483  Research on the Discrete-Time Optimal Control of Photovoltaic MPPT
Yongheng Pang, Lei Meng, Huaguang Zhang, Dongsheng Yang, Guangru Zhang
North-eastern University, Electrical Research Institution
China

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Date/Time: Thursday, 14 December 2017/11:00 – 12:40 hrs
Venue: Room 304B
Chair: Yuhao Sun, The Cambridge Centre for Energy Efficiency in Singapore (CARES), Singapore

320  Distributed Voltage Control Method Using Volt-Var Control Curve of Photovoltaic inverter for a Smart Power Grid System
Abdul Motin Howlader, Staci Sadoyama, Leon R. Roose, Saeed Sepasi
University of Hawaii
United States

335  Research on Forecasting Method of Photovoltaic Power Generation Output Based on Cluster Analysis
Qiwei Wang, Zhiyuan Cai, Shaohua Ma, Yangyang Ge
Shenyang University of Technology, State Grid Liaoning Electric Power Research Institute
China

363  Dynamic Power Control of Three-Phase Multiport-Active Bridge DC-DC Converters for Interconnection of Future DC-Grids
Markus Neubert, Stefan P. Engel, Jan Gottschlich, Rik W. De Doncker
RWTH Aachen University
Germany

403  Unregulated Series Resonant Converter for Interlinking DC Nanogrids
Kevin Tomas Manez, Zhe Zhang, Ziwei Ouyang
Technical University of Denmark
Denmark
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Date/Time: Thursday, 14 December 2017/11:00 – 1240 hrs
Venue: Room 305
Chair: Hideo Saotome, Chiba University, Japan

393 Research on State Diagnosis Model of Transformer Winding Based on Multiple Physical Fields Coupling
Jianyuan Xu, Chen Cao, Wei Li, Xin Lin
Shenyang University of Technology
China

395 Real-Time Simulation of an Asymmetrical Phase-Domain Synchronous Machine on FPGA
Luc-André Grégoire, Jeremy Vian, Sébastien Cense, Jean Bélanger
OPAL-RT Technologies Inc.
Canada

408 A New Methodology for Vibration Reduction of a 2-Phase SRM Based on FEM Coupled Simulations and Genetic Algorithm Model
Daniel Augusto Prudente Correa, Silvio Nabeta, Jorge Da Silva, Fabio Pereira
EPUSP, CTMSP
Brazil

445 Elucidation of Quasi-Duality between Series-Series and Series-Parallel Topologies of Resonant Inductive Coupling Wireless Power Transfer Systems
Masataka Ishihara, Kazuhiro Umetani, Eiji Hiraki
Okayama University
Japan

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Venue: Room 302A
Chair: Geoffrey Walker, Queensland University of Technology, Australia

132 Study of a 3kW High-Efficient Wide-Bandgap DC-DC Power Converter for Solar Power Integration in 400V DC Distribution Networks
Yucheng Zhang, Yashwanth Bezawada, Ruiyun Fu, Weisong Tian, Robb M. Winter
Old Dominion University, Mercer University, South Dakota School of Mines and Technology
United States

247 The Application of VSC HVDC Technology to Asynchronous Interconnection in China
Yang Yuexi, Yang Jie, He Zhiyuan, Du Zhenyu, Zhu Lin, Kou Longze
Global Energy Interconnection Grid Research Institute, State Key Laboratory of Advanced Power Transmission Technology
China

273 A Capacitor Voltage Balancing Algorithm for Hybrid Modular Multilevel Converters in HVDC Applications
Viktor Hofmann, Mark-M. Bakran
University of Bayreuth
Germany

343 Study on Application of Multi-Level Converter to Realize Fast Current Control in DC Micro-Grid with Extremely Low Impedance Interconnections
Masaya Katayama, Tatsuki Ohno, Hidemine Obara, Atsuo Kawamura
**Session S12: Motor Drive and Motion Control II**

*Date/Time:* Thursday, 14 December 2017/13:30 – 1510 hrs  
*Venue:* Room 302B  
*Chair:* Oliver Wallscheid, University Paderborn, Germany

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<td>Filter Setting for Improving the Current Control Performance of IPMSMs in Over-modulation Region of Inverter</td>
<td>Yosuke Nakayama, Shinji Doki, Atsushi Matsumoto, Masaru Hasegawa</td>
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<td>Dongwoo Lee, Kan Akatsu</td>
<td>Shibaura Institute of Technology</td>
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<td>Japan</td>
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**Session S13: Emerging Technologies I**

*Date/Time:* Thursday, 14 December 2017/13:30 – 1510 hrs  
*Venue:* Room 304A  
*Chair:* Abdul Motin Howlader, University of Hawaii, Manoa, USA

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<td>Energy and Fuel Utilization of SiC-Based 400V DC Distribution Network and 208V AC Distribution Network with Distributed Resources Installation</td>
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<td>Old Dominion University, Mercer University, South Dakota School of Mines and Technology</td>
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<td>United States</td>
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<td>Maximizing the Voltage and Current Capability of GaN FETs in a Hard-Switching Converter</td>
<td>Edward A. Jones, Paige Williford, Zhe Yang, Jianliang Chen, Fred Wang, Sandeep Bala, Jing Xu, Joonas Puukko</td>
<td>The University of Tennessee, ABB Corporate Research, United States</td>
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<td>Marco Rivera, J. Muñoz, Patrick Wheeler, Xu Lie</td>
<td>Universidad de Talca, Chile</td>
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<td>University of Nottingham, UK</td>
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<td>Tsinghua University, China</td>
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Date/Time: Thursday, 14 December 2017/13:30 – 1510 hrs
Venue: Room 304B
Chair: Elisabeth Gobl, Johannes Kepler University, Austria

156 Eddy Current Loss Analysis of High Speed Permanent Magnet Motor with Partial Shielding
Rui Dai, Fengge Zhang, Guangwei Liu, Ye Hao
Shenyang University of Technology
China

75 Methods and Verification of Loss Breakdown in an AC Brushless PM Soft Magnetic Composite Machine
Yik Ling Lim, Wen. L. Soong, Nesimi Ertugrul
The University of Adelaide
Australia

81 Development of High-Efficiency Permanent Magnet Synchronous Generator for Motorcycle Application
Toshihiko Noguchi, Yuki Kurebayashi, Tetsuya Osakabe, and Toshihisa Takagi
Shizuoka University, Suzuki Motor Corporation
Japan

381 Maximization Design of Thrust Force for Cross-Coupled 2 DOF Planar Direct Drive Motor
Hiroshi Asai, Koki Sakuma, Tomoyuki Shimono, Takahiro Mizoguchi
Yokohama National University, Kanagawa Institute of Industrial Science and Technology
Japan

Session S15: Special Session by Technical Expert Panel
Date/Time: Thursday, 14 December 2017/13:30 – 1510 hrs
Venue: Room 305
Chair: Allen Hefner, Department of Energy/National Institute of Standards and Technology, USA

Wide Band Gap Power Electronics - Bridging the gap between technology and market
A panel of experts will provide their perspective on the status of SiC/GaN power devices and adoption in applications and products. The applications discussed will include drive systems and grid interface.

Panelists:
Allen Hefner (Chair) - Department of Energy/National Institute of Standards and Technology, USA
Johan Enslin - Clemson University, USA
Brij N. Singh - John Deere Electronic Solutions, USA
Ty McNutt - Wolfspeed/Cree, USA
Andrew Rockhill - Eaton Corporate Research & Technology, USA
Yung C. Liang - National University of Singapore Suzhou Research Institute, China
Ravi Raju - GE Global Research, USA

Session S16: Power System and FACTS II
Date/Time: Friday, 15 December 2017/09:00 – 1040 hrs
Venue: Room 302A
Chair: Kay Soon Low, National University of Singapore, Singapore
A Control Method for on Board Battery Power to Compensate the Fluctuation of Line Voltage in Case of Long Distance Power Feeding in DC Electric Railway
Suguru Hiramatsu, Hiroyasu Kobayashi, Febry Pandu Wijaya, Keiichiro Kondo, Masahisa Kageyama
Chiba University, West Japan Railway Company
Japan

Current-Balancing Technique for Paralleled Interleaved Inverters with Magnetically Coupled Inductors
Houman Pezeshki, Dejan Jovanović, Mark A.H. Broadmeadow, Geoff R. Walker, Gerard F. Ledwich
Queensland University of Technology
Australia

Studies on the Effects of Thyristor Dynamic Extinction Angle on HVDC Commutation Failure
Weihua Xu, Xiaoguang Wei, Kunpeng Zha, Jie Yang, Zhiyuan He
Global Energy Interconnection Research Institute, C-EPRI Electric Power Engineering Co. Ltd.
China

Fault-Tolerant Operation Scheme for Modular Multilevel Converter Under Arm Energy Imbalance
Kyeon Hur, Jaesik Kang, Heejin Kim, Hong-Ju Jung, Dong-Su Lee
Yonsei University, Hyosung Power and Industrial Systems R&D Center
Korea, Republic of

Power Loss Analysis of DAB Converter for SST Operated in Oscillating Power Control
Yang Zou, Rene Barrera-Cardenas, Takanori Isobe, Hiroshi Tadano
University of Tsukuba
Japan

Session S17: Motor Drive and Motion Control III
Date/Time: Friday, 15 December 2017/09:00 – 1040 hrs
Venue: Room 302B
Chair: Ufot Ekong, Tokai University, Japan

Asymptotic MTPF Control for High-Speed Operations in Direct Torque Controlled IPMSM Drives
Atsushi Shinohara, Yukinori Inoue, Shigeo Morimoto, Masayuki Sanada
Kagoshima University, Osaka Prefecture University
Japan

Impact of Rotor Position Sensor Errors on Speed Controlled Permanent Magnetized Synchronous Machines
Jens Gäechter, Mario Hirz, Roland Seebacher
Graz University of Technology
Austria

Analysis and Minimization of Output Current Ripple of Inverter-Fed Six-Phase AC Motors
Anwar Muqorobin, Pekik Argo Dahono, Agus Purwadi
Institute of Technology Bandung
Indonesia

Position Sensorless Adaptive Positioning Servo System Based on DyCE Principle with Adaptive Control Input Synthesis Using Convolutional Integration for Differential Calculation
Naoki Kawamura, Masaru Hasegawa
Chubu University
Japan

Session S18: Emerging Technologies II
Date/Time: Friday, 15 December 2017/09:00 – 1040 hrs
Venue: Room 304A
Chair: Mahinda Vilathgamuwa, Queensland University of Technology, Australia
Development of Interface Using Marker less AR for Hydroponic Culture Managing Systems in the Distant Place
Masaki Sekimoto, Kazuo Ikeshiro, Hiroki Imamura
Soka University
Japan

Module Integrated GaN Power Stage for High Switching Frequency Operation
Yasser Nour, Arnold Knott
Technical University of Denmark
Denmark

Power Density Distribution Analysis of an IPT System Based on Poynting Vector
Yuan Liu, Aiguo Patrick Hu
The University of Auckland
New Zealand

Characteristics of Wireless Power Transfer System with Two-dimensional Transmission Coils
Yongoh Choi, Won-Kyu Seol, Se-Kyo Chung
Gyeongsang National University
Korea

Session S19: Converter Switching Control and Topology I
Date/Time: Friday, 15 December 2017/09:00 – 10:40 hrs
Venue: Room 304B
Chair: Vivien Grau, RWTH Aachen University, Germany

A New Soft-Switched High Step-Up DC-DC Converter with Dual Coupled Inductors
Mojtaba Forouzesh, Yanfeng Shen, Keyvan Yari, Yam Siwakoti, Frede Blaabjerg, Huai Wang
Aalborg University, Denmark
Guilan Regional Electric Company, Iran
University of Technology Sydney, Australia

Pure Sinusoidal Output Current-Source Inverter Using Inductor Modules
Toshihiko Noguchi, Yosuke Iwata, Sota Yamaguchi
Shizuoka University
Japan

Dual-Port Output Control of Isolated DC/DC Converter Focusing on Duty Cycle and Frequency of Primary Inverter
Toshihiko Noguchi, Kazuki Shimizu, Yoshinori Matsushita
Shizuoka University
Japan

A Single Phase DC-AC Dual Active Bridge Series Resonant Converter For Photovoltaic Applications
Jiatu Hong, D.M. Vilathgamuwa, N.Ghasemi, T.Ishrat, Jiang You
Queensland University of Technology, Australia
Harbin Engineering University, China

Session S20: Industrial Seminar
Date/Time: Friday, 15 December 2017/09:00 – 10:40 hrs
Venue: Room 305
Chair: Yen Kheng Tan, Singapore University of Technology and Design, Singapore

Latest Advancements in the Real-Time Simulation of Power Electronics and Drive Systems
Luc-André Grégoire and Thomas Kirk
OPAL-RT Technologies

Abstract - Fast and efficient real-time simulation, when performing Hardware-in-the-Loop (HIL) studies, relies on two aspects: performance computing hardware and advanced solvers. Regardless of the application, the main
challenge is the hard time constraint to be met when solving for states at each time step. Currently, the hardware most commonly used are the central processing unit (CPU) and field-programmable-gate-array (FPGA) with each offering a different approach in the implementation of solvers. Generally, hardware is selected based on the time constant of the model to be simulated. For example, in the case of large power systems, the use of a CPU is often preferred with time-steps typically ranging between 25 µs (40 kHz) to 50 µs (20 kHz). In the case of power electronics and electric drive simulation, FPGAs can simulate these systems at high-frequencies ranging from 1-5 MHz. In some cases, a combination of FPGA and CPU can be used to perform a synchronized co-simulation. Application such as microgrids benefit from such co-simulation with distribution systems and their lower-frequency dynamics simulated on CPU, while converters and drives remain on FPGA. This presentation will also explore other applications including the simulation of Modular Multilevel Converters (MMCs) and Power Hardware-in-the-Loop (PHIL).

### Session S21: Power Quality and Harmonics

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<td>Xin Li, Wilsun Xu</td>
<td>University of Alberta, Canada</td>
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<td>Mixed Conduction Mode Control for Inductor Minimization in Grid-Tied Inverter</td>
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<td>94</td>
<td>New Hybrid Static Var Compensator with Series Active Filter</td>
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<td>Yamaguchi University, The Chugoku Electric Manufacturing Company Incorporated, Japan</td>
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<td>338</td>
<td>Flying-Capacitor Linear Amplifier to Realize Both High-Efficiency and Low Distortion for Power Conversion Applications Requiring High-Quality Waveforms</td>
<td>Tatsuki Ohno, Masaya Katayama, Hidemine Obara, Atsuo Kawamura</td>
<td>Yokohama National University, Japan</td>
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### Session S22: Motor Drive and Motion Control IV

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<td>Ryu Hosooka, Shinji Shinnaka</td>
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<td>Ufot Ekong, Mamiko Inamori, Masayuki Morimoto</td>
<td>Tokai University, Japan</td>
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<td>165</td>
<td>A Unified SVPWM Realization for Minimizing Circulating Currents of Dual Three Phase Machines</td>
<td>Hisham Eldeeb, Christoph Hackl, Mohamed Abdelrahem, Ayman Abdel-Khalik</td>
<td>Technical University of Munich, Germany</td>
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Alexandria University, Egypt

214 MPC Based Current Sharing for Maximum Torque Dynamics in Efficiency Optimized Field Oriented Induction Machine Control
Michael Schubert, Kshitij Girigoudar, Rik W. De Doncker
RWTH Aachen University
Germany

Session S23: Emerging Technologies III

Date/Time: Friday, 15 December 2017/11:00 – 1240 hrs
Venue: Room 304A
Chair: Hiroki Imamura, Soka University, Japan

314 Overmodulation of Seven-Phase Systems Using Minimum Infinity Norm
Tomas Komrska, Tomas Glasberger, Zdenek Peroutka
University of West Bohemia
Czech Republic

361 High-Voltage Pulsed Power Supply for the Igniter Circuit of a Pulsed Plasma Thruster
Kay Soon Low, Bingyin Kang
National University of Singapore
Singapore

432 Spectral Synthesis of Switching Distortion in Multilevel Converters
Eduard Specht, Christian Korte, Marc Hiller, Stefan Goetz
Karlsruhe Institute of Technology, Germany

478 Enhancing Wireless Power Transfer Capability of Inductive Power Transfer System Using Matrix Power Repeater
Rong Hua, Bo Long, Aiguo Patrick Hu
The University of Auckland
New Zealand

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Date/Time: Friday, 15 December 2017/11:00 – 1240 hrs
Venue: Room 304B
Chair: Huai Wang, Aalborg University, Denmark

106 Current-Doubler Based Multiport DC/DC Converter with Galvanic Isolation
Yoshinori Matsushita, Toshihiko Noguchi, Osamu Kimura, Tatsuo Sunayama
Shizuoka University, Yazaki Corporation
Japan

186 A Gate Driver Approach Enabling Switching Loss Reduction for Hard-Switching Applications
Michael Ebli, Martin Wattenberg, Martin Pfost
Reutlingen University, Dortmund Technical University
Germany

238 Control Techniques of the Auxiliary-Resonant Commutated Pole in the Dual-Active Bridge
Johannes Voss, Jochen Henn, Rik W. De Doncker
RWTH Aachen University
Germany

312 Analysis and Design of a Series-Resonant NPC DC-DC Converter for Auxiliary Supply Applications in DC Grids
Session S25: Power Electronic Applications I
Date/Time: Friday, 15 December 2017/11:00 – 1240 hrs
Venue: Room 305
Chair: Yung C. Liang, National University of Singapore, Singapore

253  Power Electronics for Subsea Systems: Challenges and Opportunities
Kaushik Rajashekara, Harish Krishnamoorthy
University of Houston
United States

422  Efficiency Improvement of High Frequency Inverter for Wireless Power Transfer System Using a Series Reactive Power Compensator
Jun Osawa, Takanori Isobe, Hiroshi Tadano
University of Tsukuba
Japan

446  Series Resonant Converters with the Resonant Capacitor Replaced by a Bridge
Ravi Raju
GE Global Research
United States

452  Application of GaN Device to MHz Operating Grid-Tied Inverter Using Discontinuous Current Mode for Compact and Efficient Power Conversion
Daichi Yamanodera, Takanori Isobe, Hiroshi Tadano
University of Tsukuba
Japan

Session S26: Electric Machine Design and Analysis II
Date/Time: Friday, 15 December 2017/13:30 – 1510 hrs
Venue: Room 302A
Chair: Hisham Eldeeb, Technical University of Munich, Germany

311  Two Layer Winding Arrangement for an Ironless, High Speed Axial-Flux PM-Machine
Tobias Micklitz, Wilfried Hofmann
TU Dresden
Germany

341  Slotless Bearingless High Speed Disk Drive Designed for Speeds beyond 100 krpm
Elisabeth Göbl, Wolfgang Amrhein, Hubert Mitterhofer
Johannes Kepler University Linz, Linz Center of Mechatronics GmbH
Austria

345  Design of Experiments Based Optimization of Synchronous and Switched Reluctance Machines
Tobias Lange, Claude Weiss, Rik W. De Doncker
RWTH Aachen University
Germany

348  Key Factors for the Design of Synchronous Reluctance Machines with Concentrated Windings
Tobias Lange, Claude Weiss, Rik W. De Doncker
RWTH Aachen University
Germany
Session S27: Motor Drive and Motion Control V

Date/Time: Friday, 15 December 2017/13:30 – 1510 hrs
Venue: Room 302B
Chair: Michael Schubert, RWTH Aachen University, Germany

223 Advanced Current Control of Synchronous Reluctance Motors
Riccardo Antonello, Ludovico Ortombina, Fabio Tinazzi, Mauro Zigliotto
University of Padova
Italy

231 On the True Maximum Efficiency Operations of Synchronous Motor Drives
Fabio Tinazzi, Paul Sandulescu, Luca Peretti, Mauro Zigliotto
University of Padova, Italy
ABB Corporate Research, Sweden

252 Energy-Efficient Stand-Alone Solar Water-Pumping System for Synchronous Reluctance Motor
Ludovico Ortombina, Fabio Tinazzi, Mauro Zigliotto
University of Padova
Italy

256 Precise Field Oriented Torque Control of Induction Machines Using Thermal Model Based Resistance Adaption
Fang Qi, Daniel Scharfenstein, Michael Schubert, Rik W. De Doncker
RWTH Aachen University
Germany

257 An Effective Start-up Algorithm for Sensorless Synchronous Reluctance and IPM Motor Drives
Ludovico Ortombina, Fabio Tinazzi, Mauro Zigliotto
University of Padova
Italy

Session S28: Emerging Technologies IV

Date/Time: Friday, 15 December 2017/13:30 – 1510 hrs
Venue: Room 304A
Chair: Tomas Komrska, University of West Bohemia in Pilsen, Czech Republic

Marc Hagemeyer, Norbert Fröhleke, Joachim Böcker, Bernd Rödder, Lars Alßmann, Bernd Völkelz
Paderborn University, NIMAK GmbH
Germany

268 Potential of a Power Supply on Chip for Solar Cell Based Energy Harvesting Systems
Kosei Yamada, Kengo Hiura, Satoshi Matsumoto
Kyushu Institute of Technology
Japan

138 Development of High-Speed and High-Voltage Pulse Generator for NOx Decomposition Plasma Reactor
Shizuoka University
Japan

107 Research on Natural Circulation Cooling System for High Power Electronic Devices
Zhou Jianhui, Sun Lijun, Wang Hang, Zha Kunpeng, Luan Hongzhou
GEIRI of the State Grid Corporation of China, China-Epri Electric Power Engineering Co., Ltd., State Key Laboratory of Advanced Transmission Technology, Beijing Key Laboratory of High Power Electronics
China
Session S29: Power Electronic Applications II
Date/Time: Friday, 15 December 2017/13:30 – 1510 hrs
Venue: Room 304B
Chair: Ravi Raju, GE Global Research, USA

195 The Analysis of Series – Parallel – Parallel Compensation Current Source Inverter for Wireless Power Transfer in EVs Charging Application
Nattapong Hatchavanich, Mongkol Konghirun, Anawach Sangswang
King Mongkut’s University of Technology Thonburi
Thailand

287 Performance of Size-Adjustable Coils for Compensation of Lateral Misalignment Between Coils in Wireless Power Transfer Systems Based on Magnetic Resonance
Taejun Lim, Yongshik Lee
Yonsei University
Korea, Republic of

54 A Ripple Reduction Method for a Two Stages Battery Charger with Multi-Winding Transformer Using Notch Filter
Haimeng Wu, Volker Pickert, Simon Lambert, Peter Allan, Xu Deng, Huaxia Zhan
Newcastle University, Hyperdrive innovation LTD,
United Kingdom

96 Characteristics of New Single Phase Voltage Doubler Rectifier Circuit Using the Partial Switching Strategy
Kenji Amei, Akito Kumagai, Takahisa Ohji, Kyohei Kiyota, Masaaki Sakui
University of Toyama
Japan

Session S30: Traction and Automotive Systems
Date/Time: Friday, 15 December 2017/13:30 – 1510 hrs
Venue: Room 305
Chair: Toshihiko Noguchi, Shizuoka University, Japan

124 Modular Active High Power Density 380 V PFC with SiC-MOSFET Technology for Mobile Applications
Andreas Greifelt, Georg Heiland, Dieter Gerling
FEAAM GmbH, Germany
FinePower GmbH, Germany
Universitaet der Bundeswehr Muenchen, Germany

207 Identification Scheme of Maximum Traction Force Using Recursive Least Square for Traction Control in Electric Locomotives
Tajrin Ishrat, Gerard Ledwich, Mahinda Vilathgamuwa, Pietro Borghesani
Queensland University of Technology
Australia

251 Glocal Identification Methods for Low-Order Lumped-Parameter Thermal Networks Used in Permanent Magnet Synchronous Motors
Daniel Gaona, Oliver Wallscheid, Joachim Böcker
University of Paderborn
Germany
Optimized Space Vector Modulation for DC-Link Balancing in Three-Level Neutral-Point-Clamped Inverters for Electric Drives
Michael Laumen, Michael Schubert, Andreas Bubert, Alexander Lamprecht, Rik W. De Doncker
RWTH Aachen University
Germany

Optimization of Hybrid Electric Drive System Components in Long-Haul Vehicles for the Evaluation of Customer Requirements
Michael Fries, S. Wolff, L. Horlbeck, M. Kerler, M. Lienkamp, A. Burke, L. Fulton
Technical University of Munich, Germany
University of California Davis, United States

Session S31: Power Electronic Applications III
Date/Time: Friday, 15 December 2017/15:30 – 17:10 hrs
Venue: Room 302A
Chair: King J. Tseng, Singapore Institute of Technology, Singapore

Current Spike Reduction Technique for High Power Laser Diode Driver with Pulse Current Output
Seiya Abe, Yuuki Oka, Tsuyoshi Ueno
Kyushu Institute of Technology, Ricoh Company Ltd.
Japan

A Discrete Pulse Group Control–Based Series Resonant Inverter with Complete ZCS–Assisted Inductors for Consumer High Frequency IH Application
Koki Ogura, Mohan Kolhe, Saad Mekhilef, Mutsuo Nakaoka
Kyushu Sangyo University, Japan
University of Agder, Norway
University of Malaya, Malaysia

A Novel Single-Stage Architecture for Electric Vehicle Battery Charger Characterizing Multiple Operating Mode
Damin Zhang, Qiang Zhang, Zhixiong Zhong, Huipin Lin, Zhengyu Lu, Shaobo Kang
High-voltage Key Laboratory of Fujian Province, Zhejiang University
China

Implementation and Integration of a Smart App in a Smart Building for Personal Visual Comfort
Arun Kumar, Aditi Kajale, Pushpendu Kar, Rakesh Warier, Sanjib Kumar Panda
National University of Singapore
Singapore

Experimental Analysis of a Fully Compliant Grid Inverter with Controllable Response
Luis Reguera Castillo, Antonio Lázaro Blanco, Andrew Roscoe
University of Strathclyde, University of Strathclyde, United Kingdom
University Carlos III of Madrid, Spain

Session S32: Motor Drive and Motion Control VI
Date/Time: Friday, 15 December 2017/15:30 – 17:10 hrs
Venue: Room 302B
Chair: Fabio Tinazzi, University of Padova, Italy

Space Vector Modulation of Dual Inverter with Battery and Capacitor across DC Buses
Toshihiko Noguchi, Yoshiaki Ohto, Takanari Sasaya
Shizuoka University, Denso Corporation
Japan

On Accuracy of Loss Models Including VSD Induced Additional Harmonic Losses for Online Energy Efficient Control of Induction Motor
Rahul S. Kanchan, Reza Rajabi Moghaddam
210 IoT-Based Traction Motor Drive Condition Monitoring in Electric Vehicles: Part 1
Jakkrit Kunthong, Tirasak Sapaklom, Mongkol Konghirun, Cherdchai Prapanavarat, Piyasawat Navaratana Na Ayudhya, Ekkachai Mjujalinvimut, Sampast Boonjeed
King Mongkut’s University of Technology Thonburi, Thailand
Technology Leamchabang College, Thailand

266 Specify the Matching of Motor Drive and Electric Machine in Prime Mover Emulators
Ruiyun Fu
Mercer University
United States

Session S33: Converter Switching Control and Topology III
Date/Time: Friday, 15 December 2017/15:30 – 1710 hrs
Venue: Room 304A
Chair: Yen Kheng Tan, Singapore University of Technology and Design, Singapore

334 Damping Control Method of Regenerative Brake Control under Light Load Condition Utilizing Over Voltage Resistor
Febry Pandu Wijaya, Hiroyasu Kobayashi, Keiichiro Kondo, Tetsuya Iwasaki, Akihiro Tsumura
Chiba University, Odakyu Electric Railway Co. Ltd.
Japan

354 Small Signal Parameter of LLC Converter
Yusuke Murakami, Terukazu Sato, Kimihiro Nishijima
Oita University
Japan

362 Soft-Switching Operation Strategy for Three-Phase Multiport-Active Bridge DC-DC Converters
Markus Neubert, Hauke van Hoek, Jan Gottschlich, Rik W. De Doncker
RWTH Aachen University
Germany

365 A Multi-Output Resonant Gate-Driven Power Supply for Electric Vehicle Applications
Daniel von den Hoff, Karl Oberdieck, Rik W. De Doncker
RWTH Aachen University
Germany

946 Analytical Model of Three-Phase Four-Wire VSC Operating as Grid-Forming Power Converter under Unbalanced Load Conditions
Claudionor F. Nascimento, Oumar Diene, Edson H. Watanabe
Federal University of São Carlos, Federal University of Rio de Janeiro, Cidade Universitária
Brazil