Industrial Seminar

Industrial Seminar ····· Conference Hall (1F)

Monday, June 21 14:00 – 17:30
Chair: Prof. Toshihisa Shimizu (Tokyo Metropolitan University)

14:00 **Mr. Tatsuo Teratani**
Project General Manager, Electronics Development Div.2, Toyota Motor Corporation
"Electric Propulsion for Vehicles and Total Envergy Management – PHV and EV link to Grid"


Mr. Tatsuo Teratani

14:30 **Mr. Tadatoshi Babasaki**
Senior Research Engineer, Supervisor, Energy Supply Technology Group Leader, *NTT Energy and Environment Systems Laboratories*
"NTT Activity for Green IT"


Mr. Tadatoshi Babasaki

15:00 **Mr. Atsushi Fujita**
Chief Engineer, Core Technology Development Center, Corporate Engineering Division, Home Appliance Company, Panasonic Corporation
"Advances of Power Electronics Technology in the Induction Heating Appliances"


Mr. Atsushi Fujita

15:30 Break

Chair: Prof. Tomoki Yokoyama (Tokyo Denki University)

16:00 **Mr. Tatsuo Saga**
Executive Technical Research Fellow, Solar Systems Development Group, Sharp Corp.
"Development of Photovoltaic Generation System in SHARP"


Mr. Tatsuo Saga

16:30 **Dr. Teruo Yoshino**
Technology Executive, Power Electronics Systems Division, TMEIC
"Power Electronics for Low-Carbon Industrial Revolution"


Dr. Teruo Yoshino

17:00 **Mr. Takeshi Sato**
New Energy and Industrial Technology Development Organization (NEDO)
"NEDO's Power Electronics Projects and Related Activities"


Mr. Takeshi Sato

Program

Opening Ceremony ····· Conference Hall (1F)

Tuesday, June 22 9:00 - 9:30
Chair: Dr.Teruo Yoshino, Vice-Chair, Steering Committee

Opening address	Dr. Shinzo Tamai, President, IEEJ-IAS
Welcome address	Prof. Atsuo Kawamura, Chair, Steering Committee
Congratulatory message	Prof. Deepak Divan, President, IEEE PELS
Congratulatory message	Prof. Chung-Yuen Won, President, KIPE (2011)
Congratulatory message	Prof. Jinjun Liu, Representative of President, CES (2012), CES ECCE Asia Liaison
Isao Takahashi Award	Prof. Hirofumi Akagi, Chair, Organizing Committee
Report on IPEC Papers	Prof. Yukihiko Sato, Chair, Technical Program Committee

Plenary Session ····· Conference Hall (1F)

Tuesday, June 22 9:30 - 11:45
Chair: Prof. Hirofumi Akagi, Chair, Organizing Committee
Prof. Hiroyuki Ohsaki, Chair, Technical Program Committee

9:30 **Dr. Eisuke Masada**
Chairman, Railway Technical Research Institute
"Railway Technilogies in the Next Decade and Power Electronics"


Dr. Eisuke Masada

10:15 **Dr. Gregory Snitchler**
Manager, Electromegnetic Design and Test Engineering, American Superconductor Corp.
"Progress on High Temperature Superconductor Propulsion Motors and Direct Drive Wind Generators"


Dr. Gregory Snitchler

11:00 **Dr. Peter K. Steimer**
Vice President Innovation Power Electronics and MV Drives, ABB Ltd.
"Enabled by High Power Electronics - Energy efficiency, Renewables and Smart Grid"


Dr. Peter K. Steimer

Technical Sessions

Tuesday, June 22: 12:00-13:30

Main Hall

Poster Session 22P1 Static Power Converters 1

Chair: Hideaki Fujita (*Tokyo Institute of Technology*)
Takaharu Takeshita (*Nagoya Institute of Technoloy*)

22P1-1 **A 6-kW, 2-kWh Lithium-Ion Battery Energy Storage System Using a Bidirectional Isolated DC-DC Converter**
Nadia M. L. Tan, Takahiro Abe, Hirofumi Akagi
Tokyo Institute of Technology, Japan

22P1-2 **Evaluation of a Neural Control with Optimal Architecture for a DC/DC Converter**
F. H. Martinez S.[1], D. F. Gomez M.[2], M. Castiblanco O.[1]
1) Distrital University, Colombia, 2) Fyr Ingenieros, Colombia

22P1-3 **Current-Fed DC-DC Converter with ZCS for High Voltage Applications**
Wen-Chung Chen, Tsorng-Juu Liang, Lung-Sheng Yang, Jiann-Fuh Chen
National Cheng-Kung University, Tainan

22P1-4 **Transformerless High Step-Up DC-DC Converter using Cascode Technique**
Liang-Jye Shu, Tsorng-Juu Liang, Lung-Sheng Yang, Ray-Lee Lin
National Cheng Kung University, Taiwan

22P1-5 **Interleaved PWM Active-Clamping Buck-Type Converter**
Bor-Ren Lin[1], Chau-Shing Wang[2], Jyun-Ji Chen[1], Kun-Liang Shih[1]
1) National Yunlin University of Science & Technology, Taiwan, 2) National Changhua Univerisyt of Education, Taiwan

22P1-6 **Boost Converter with Improved Transfer Ratio**
DV Nicolae[1], CG Richards[1], JFJ van Rensburg[2]
1) Tshwane University of Technology, Sotuh Africa, 2) Vaal University of Technology, South Africa

22P1-7 **A New Single-Inductor Triple-Output Buck Converter Using CMOS Technology**
Jiann-Jong Chen, Chuan-Hong Zheng, Yuh-Shyan Hwang
National Taipei University of Technology, Taiwan

22P1-8 **Design and Optimization of High Current Power Supply for Electrochemistry**
Weimin Zhang, Minghai Deng, Yunqing Pei, Zhaoan Wang
Xi'an Jiaotong University, P.R.China

22P1-9 **Interleaved LLC Series Converter with Output Voltage Doubler**
Bor-Ren Lin[1], Wen-Ren Yang[2], Jyun-Ji Chen[1], Chien-Lan Huang[1], Ming-Hung Yu[1]
1) National Yunlin University of Science & Technology, Taiwan, 2) National Changhua Univerisyt of Education, Taiwan1

22P1-10 **Robust Control Design and Implementation for a Quadratic Buck Converter**
H. Bevrani[1/2], P. Babahajyani[1], F. Habibi[1], T. Hiyama[2]
1) University of Kurdistan, Iran, 2) Kumamoto University, Japan

22P1-11 **Implementation of a Parallel ZVS Forward Converter with Less Power Switches**
Bor-Ren Lin, Huann-Keng Chiang, Jyun-Ji Chen, Huei-Yuan Shih
National Yunlin University of Science & Technology, Taiwan

22P1-12 **Two-Stage Multiphase Switched-Capacitor Converter with Variable-Phase and PWM Control**
Yuen-Haw Chang
Chaoyang University of Technology, Taiwan

22P1-13 **A Forward Converter Employing a Simple ZCS-PWM Auxiliary Circuit to Achieve Soft-Switching and Power Transformer Resetting**
Chang-Hua Lin[2], Chien-Ming Wang[1], Chia-Hua Liu[1], Teng-Chieh Yang[1]
1) National Ilan University, Taiwan, 2) Tatung University, Taiwan

22P1-14 Analysis and Design of a Novel Soft-Switching Three-Phase Inverter
Maoh-Chin Jiang, Geng-Bin Tu, Chun-Hung Chen, Chia-Ten Chen
National Ilan University, Taiwan

22P1-15 High Performance Single-Stage Transformer-Isolated AC/DC Converter
Chien-Ming Wang[1], Chang-Hua Lin[2], Chia-Hua Liu[1], Teng-Chieh Yang[1]
1) National Ilan University, Taiwan, 2) Tatung University, Taiwan

22P1-16 Design of a Cost-Effective DC-DC Converter with High Power Density for Magnetron Power Supplies
Byeong-Mun Song[1], Moon-Ho Kye[2], Rae-Young Kim[3]
1) Baylor University, USA, 2) PowerPlaza USA, USA, 3) Hanyang Univ., Korea

Poster Session 22P2 Power Semiconductor Devices and Packaging

Chair: Tsuneo Ogura (*Toshiba Corporation)*
Yasukazu Seki (*Fuji Electric Device Technorogy Co., Ltd.)*

22P2-17 Neutron Induced Single-Event Burnout of IGBT
Tomoyuki Shoji[1], Shuichi Nishida[2], Toyokazu Ohnishi[2], Touma Fujikawa[2], Noboru Nose[2], Masayasu Ishiko[1], Kimimori Hamada[2]
1) Toyota Central R&D Labs., Inc., Japan, 2) Toyota Motor Corporation, Japan

22P2-18 Evaluation of the Performances of a Novel Punch Through Trench IGBT using a $Si_{(1-x)}Ge_{(x)}$ N^+ Buffer Layer by using Finite Elements Simulations
S. Azzopardi, Y. Belmehdi, F. Capy, J. -Y. Deletage, E. Woirgard
University of Bordeaux, France

22P2-19 A New Intelligent Power Module with Reverse Conducting IGBTs for up to 2.5kW Motor Drives
Junho Song[1], Junbae Lee[1], Daewoong Chung[1], Bumseok Suh[1], Frank Wolfgang[2]
1) LS Power Semitech, 2) Infineon Technologies Germany

22P2-20 Mixed-mode Simulation based Study of GTO Performance in Low-temperature Pulsed Operation
A. Castellazzi[1], F. Abdesselam[2]
1) University of Nottingham, UK, 2) Zodiac Aerospace, France

22P2-21 Experimental Parametric Study of the Parasitic Inductance Influence on MOSFET Switching Characteristics
Zheng Chen[1], Dushan Boroyevich[1], Rolando Burgos[2]
1) Virginia Polytechnic Institute and State University, USA, 2) ABB Corporate Research, USA

22P2-22 Switching Characteristic of Si-IEGTs and SiC-PiN Diodes Pair Connected in Series
Kyungmin Sung[1], Hironobu Akiyama[1], Kazuto Takao[2], Takeo Kanai[3], Yasunori Tanaka[4], Hiromichi Ohashi[4]
1) Ibaraki National College of Technology, Japan, 2) Toshiba Corporation, Japan, 3) Toshiba Mitsubishi-Electric Industrial System Corporation, Japan, 4) National Institute of Advanced Industrial Science and Technology, Japan

22P2-23 Switching Characteristics of SiC-VJFET and Manufacture of Inverter
Katsuhiko Harada, Kentaro Maki, Sompathana Pounyakhet, Jyunitiro Tokiyoshi, Masahiro Kozako, Shinya Ohtsuka, Masayuki Hikita
Kyushu Institute of Technology, Japan

22P2-24 High Temperature High Voltage Packaging of Wideband Gap Semiconductors Using Gas Insulating Medium
Thierry Lebey[1], Ichiro Omura[2], Masahiro Kozako[2], Hiroki Kawano[2], Masayuki Hikita[2]
1) Paul Sabatier University, France, 2) Kyushu Institute of Technology, Japan

22P2-25 Power Device Consideration on High Power PFC Pre-regulator for Optimized Design
Wonseok Kang[1], Sungmo Young[2], Taeyoung Ahn[3], Seonggi Chang[1]
1) LG Electronics, Korea, 2) HV PCIA, Fairchild Korea Semiconductor, Korea, 3) Cheongju University, Korea

Poster Session 22P3 Modeling, Simulation, EMI and Reliability 1

Chair: Satoshi Ogasawara (*Hokkaido University)*
Toshihisa Shimizu (*Tokyo Metropolitan University)*

22P3-26 Developing an Active Filter Based on Least Square Method
Kempei Seki
Mitsubishi Electric Corporation, Japan

22P3-27 Active Gate Control for High Power IGBTs with Separated Gains
Li Ming[1], Wang Yue[1], Fang Xiong[1], Zhang Leqiang[2], Wang Zhaoan[1]
1) Xi'an jiaotong university, China, 2) Ordnance Engineering College, China

22P3-28 **Gain Limits for Current Loop Controllers of Single and Three-phase PWM Converters**
F. O. Martinz, R. D. Miranda, W. Komatsu, L. Matakas Jr.
Polytechnic School of the University of São Paulo, Brazil

22P3-29 **The Control Region of Hysteresis Control for Neutral-Point Voltage Balancing of NPC Threelevel Inverters**
Li Ning, Wang Yue, Jiang Yingwei, Zhang Changsong, Wang Zhaoan
Xi'an Jiaotong University, China

22P3-30 **Derivation Method of Output Impedance of DC-DC Converters Paralleled System with Active Current Sharing Control for System Stability Analysis**
Hao Wang, Jinjun Liu, Dan Hou
Xi'an Jiaotong University, China

22P3-31 **Filter Design Technique for Inverter Complied with European EMC standard**
T. Chida[1], N. Kusuno[1], A. Mishima[1], M. Kurita[2], S. Ibori[2]
1) Hitachi, Ltd., Japan, 2) Hitachi Industrial Equipment Systems Co., Ltd., Japan

22P3-32 **Dead-time Effect and its Compensation in Common-mode Voltage Elimination of PWM Inverter with Auxiliary Inverter**
N. Aizawa, M. Kikuchi, H. Kubota, I. Miki, K. Matsuse
Meiji University, Japan

22P3-33 **A New Single-Loop Method for Steady-State Analysis and Design of Networks with Switching Power Converters**
M. Plesnik, M. Nakhla
Carleton University, Canada

22P3-34 **Improved Current Control Dynamics at the Point of Inflection in Tokamak Coil Power Supply**
Il-Han Choi[1], Seung-Ho Song[1], Seung-Gi Jeong[1], Jong-Seok Oh[2], Jungwan Choi[2], Jae-Hak Suh[2]
1) Kwangwoon University, Korea, 2) ITER Korea, Korea

22P3-35 **Closed Loop Control of a Pulsed Series Parallel Resonant Converter with Current Doubler**
K. Klement, H. Timborabadi, A. El-Deib, F. Dawson
University of Toronto, Canada

22P3-36 **Real Time Simulator for Railway Traction and Auxiliary Power Unit Control Applications**
L. Kovudhikulrungsri, K. Yuki, T. Arai, A. Hirahara
Toshiba Corp., Japan

22P3-37 **Analysis of the electrical characteristics of novel ESD protection device with high holding voltage under various temperatures**
Yong Seo Koo[1], Hyun Duck Lee[2], Jong Il Won[2], Yil Suk Yang[3]
1) Department of Electronics and Electrical Engineering, Dankook University, Korea., 2) Department of Electronic Engineering, Seokyeong University, Korea, 3) Electronics and Telecommunications Research Institute, Korea

22P3-38 **Behaviorally Modeling Three-Phase Boost Rectifiers and the Validity Verification in Large-Signal Simulations**
Runxin Wang[1], Qinsan Hou[2], Jinjun Liu[2], Tianhao Tang[1]
1) Shanghai Maritime University, Chaina, 2) Xi'an Jiaotong University, China

Poster Session 22P4 Electric Machines, Actuators and Sensors 1

Chair: Kan Akatsu (*Shibaura Institute of Technology)*

22P4-39 **Power Characteristics of a Permanent Magnet Flux Switching Generator for a Low-speed Wind Turbine**
S. Kayano, M. Sanada, S. Morimoto
Osaka Prefecture University, Japan

22P4-40 **APS Control Method for Gas Turbine Start-up by SFC**
A. Hisanori Taguchi, B. Shinzo Tamai, C. Yasuhiko Hosokawa, D. Akinobu Ando
Toshiba Mitsubishi-Electric Industrial Systems Corporation, JAPAN

22P4-41 **Study of Iron Loss in Induction Motor made with Soft Magnetic Composite Core based on Finite Element Analysis**
T. Matsumoto[1], S. Shimomura[1], M. Morimoto[2]
1) Shibaura Institute of Technology, Japan, 2) Tokai University, Japan

22P4-42 **10 Mrpm Spinning Ball Motor - Preparing the next generation of ultra-high speed drive systems**
C. Wildmann[1], T. Nussbaumer[2], J. W. Kolar[1]
1) ETH Zurich, Switzerland, 2) Levitronix GmbH, Switzerland

22P4-43 **Control of Electromagnetic Levitation Transport of Flexible Steel Plate (Fundamental Considerations on Elastic Vibration Control under Transport)**
T. Narita, Y. Oshinoya, S. Hasegawa
Tokai University, Japan

22P4-44 **Application of MERS Power Circuit on the Induction Heater for Metal Ring**
Henry (Yoshinori) Nagao[1], Tetsuzo Sakamoto[2]
1) Etoh Inc., Japan, 2) Kyushu Institute of Technology, Japan

22P4-45 **Considerations on the Operating Point of a Planar Parametric Transformer Based on the Mathieu equation**
M. Yoshida[1], M. Ohta[2], Y. Sakamoto[2]
1) Hachinohe National College of Technology, Japan, 2) Hachinohe Institute of Technology, Japan

22P4-46 **A New PLL Method for Resolvers**
Lazhar Ben-Brahim, Mohieddine Benammar
Qatar University, Qatar

22P4-47 **Novel Power Supply Topology for Large Working Gap Dry EDM**
A. Looser, L. Linares, C. Zwyssig, J. W. Kolar
ETH Zurich, Switzerland

Poster Session 22P5 Power Electronics Applied to Power Systems 1

Chair: Tatsuhito Nakajima (*The University of Tokyo)*
Tomoki Yokoyama (*Tokyo Denki University)*

22P5-48 **Design of a Wide Input Range DC/DC Converter Based on SEPIC Topology for Fuel Cell Power Conversion**
A. Chih-Chiang Hua, B. Cheng-you Tsai
National Yunlin University of Science & Technology, Taiwan

22P5-49 **A Starting Method of the Harmonic Current Compensator Using a Hybrid Active Filter for Wind Power Generation Systems with Soft Starters**
H. Yamada[1], E. Hiraki[2], T. Tanaka[2]
1) Kyushu Institute of Technology, Japan, 2) Yamaguchi University, Japan

22P5-50 **Design and Implementation of Power Converters for Wind Energy Conversion System**
Chih-Chiang Hua, Chien-Hung Cheng
National Yunlin University of Science & Technology, Taiwan

22P5-51 **A Modified Sheppard-Taylor Converter Suitable for PEM Fuel Cell**
Chih-Chiang Hua, Hsi-Chin Chiang
National Yunlin University of Science& Technology, Taiwan

22P5-52 **Integrated Power Conversion for DC Power System by Flying Capacitor Multi-Level Converter**
M. Hojo, K. Minato
The University of Tokushima, Japan

22P5-53 **Design Consideration of Flat Transformer in LLC Resonant Converter for Low Core Loss**
Sihun Yang[1], Seiya Abe[2], Masahito Shoyama[1]
1) Kyushu University, Japan, 2) The International Centre for the Study of East Asian Development, Japan

22P5-54 **A Novel Digital Phase-locked-loop for Single-Phase Grid-connected Power Generation Systems**
Qi Zhang[1], Xiangdong Sun[1], Yanru Zhong[1], Mikihiko Matsui[2], Biying Ren[1]
1) Xi'an University of Technology, China, 2) Tokyo Polytechnic University, Japan

22P5-55 **Novel PLL Systems which suffer little Influence from Voltage Unbalance and Distortion**
Yoshitaka Kawabata, Tatsuya Maekawa, Takao Kawabata
Ritsumeikan University, Japan

22P5-56 **A Novel D-Estimation Method of Phase, Frequency, and Amplitude of Single-Phase Signals**
Shinji Shinnaka
Kanagawa University, Japan

22P5-57 **Impact of Virtual Flux Reference Frame Orientation on Voltage Source Inverters in Weak Grids**
Jon Are Suul, Tore Undeland
Norwegian University of Science and Technology, Norway

22P5-58 **A Controller in d-q Synchronous Reference Frame for Hybrid HVDC Transmission System**
Raymundo E. Torres-Olguin, Marta Molinas, Tore M. Undeland
Norwegian University of Science and Technology, Norway

Poster Session 22P6 Power Electronics and Drives Applied to Home Appliance

Chair: Fujio Kurokawa (*Nagasaki University)*
Makoto Kitabatake (*Panasonic)*

22P6-59 Analysis and Implementation of a Novel Single-Stage Low-Frequency Electronic Ballast for HID Lamps
Hung-Liang Cheng[1], Chin-Sien Moo[2], Chun-Kai Huang[2], Chung-Sheng Yang[2]
1) I-Shou Univ., Taiwan, 2) Natl. Sun Yat-sen Univ., Taiwan

22P6-60 Development of Lighting Source with CCFL in T8-Tube
Yong N. Chang[1], Ching C. Lin[1], Shun Y. Chan[2], Shian N. Lin[3], Jia C. Lin[3]
1) National Formosa University, Taiwan, 2) Cheng-Shiu University, Taiwan

22P6-61 Transition-Mode Dimmable LED Driver for Illumination Applications
T. W. Ching
University of Macau, Macau

22P6-62 Driving Circuit for High-Brightness LED Lamps
Yun-Hao Chang[1], Yu-Jen Chen[1], Ying-Chun Chuang[2], Chin-Sien Moo[1]
1) Nat. Sun Yat-sen Univ., Taiwan, 2) Kun Shan Univ. Taiwan

22P6-63 A Hybrid Converter for Improving Efficiency at Light Load Region
Masaya Takahashi, Kimihiro Nishijima, Michihiko Nagao, Terukazu Sato, Takashi Nabeshima
Oita University, Japan

22P6-64 A Constant Power Controller of DC-AC Electronic Ballast Inverter for HID Lamps
Chun-An Cheng, Hung-Liang Cheng, Kuan-Lin Chu, Kun-Jheng Lin
I-Shou University, Taiwan

22P6-65 Dual-Output Buck-Boost Converter with Positive and Negative Output Voltages under Single Positive Voltage Source Fed
K. I. Hwu[1], Y. T. Yau[1], Jenn-Jong Shieh[2]
1) National Taipei University of Technology, Taiwan, 2) Ta Hwa Institute of Technology, Taiwan

22P6-66 Interleaved Active-Clamping Converter with ZVS/ZCS Features
Tsun-Hsiao Hsia[1], Hsien-Yi Tsai[1], Dan Chen[1], Martin Lee[2], Chun-Shih Huang[1]
1) Department of Electrical Engineering, National Taiwan University, Taipei, Taiwan, 2) Chicony Power Technology Co.,Ltd., Taipei, Taiwan

22P6-67 Controlling Power Factor Correction Converter for Single-phase AC Power Source without Line Voltage Sensor
Yasuo Notohara[1], Takahiro Suzuki[1], Tsunehiro Endo[1], Hiroki Umeda[1], Atsushi Okuyama[2], Yuji Funayama[2], Kenji Tamura[2]
1) Hitachi, Ltd, Japan, 2) Hitachi Appliances, Inc., Japan

22P6-68 A Two-phase Zero-Voltage-Transition Boost Converter for Power Factor Correction
Yao-Ching Hsieh[1], Ming-Ren Chen[1], Hau-Chen Yen[2]
1) National Dong Hwa University, Taiwan, 2) Fortune Institute of Technology, Taiwan

22P6-69 High Power Factor Control of Electrolytic Capacitor less Current-Fed Single-phase to Three-phase Power Converter
H. Haga[1], K. Nishiya[2], S. Kondo[1], K. Ohishi[1]
1) Nagaoka University of Technology, Japan, 2) Sendai National College of Technology, Japan

22P6-70 A Novel Current Driven Method for Center-tapped Synchronous Rectifier
Xiaojun Guo[1], Weiming Lin[1], Xinke Wu[2]
1) Fuzhou University, China, 2) Zhejiang University, China

Poster Session 22P7 Education in Power Electronics and Electrical Engineering

Chair: Naoyuki Aikawa (*Tokyo University of Science)*
Hirohito Funato (*Utsunomiya University)*

22P7-71 Development of Electric Circuit Exercise System by E-learning
G. Komori[1], N. Aikawa[1], Y. Nishida[2]
1) Tokyo University of Science, Japan, 2) Chiba Institute of Technology, Japan

22P7-72 Lab Work for the Power-Oriented Design of a Wireless Sensor Network
Guillaume Auriol[1,3], Claude Baron[1,3], Jean-Marie Dilhac[2,3], Marise Bafleur[2,3], Jean-Yves Fourniols[2,3]
1) LATTIS, FRANCE, 2) CNRS, FRANCE, 3) Université de Toulouse, France

Room A

Oral Session 22A1 (OS) Microgrid 1

Chair: Po-Tai Cheng (*National Tsing Hua University*)
Divan Deepak (*Georgia Institute of Technology*)

22A1-1 **Stability Analysis and Experimental Validation of a Control Strategy for Autonomous Operation of Distributed Generation Units**
Invited Paper
13:45 Behrooz Bahrani[1], Houshang Karimi[2], Reza Iravani[3]
1) Ecole Polytechnique Fédérale de Lausanne, Switzerland, 2) Sharif University of Technology, Iran, 3) University of Toronto, Canada

22A1-2 **Improving Power Quality and Distribution Efficiency in Micro-Grids by Cooperative Control of Switching Power Interfaces**
Invited Paper
14:10 Paolo Tenti[1], Alessandro Costabeber[1], Paolo Mattavelli[2]
1) University of Padova, Italy, 2) Virginia Polytechnic Institute and State University, USA

22A1-3 **Loss Evaluation of DC Distribution for Residential Houses Compared with AC System**
Invited Paper
H. Kakigano, M. Nomura, T. Ise
14:35 *Osaka University, Japan*

22A1-4 **Voltage Disturbance Generator With Phase Jump for the Test of Microgrid**
Invited Paper
Eui-Cheol Nho[1], Jae-Hun Jung[1], In-Dong Kim[1], Tae-Won Chun[2], Heung-Geun Kim[3], Nam-Sup Choi[4], Jaeho Choi[5]
15:00 *1) Pukyong National University, Korea, 2) University of Ulsan, Korea, 3) Kyungpook National University, Korea, 4) Chonnam National University, Korea, 5) Chungbuk National University, Korea*

Room B

Oral Session 22B1 (OS) Multilevel Converters 1

Chair: Fang Z. Peng (*Michigan State University*)
Noriko Kawakami (*Toshiba Mitsubishi-Electric Industral Systems Corporation*)

22B1-1 **Recent Advances in Multilevel Converter/Inverter Topologies and Applications**
Invited Paper
Fang Z. Peng, Wei Qian, Dong Cao
13:45 *Michigan State University, USA*

22B1-2 **Modular Multilevel Converter: An Universal Concept for HVDC-Networks and Extended DC-Bus-Applications**
Invited Paper
R. Marquardt
14:10 *Universitity of Bundeswehr Munich, Germany*

22B1-3 **Classification, Terminology, and Application of the Modular Multilevel Cascade Converter (MMCC)**
Invited Paper
Hirofumi Akagi
14:35 *Tokyo Institute of Technology, Japan*

22B1-4 **Multi-Level Converters for Large Capacity Motor Drive**
Invited Paper
Hiromi Hosoda[1], Steven Peak[2]
15:00 *1) Toshiba Mitsubishi-Electric Industrial Systems Co., Japan, 2) TM GE Automation Systems LLC, USA*

Room C

Oral Session 22C1 Power Semiconductor Devices and Packaging 1

Chair: Gourab Majumdar (*Mitsubishi Electric Corporation*)
Hiroshi Yamaguchi (*AIST*)

22C1-1 **New IGBT Modules for Advanced Neutral-Point-Clamped 3-Level Power Converters**
13:45 K. Komatsu[1], M. Yatsu[2], S. Miyashita[1], S. Okita[1], H. Nakazawa[2], S. Igarashi[1], Y. Takahashi[2], Y. Okuma[2], Y. Seki[1], T. Fujihira[3]
1) Fuji Electric Systems Co. Ltd., Japan, 2) Fuji Electric Holdings Co., Ltd., Japan, 3) Fuji Electric Device Technology Co., Ltd., Japan

22C1-2 **High Power Density, Low Stray Inductance, Double Sided Cooled Matrix-converter Type Switch**
14:10 A. Castellazzi, A. Solomon, P. Agyakwa, J. Li, A. Trentin, C. M. Johnson
University of Nottingham, UK

22C1-3 **Analysis of the Trade-Off Between Input Current Quality and Efficiency of High Switching Frequency PWM**
14:35 **Rectifiers**
M. Hartmann, J. W. Kolar
Swiss Federal Institute of Technology, Switzerland

22C1-4 **New Power Module Concept by Forced-Air Cooling System for Power Converter**
15:00 K. Kodani, T. Tsukinari, T. Matsumoto
Toshiba Corporation, Japan

22C1-5 **Characterization of Lead-Free Solder and Sintered Nano-Silver Die-Attach Layers Using Thermal Impedance**
15:25 Xiao Cao, Tao Wang, Guo-Quan Lu, Khai D. T. Ngo
Virginia Polytechnic Institute and State University, USA

Room D

Oral Session 22D1 Power Electronics and Drives Applied to Home Appliance 1

Chair: Dehong Xu (*Zhejiang University*)
Makoto Kitabatake (*Panasonic Corporation*)

22D1-1 **Sliding-Mode Quantized Control of a Class-D Audio Power Amplifier**
13:45 Shiang-Hwua Yu, Yung-Huei Tsai
National Sun Yat-Sen University, Taiwan

22D1-2 **Output Power Enhancement of Full-Bridge Class-D Amplifier**
14:10 K. I. Hwu, Y. T. Yau
National Taipei University of Technology, Taiwan

22D1-3 **Single-Phase Quasi-Z-Source AC-AC Converter with Safe-Commutation Strategy**
14:35 Minh-Khai Nguyen[1], Young-Gook Jung[2], Young-Cheol Lim[1]
1) Chonnam National University, KOREA, 2) Daebul University, KOREA

22D1-4 **V/f Control of Permanent Magnet Synchronous Motors suitable for Home Appliances by DC-link Peak Current**
15:00 **Control Method**
M. Kiuchi[1], T. Ohnishi[1], H. Hagiwara[2], Y. Yasuda[3]
1) The University of Tokushima, Japan, 2) Panasonic Corporation, Home appliance company, Japan, 3) Panasonic Semiconductor Systems and Technology Co., Ltd., Japan

22D1-5 **Space Vector Modulation for a Single Phase to Three Phase Converter Using an Active Buffer**
15:25 Yoshiya Ohnuma, Jun-ichi Itoh
Nagaoka University of Technology, Japan

Room E

Oral Session 22E1 Permanent Magnet Motor Drive 1

Chair: Chuang-Sheng Liu (*National Formosa University*)
Kan Akatsu (*Shibaura Institute of Technology*)

22E1-1 **Prototype and Characteristics Measurement of Bearingless Motor with Wide Air Gap Structure**
13:45 Kazunobu Oi[1], Daiki Matsuhashi[1], Masakatsu Nomura[1], Masatsugu Takemoto[2], Tadashi Fukao
1) Meidensha corporation, Japana, 2) Hokkaido University, Japana

22E1-2 **Enhanced Speed and Current Control of PMSM Drives by Perfect Tracking Algorithms**
14:10 Koichi Sakata[1], Hiroshi Fujimoto[2], Luca Peretti[3], Mauro Zigliotto[3]
1) Yokohama National University, Japan, 2) The University of Tokyo, Japan, 3) University of Padova, Italy

22E1-3 **Control Method for IPMSM Based on Perfect Tracking Control and PWM Hold Model in Overmodulation Range**
14:35 Takayuki Miyajima[1], Hiroshi Fujimoto[2], Masami Fujitsuna[3]
1) Yokohama National University, Japan, 2) The University of Tokyo, Japan, 3) DENSO Corporation, Japan

22E1-4 **A Stable Field-Weakening Control Using Voltage Phase Operations in the High-Power Region**
15:00 Wataru Hatsuse[1], Yasuo Notohara[1], Kentarou Ohi[1], Kazuaki Tobari[1], Kenji Tamura[2], Chie Unoko[2], Yuji Funayama[2]
1) Hitachi, Ltd., Japan, 2) Hitachi Appliances, Inc., Japan

22E1-5 **A Robust Field-Weakening Control Strategy for IPMSM Drives**
15:25 Jenn-Horng Liaw[1], Yi-Hung Liao[2], Che-Wei Tung[1], Shinn-Ming Sue[1], Yi-Shuo Huang[3]
1) Ming Hsin University of Science and Technology, Taiwan, 2) National Penghu University, Taiwan, 3) Industrial Technology Research Institute, Taiwan

Room F

Oral Session 22F1 DC-DC Converter 1

Chair: Alexis Kwasinski (*University of Texas at Austin*)
Khai Ngo (*Virginia Tech*)

22F1-1 **Modeling and Control of a Zeta Converter**
13:45 E. Vuthchhay[1], C. Bunlaksananusorn[2]
1) Institute of Technology of Cambodia (ITC), Cambodia, 2) King Mongkut's Institute of Technology Ladkrabang (KMITL), Thailand

22F1-2 **A High Efficiency Isolated DC/DC Converter Using Series Connection on Secondary Side**
14:10 Satoshi Miyawaki[1], Jun-ichi Itoh[1], Kazuki Iwaya[2]
1) Nagaoka University of Technology, Japan, 2) DENSEI-LAMBDA, Ltd., Japan

22F1-3 **An Optimized, 99% Efficient, 5kW, Phase-Shift PWM DC-DC Converter for Data Centers and Telecom**
14:35 **Applications**
U. Badstuebner, J. Biela, J. W. Kolar
ETH Zurich, Switzerland

22F1-4 **Double DC-DC Converter for Uninterruptible Power Supply Applications**
15:00 E. K. Sato, M. Kinoshita, K. Sanada
TMEIC, Japan

Room G

Oral Session 22G1 (OS) Modeling, Analysis, and Simulation of Power Electronic Systems

Chair: Heung-Geun Kim (*Kyungpook University*)
Toshiji Kato (*Doshisha University*)

22G1-1 **Voltage-Dependent Capacitors in Power Electronic Multi-Domain Simulations**
Invited Paper U. Drofenik, A. Müsing, J. W. Kolar
13:45 *ETH Zurich, Switzerland*

22G1-2 **Simulation for Constant Torque Control of Switched Reluctance Motors by FEM and Circuit Simulator**
Invited Paper H. Ishikawa
14:10 *Gifu University, Japan*

22G1-3 **Indirect Digital Control of Three-phase DC/AC Inverter**
Invited Paper Jinmok Lee[1], Jaeho Choi[2], K. H. Park[1], K. S. Han[1]
14:35 *1) LS Industrial Systems Ltd., Korea, 2) Chungbuk National University, Korea*

22G1-4 **A Generalized Methodology for Obtaining the Steady-State Solution of a Closed-Loop Power Converter**
Invited Paper K. L. Lian[1], P. W. Lehn[2]
15:00 *1) National Taiwan University of Science and Technology, Taiwan, R.O.C., 2) University of Toronto, Canada*

22G1-5 **Efficient Steady-State Computation of A Power Electronic Converter System by the Envelope Following Method**
Invited Paper Toshiji Kato, Kaoru Inoue, Yudai Kumiki, Masashi Yamane
15:25 *Doshisha University, Japan*

Room H

Oral Session 22H1 Converters for PV Systems

Chair: Byeong-Mun Song (*Baylor University*)
Youichi Ito (*Sanken Electric*)

22H1-1 **Solar-Generator-Interfacing with a Current-Fed Superbuck Converter Implemented by Duality-Transformation**
13:45 **Methods**
J. Leppäaho, T. Suntio
Tampere University of Technology, Finland

22H1-2 **Relevant Aspects in Designing a Photovoltaic Inverter for Industrial and Commercial Applications**
Invited Paper Tatsuaki Ambo, Eiichi Ikawa, Rubén Inzunza
14:10 *Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan*

22H1-3 **Analysis of a Battery-integrated Boost Converter for Module-based Series Connected Photovoltaic System**
14:35 Yang Du, Dylan Dah-Chuan Lu
The University of Sydney, Australia

22H1-4 **Ripple Analysis of Interleaved Soft Switching Boost Converter for Photovoltaic Applications**
15:00 Doo-Yong Jung[1], Young-Hyok Ji[1], Jun-Ho Kim[1], Chung-Yuen Won[1], Yong-Chae Jung[2]
1) Sungkynkwan University, Korea, 2) Namseoul University, Korea

22H1-5 **Dynamics of Current-Fed Converters and Stability-Assessment of Solar-Generator Interfacing**
15:25 J. Leppäaho, J. Huusari, L. Nousiainen, T. Suntio
Tampere University of Technology, Finland

Tuesday, June 22: 16:20-18:25

Room A

Oral Session 22A2 (OS) Microgrid 2

Chair: Po-Tai Cheng (*National Tsing Hua University*)
Yoon-Ho Kim (*Chung Ang University*)

22A2-1 **Minigrids: Analysing the State-of-Play**
Invited Paper A. Berry, G. Platt, D. Cornforth
16:20 *CSIRO Energy Technology, Australia*

22A2-2 **Improvement of a PV-FC Hybrid Source Operation in a Microgrid**
Invited Paper Loc Nguyen Khanh[1], Dong-Jun Won[1], Sung-Eun Lee[1], Jae-Geun Jeon[1], Jae-Ho Choi[2]
16:45 *1) Department of Electrical Engineering, INHA University, South Korea, 2) School of Electrical and Computer Engineering, Chungbuk National University, South Korea*

22A2-3 **Study of AC/DC Power Supply System with DGs using Parallel Processing Method**
Invited Paper K. Yukita[1], Y. Shimizu[1], Y. Goto[1], M. Yoda[1], A. Ueda[1], K. Ichiyanagi[1], K. Hirose[2], T. Takeda[2], T. Ota[3], Y. Okui[3], H. Takabayashi[4]
17:10 *1) Aichi Institute of Technology, Japan, 2) NTT Facilites, Inc, Japan, 3) SANYO Denki Co., Ltd, Japan, 4) Shin-Kobe Electric Machinery Co., Ltd, Japan*

22A2-4 **Minimizing Emissions in Microgrids While Meeting Reliability and Power Quality Objectives**
Invited Paper Anish Prasai, Andrew Paquette, Yi Du, Ronald Harley, Deepak Divan
17:35 *Georgia Institute of Technology, USA*

Room B

Oral Session 22B2 Multilvevel Converters 2

Chair: Rubén Inzunza (*Toshiba Mitsubishi-Electric Industrial Systems Corporation*)
Rainer Marquardt (*Universität der Bundeswehr München*)

22B2-1 **Voltage Balancing of the Four Split DC Capacitors for a Five-Level Diode-Clamped PWM Inverter with a Front-End Diode Rectifier**
16:20 Kazunori Hasegawa, Hirofumi Akagi
Tokyo Institute of Technology, Japan

22B2-2 **A Novel DC-Link Voltage Regulation Method for Single Source Hybrid Multilevel Inverters**
16:45 S. D. G. Jayasinghe[1], D. M. Vilathgamuwa[1], U. K. Madawala[2]
1) Nanyang Technological University, Singapore, 2) The University of Auckland, New Zealand

22B2-3 **Evaluation of Control and Modulation Methods for Modular Multilevel Converters**
17:10 Daniel Siemaszko, Antonios Antonopoulos, Kalle Ilves, Michail Vasiladiotis, Lennart Ängquist, Hans-Peter Nee
Royal Institute of Technology (KTH), Sweden

22B2-4 **Predictive Control of Three-Level Active NPC Converter with Evenly Energy Losses Distribution**
17:35 Daniel Andler[1], Marcelo Perez[1], José Rodríguez[1], Steffen Bernet[2]
1) Technical University Federico Santa María, Chile, 2) Technical University Dresden, Germany

22B2-5 **Design of Discontinuous Switching Sequences in the Case of Grid-Connected Three-Level Voltage-Source**
18:00 **Converter**
P. Lauttamus, H. Tuusa
Tampere University of Technology, Finland

Room C

Oral Session 22C2 (OS) Power Semiconductor Devices and Packaging (I) Si-IGBT

Chair: Masayasu Ishiko (*Toyota Central R&D Labs., Inc.*)
Mutsuhiro Mori (*Hitachi, Ltd.*)

22C2-1 **New IGBT Development for Traction Drive and Wind Power**
Invited Paper J. G. Bauer, T. Duetemeyer, L. Lorenz
16:20 *Infineon Technologies AG, Germany*

22C2-2 **Power Module Technology for Home Power Electronics**
Invited Paper Gourab Majumdar
16:45 *Mitsubishi Electric Corporation, Japan*

22C2-3 **Development Trends of Power Semiconductors for Hybrid Vehicles**
Invited Paper Tetsuya Kanata, Katsuhiko Nishiwaki, Kimimori Hamada
17:10 *Toyota Motor Corporation, Japan*

22C2-4 **Advanced IGBT Chip Technology for Industrial Motor Drive Applications**
Invited Paper Tomoyuki Yamazaki, Yuichi Onozawa, Masahito Otsuki, Naoto Fujishima, Yasukazu Seki
17:35 *Fuji Electric Systems Co., Ltd., Japan*

22C2-5 **New Discrete IGBT Development for Consumer Use - Application-Specific Advanced Discrete IGBTs with**
Invited Paper **Optimized Chip Design**
18:00 Shinichi Umekawa, Masakazu Yamaguchi, Hideaki Ninomiya, Seiichiro Wakiyama
Semiconductor Company, Toshiba Corp., Japan

Room D

Oral Session 22D2 EV & HEV

Chair: Seung-Ki Sul (*Seoul National University*)
Masayuki Morimoto (*Tokai University*)

22D2-1 **Real-Time Study of a Current Controlled Plug-in Vehicle for Vehicle-to-Grid Transaction**
16:20 P. Mitra, G. K. Venayagamoorthy, K. Corzine
Missouri University of Science and Technology, USA

22D2-2 **Pitching Control Method Based on Quick Torque Response for Electric Vehicle**
16:45 Hiroshi Fujimoto[1], Shinsuke Sato[2]
1) The University of Tokyo, Japan, 2) Yokohama National University, Japan

22D2-3 **Compact Contactless Power Transfer System for Electric Vehicles**
17:10 Y. Nagatsuka[1], N. Ehara[1], Y. Kaneko[1], S. Abe[1], T. Yasuda[2]
1) Saitama University, Japan, 2) Technova Inc., Japan

22D2-4 **Basic Study on Fuel-Cell-Hybrid-Electric-Vehicle Fueled by Sodium Borohydride**
17:35 Yosuke Sakamoto[1], Nobukazu Hoshi[1], Shinichiro Murooka[1], Meifen Cao[2], Atsuo Yoshizaki[3], Keiichi Hirata[3]
1) Tokyo University of Science, Japan, 2) Tokyo Metropolitan College of Industrial Technology, Japan, 3) Hydric Power Systems, Japan

22D2-5 **System Configuration and Control Strategy for Compound Type Hybrid Excavator with Ultra Capacitor**
18:00 Hak-Jun Lee[1], Seung-Ki Sul[1], Sang-Yeop Kwak[2], Sang-Il Kim[2]
1) Seoul National University, Korea, 2) Doosan Infracore Co., Ltd., Korea

Room E

Oral Session 22E2 Inverters for Motor Drive

Chair: Giuseppe Guidi (*Yokohama National University*)
Toshihiko Noguchi (*Shizuoka University*)

22E2-1 **A New PWM Pulse Modification Procedure of DC Bus Current Detection for Noise Adaptation**
16:20 Yoichiro Arakawa[1], Shigehisa Aoyagi[1], Koichiro Nagata[1], Yusuke Arao[2]
1) Hitachi, Ltd., Japan, 2) Hitachi Industrial Equipment Systems Co., Ltd., Japan

22E2-2 **Novel Inverter with Zero Voltage Switching (ZVS) Commutation Circuit for High-voltage/High-power Motor**
16:45 **Drives**
Akihisa Matsushita[1], Kazuyasu Takimoto[1], Kentaro Suzuki[1], Hiromichi Tai[1], Ryoichi Kurosawa[2], Isao Kamiyama[2]
1) Toshiba Corporation, Japan, 2) Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan

22E2-3 **High Quality Voltage Regulation of a Five-Level Current Source Inverter**
17:10 S. A. S Grogan[1], B. P. McGrath[2], D. G. Holmes[2]
1) Monash University, Australia, 2) RMIT University, Australia

22E2-4 **A Fractal based Space Vector PWM Scheme for General n- Level Inverters**
17:35 Shiny G., M. R. Baiju
College of Engineering, India

22E2-5 **A Bit-Stream Based Space Vector Modulator**
18:00 Jonathan Bradshaw[1], Udaya Madawala[1], Nitish Patel[1], Mahinda Vilathgamuwa[2]
1) The University of Auckland, New Zealand, 2) Nanyang Technological University, Singapore

Room F

Oral Session 22F2 (OS) Energy Conservation Technologies for Power Supply Equipment and System

Chair: Keiichi Hirose (*NTT Facilities/Nagoya University*)
Masahito Shoyama (*Kyushu University*)

22F2-1 **Effects of Instantaneous Constant-Power Loads on DC Micro-grids for Sustainable Power Systems**
Invited Paper Alexis Kwasinski, Chimaobi N. Onwuchekwa
16:20 *The University of Texas at Austin, USA*

22F2-2 **Examination progress and development of HVDC power feeding system**
Invited Paper Tadatoshi Babasaki[1,2], Toshimitsu Tanaka[1], Kaoru Asakura, Yousuke Nozaki[1], Fujio Kurokawa[2]
16:45 *1) NTT Energy and Environment System Laboratories, Japan, 2) Nagasaki University, Japan*

22F2-3 **HVDC Power Distribution Systems for Telecom Sites and Data Centers**
Invited Paper Akiyoshi Fukui, Takashi Takeda, Keiichi Hirose, Mikio Yamasaki
17:10 *NTT Facilities, Inc., Japan*

22F2-4 **Modeling and Design of Current Balancing Control in Voltage-Mode Multiphase Interleaved Voltage Regulators**
Invited Paper Ming-Ting Tsai[1], Dan Chen[1], Ching-Jan Chen[1], Chen-Hua Chiu[1], Wei-Hsu Chang[2]
17:35 *1) National Taiwan University, Taiwan, 2) Richtek Technology Corporation, Taiwan*

22F2-5 **A New Digitally Controlled Switching Power Supply for Green IT**
Invited Paper Fujio Kurokawa[1], Yuki Maeda[1], Yuichiro Shibata[1], Hidenori Maruta[1], Tsukasa Takahashi, Kouta Bansho[2], Toru
18:00 Tanaka[2], Keiichi Hirose[2]
1) Nagasaki University, Japan, 2) NTT Facilities, Inc., Japan

Room G

Oral Session 22G2 Analysis and Design of EMI 1

Chair: Hua Chin-Chiang (*National Yunlin University and Science Technology*)
Keiji Wada (*Tokyo Metropolitan University*)

22G2-1 **Extracting the Parameters of a Common Mode EMI Equivalent Circuit Model for a Drive Inverter**
16:20 Xun Gong, J. A. Ferreira
Delft University of Technology, The Netherlands

22G2-2 **Characterization of Parasitic Impedance in a Power Electronics Circuit Board using TDR**
16:45 S. Hashino, T. Shimizu
Tokyo Metropolitan University, Japan

22G2-3 **Shifting Input Filter Resonances - An Intelligent Converter Behavior for Maintaining System Stability**
17:10 Mario Schweizer, Johann W. Kolar
Swiss Federal Institute of Technology (ETH Zurich), Switzerland

22G2-4 **Effective EMI Filter Design Method for Three-Phase Inverter based upon Software Noise Separation**
17:35 Po-Shen Chen, Yen-Shin Lai
Center for Power Electronics Technology, Taiwan

22G2-5 **Considerations for Digital Controllers Targeted at Conducted-Noise Spectrum-Spreading in DC-DC Converters**
18:00 Gamal M. Dousoky, Masahito Shoyama
Kyushu University, Japan

Room H

Oral Session 22H2 MPPT Control Systems

Chair: Chanin Bunlaksananusorn (*King Mongkut's Institute of Technology Ladkrabarg)*
Noriyuki Kimura (*Osaka Institute of Technology)*

22H2-1 **Capacitor Voltage Control for MPPT Range Expansion and Efficiency Improvement of Gridconnected Quasi**
16:20 **Z-Source Inverter**
Jong-Hyoung Park[1], Heung-Geun Kim[1], Eui-Cheol Nho[2], Tae-Won Chun[3]
1) Kyungpook National University, Korea, 2) PuKyong National University, Korea, 3) University of Ulsan, Korea

22H2-2 **Battery Charger with MPPT Function for Stand-Alone Wind Turbines**
16:45 Kuo-Yuan Lo[1], Yung-Ruei Chang[1], Yaw-Ming Chen[2]
1) Institute of Nuclear Energy Research Atomic Energy Council, Taiwan, 2) National Taiwan University, Taiwan

22H2-3 **Application of Power Compensating Concept for High Efficiency Maximum Power Point Tracking in Grid-**
17:10 **Connected Photovoltaic System**
Bo Yuan, Xu Yang, Donghao Li
Xi'an Jiaotong University, China

22H2-4 **Analysis of Distributed Peak Power Tracking in Photovoltaic Systems**
17:35 Shahab Poshtkouhi, Jordan Varley, Rahul Popuri, Olivier Trescases
University of Toronto, Canada

22H2-5 **Flyback Inverter using Voltage Sensorless MPPT for AC Module Systems**
18:00 Young-Ho Kim[1], Jun-Gu Kim[1], Young-Hyok Ji[1], Chung-Yuen Won[1], Tae-Won Lee[2]
1) Sungkyunkwan Univ., Korea, 2) Samsung Electro-mechanics, Korea

Room A

Oral Session 23A1 Modeling for Power Electronic Systems

Chair: Lazhar Ben-Brahim (*Qatar University*)
Toshiji Kato (*Doshisha University*)

23A1-1 **Fast Computation Methods of PEM Fuel Cell Dynamic Models for Real-time Simulation**
9:00 Jee-Hoon Jung, Shehab Ahmed, Enjeti Prasad
Texas A&M University at Qatar, Qatar

23A1-2 **Advanced Setup for Thermal Cycling of Power Modules following Definable Junction Temperature Profiles**
9:25 A. Stupar, D. Bortis, U. Drofenik, J. W. Kolar
ETH Zurich, Switzerland

23A1-3 **Circuit Modeling Methodology for Isolated, High Bandwidth Junction Temperature Estimation**
9:50 Marsha L. Walters[1], Robert D. Lorenz[2]
1) Greensboro, U.S.A., 2) University of Wisconsin-Madison, USA

23A1-4 **Study of Modeling Method of Distributed Generators Considering Partial Dropout for Trunk Transmission**
10:15 **System**
Shinya Sugita[1], Yoshihiko Kataoka[1], Shinya Naoi[2], Yasuhiro Noro[2], Ryoichi Ichikawa[2]
1) The Tokyo Electric Power Co., Japan, 2) Toshiba Corp., Japan

Room B

Oral Session 23B1 DC-DC Converters 2

Chair: David J. Perreault (*Massachusetts Institute of Technology*)
Tamotsu Ninomiya (*Nagasaki University*)

23B1-1 **Efficiency Optimization of High Power Density Dual Active Bridge DC-DC Converter**
9:00 G. Guidi[1], M. Pavlovsky[1], A. Kawamura[1], T. Imakubo[2], Y. Sasaki[2]
1) Yokohama National University, Japan, 2) Products Development Center, Japan

23B1-2 **Soft-switched Interleaved Boost Converters for High Step-up and High Power Applications**
9:25 Yohan Park, Sewan Choi
Seoul National University of Technology, Korea

23B1-3 **Z-Source Resonant DC-DC Converter for Wide Input Voltage and Load Variation**
9:50 Honnyong Cha[1], Fang Z. Peng[2], Dongwook Yoo[1]
1) Korea Electrotechnology Research Institute, Korea, 2) Michigan State University, USA

23B1-4 **A Design of FPGA Based Hardware Controller for DC-DC Converter using SDRE Approach**
10:15 Takeaki Fujimoto, Fumitoshi Tabuchi, Tomoki Yokoyama
Tokyo Denki University, Japan

Room C

Oral Session 23C1 Wide Bandgap Power Devices

Chair: Nariaki Ikeda (*Advanced Power Device Research Association*)
Makoto Kitabatake (*Panasonic Corporation*)

23C1-1 **SiC Power Devices for Smart Grid Systems**
9:00 J. W. Palmour, J. Q. Zhang, M. K. Das, R. Callanan, A. K. Agarwal, D. E. Grider
Cree, Inc., USA

23C1-2 **GaN Power Switching Devices**
9:25 Masahiro Ishida[1], Yasuhiro Uemoto[1], Tetsuzo Ueda[1], Tsuyoshi Tanaka[1], Daisuke Ueda[2]
1) Semiconductor Company, Panasonic Corporation, Japan, 2) Panasonic Corporation, Japan

23C1-3 **High-power AlGaN/GaN HFETs on Si substrates**
9:50 Nariaki Ikeda, Shusuke Kaya, Jiang Li, Takuya Kokawa, Yoshihiro Satoh, Sadahiro Katoh
Advanced Power Device Research Association, Japan

23C1-4 **Large current SiC power devices for automobile applications**
10:15 T. Nakamura, M. Sasagawa, Y. Nakano, T. Otsuka, M. Miura
ROHM Co., Ltd., Japan

23C1-5 **Enhancement-Mode GaN MIS-HEMTs for Power Supplies**
10:40 T. Imada, M. Kanamura, T. Kikkawa
Fujitsu Laboratories Ltd., Japan

Room D

Oral Session 23D1 Power Electronics and Drives Applied to Home Appliance 2

Chair: Yen-Shin Lai (*National Taipei University of Technology*)
Fujio Kurokawa (*Nagasaki University*)

23D1-1 **Dual-Output Boost Converter with Positive and Negative Output Voltages under Single Positive Voltage Source Fed**
9:00 K. I. Hwu[1], Y. T. Yau[1] Jenn-Jong Shieh[2]
1) National Taipei University of Technology, Taiwan, 2) Ta Hwa Institute of Technology, Taiwan

23D1-2 **High Step-Up Converter Based on Charge Pump and Boost Converter**
9:25 K. I. Hwu, Y. T. Yau
National Taipei University of Technology, Taiwan

23D1-3 **Disturbance Observer-Based Control of a Dual Output LLC Converter for Solid State Lighting Applications**
9:50 Maurice G. L. Roes, Jorge L. Duarte, Marcel A. M. Hendrix
Eindhoven University of Technology, The Netherlands

23D1-4 **A Power Flow Control Method on Primary Side for a CPT System**
10:15 H. L. Li, A. P. Hu, G. A. Covic
The University of Auckland, New Zealand

Room E

Oral Session 23E1 Permanent Magnet Motor Drive 2

Chair: Ralph Kennel (*Technische Universitaet Muenchen*)
Shinji Doki (*Nagoya University*)

23E1-1 **Vector Control and Harmonic Ripple Reduction with Independent Multi-phase PMSM**
9:00 Chae-Bong Bae[1], Young-Gook Kim[1], Jang-Mok Kim[1], Hyun-Cheol Kim[2]
1) Pusan National University, Korea, 2) Agency for Defense Development, Korea

23E1-2 **New Vector Controller for PM Motors which Modeled the Cross-Coupling Magnetic Flux Saturation**
9:25 Hirokazu Nagura, Yoshitaka Iwaji, Junnosuke Nakatsugawa, Norihisa Iwasaki
Hitachi, Ltd., Japan

23E1-3 **Higher Harmonic Currents Reduction for Interior Permanent Magnet Synchronous Motors**
9:50 T. Yoshida, T. Kamejima, H. Ishikawa, H. Naitoh
Gifu University, Japan

23E1-4 **Torque Ripple Suppression Control for PM Motor with Current Control Based on PTC**
10:15 Kento Nakamura[1], Hiroshi Fujimoto[2], Masami Fujitsuna[3]
1) Yokohama National University, Japan, 2) The University of Tokyo, Japan, 3) DENSO Corporation, Japan

23E1-5 **Design of Permanent Magnet Synchronous Motor with Low Cogging Torque**
10:40 Chuan-Sheng Liu[1], Jonq-Chin Hwang[2], Po-Cheng, Chen[1]
1) National Formosa University, Taiwan, 2) National Taiwan University of Science and Technology, Taiwan

Room F

Oral Session 23F1 (OS) Education in Power Electronics

Chair: Janos Hamar (*Budapest University of Technology and Economics*)
Hirohito Funato (*Utsunomiya University*)

23F1-1 **Discrete-time Modeling Tools for DC-DC Converters**
Invited Paper J. Hamar[1,2], I. Nagy[1,3], H. Funato[4], Y. Nishida[5], H. Ohsaki[6], E. Masada[7]
9:00 *1) Budapest University of Technology and Economics, Hungary, 2) MFKK Invention and Research Center Services Co. Ltd., Hungary, 3) Hungarian Academy of Science, Hungary, 4) Utsunomiya University, Japan, 5) Chiba Institute of Technology, Japan, 6) The University of Tokyo, Japan, 7) Railway Technology Research Institute, Japan*

23F1-2 **Some Proposals for Teaching the Technology of IPMSM**
Invited Paper Tunghai Chin
9:25 *Institute for Research in Engineering Education, Japan*

23F1-3 **States on Education of Power Electronics and Electrical Drive in China's University**
Invited Paper Yang, Geng[1], Huang, Lipei[2], Xu, Dehong[3], Zhou Honglin[1]
9:50 *1) Automation Dept. of Tsinghua Univ., China, 2) Electrical Eng. Dept. of Tsinghua Univ., China, 3) P. E. Institute of Zhejiang University, China*

23F1-4 **Novel Online Simulator for Education of Power Electronics and Electrical Engineering**
Invited Paper U. Drofenik, A. Müsing, J. W. Kolar
10:15 *ETH Zurich, ETH-Zentrum, Switzerland*

23F1-5 **Experiments using Miniature Motor and Chopper Circuit for Students**
Invited Paper Noriyuki Kimura, Toshimitsu Morizane
10:40 *Osaka Institute of Technology, Japan*

Room G

Oral Session 23G1 (OS) Modeling and Suppression of EMI

Chair: Tsorng-Juu Liang (*National Cheng Kung University*)
Toshihisa Shimizu (*Tokyo Metropolitan University*)

23G1-1 **Study of Conducted EMI Reduction for Three-Phase Vienna-Type Rectifier**
Invited Paper Dong Jiang[1], Rixin Lai[2], Fred Wang[3], Fang Luo[1], Shuo Wang[2], Dushan Boroyevich[4]
9:00 *1) Virginia Tech, USA, 2) GE Global Research Center Niskayuna, USA, 3) The University of Tennessee, USA, 4) Electrical Power Systems, GE Aviation, USA*

23G1-2 **Common-Mode Voltage Reduction Modulation Techniques for Three-Phase Grid Connected Converters**
Invited Paper Chung-Chuan Hou[1], Chih-Chung Shih[2], Po-Tai Cheng[2], Ahmet M. Hava[3]
9:25 *1) Chung Hua University, Taiwan, 2) National Tsing Hua University, Taiwan, 3) Middle East Technical University, Turkey*

23G1-3 **Analytical Method and Suppression Technique of Conducted EMI Noise in a Multi-Converter System**
Invited Paper Michio Tamate[1], Akio Toba[1], Yasushi Matsumoto[1], Keiji Wada[2], Toshihisa Shimizu[2]
9:50 *1) Fuji Electric Holdings Co., Ltd., Japan, 2) Tokyo Metropolitan University, Japan*

23G1-4 **Optimization of the Current Distribution in Press-Pack High Power IGBT Modules**
Invited Paper A. Müsing, G. Ortiz, J. W. Kolar
10:15 *ETH Zurich, Switzerland*

Room H

Oral Session 23H1 Energy Management Systems

Chair: Ron Hui (*City University of Hong Kong*)
Hiroshi Yamaguchi (*AIST*)

23H1-1 **A High Reliability Photovoltaic (PV) Generation System in Cooperation with a Polymer Electrolyte Fuel Cell**
9:00 **(PEFC) Using Electric Double Layer Capacitors (EDLCs)**
Nobuyoshi Mutoh, Yoshifumi Ohnuma, Kota Suzuki
Tokyo Metropolitan Univercity, Japan

23H1-2 9:25 **Control Algorithm of Renewable Energy Power Plant Supplied by Fuel Cell/Solar Cell/ Supercapacitor Power Source**
P. Thounthong[1], S. Sikkabut[1], P. Sethakul[1], B. Davat[2]
1) King Mongkut's University of Technology North Bangkok, Thailand, 2) Nancy Université, France

23H1-3 9:50 **Composite Energy Storage System Using Dynamic Energy Management in Microgrid Applications**
Haihua Zhou, Tanmoy Bhattacharya, Ashwin M. Khambadkone
National University of Singapore, Singapore

23H1-4 10:15 **Uninterruptible Power Supply with Function of Absorbing Regenerative Energy**
Y. Ito, S. Ishiguma
Sanken Electric, Japan

23H1-5 10:40 **Screening Process of Li-Ion Series Battery Pack for Improved Voltage/SOC Balancing**
Jong-Hoon Kim, Jong-Won Shin, Chang-Yoon Jeon, Bo-Hyung Cho
Seoul National University, Korea

Room I

Oral Session 23I1 Vehicle Power Electronics

Chair: Alfred Rufer (*EPEL Lausanne*)
Keiichiro Kondo (*Chiba University*)

23I1-1 9:00 **Selective Flyback Balancing Circuit with Improved Balancing Speed for Series Connected Lithium-ion Batteries**
Jong-Won Shin, Gab-Su Seo, Chang-Yoon Chun, Bo-Hyung Cho
Seoul National University, Korea

23I1-2 9:25 **The High Efficiency Charge Equalized System for Serially Connected VRLA Battery String using Synchronous Flyback Converter**
Charnyut Karnjanapiboon[1], Kamon Jirasereeamornkul[1], Veerapol Monyakul[2]
1) King Mongkut's University of Technology Thonburi, Thailand, 2) National Science and Technology Development Agency (NSTDA), Thailand.

23I1-3 9:50 **Investigation of a Two-stage Boost Converter using the Neutral Point of a Motor**
Jun-ichi Itoh, Daisuke Ikarashi
Nagaoka University of Technology, Japan

23I1-4 10:15 **Mid-Power SAZZ Chopper with Switched Tail Loss Cancel Circuit**
Yukinori Tsuruta, Atsuo Kawamura
Yokohama National University, Japan

23I1-5 10:40 **Behavior of a Matrix Converter with a Feed Back Control in an Input Side**
Junnosuke Haruna, Jun-ichi Itoh
Nagaoka University of Technology, Japan

Wednesday, June 23: 11:30-13:00

Main Hall

Poster Session 23P1 Static Power Converters 2

Chair: Nobukazu Hoshi (*Tokyo University of Science*)
Jun-ichi Itoh (*Nagaoka University of Technology*)

23P1-1 **A DC Input Two Single-Phase AC Outputs Converter using Three Switching Devices**
Norihiro Asahi, Nobukazu Hoshi
Tokyo University of Science, Japan

23P1-2 **Design and Analysis for Backlight Inverter with Six-Phase PWM Dimming Control Circuit**
Chien-Yeh Ho[1], Chang-Hua Lin[2], Tzong-Wey Chou[1]
1) Lunghwa University of Science and Technolog, R.O.C., 2) Tatung University, R.O.C.

23P1-3 **Characteristics of High Efficiency and Low Distortion Single Phase 7 Level Inverter without Using LC Filter**
Kenji Amei, Takahisa Ohji, Masaaki Sakui
University of Toyama, Japan

23P1-4 **New H-Bridge Multilevel Current-Source PWM Inverter with Reduced Switching Device Count**
Suroso[1,2], Toshihiko Noguchi[3]
1) University of Jenderal Soedirman, Indonesia, 2) Nagaoka University of Technology, Japan, 3) Shizuoka University, Hamamatsu, Japan

23P1-5 **Hybrid Cascaded Multilevel Converter with Integrated Series Active Power Filter for Interfacing Energy Storage System to Medium Voltage Grid**
Mohamed Rashed, Christian Klumpner, Greg Asher
The University of Nottingham, UK

23P1-6 **Formulation of the Line Voltage THD, Case I: Multilevel Inverter with Equal DC Sources**
N. Farokhnia[1,3], H. Vadizadeh[2], F. Anvari asl[2], F. Kadkhoda[2], A. Vahabzadeh[4]
1) University of Technology, Iran, 2) Yong Researchers Club of Islamic Azad University, Iran, 3) Niroo Consulting Engineers Co., Iran, 4) Department of MBN Co., Iran

23P1-7 **A Study of Dynamic Reconfigurable Processor for Power Electronics Application**
Shinji Fujita, Shinsuke Oida, Tomoki Yokoyama
Tokyo Denki University, Japan

23P1-8 **Digital Control of Single Phase PWM Inverter using SDRE Approach**
Takeaki Fujimoto, Fumitoshi Tabuchi, Tomoki Yokoyama
Tokyo Denki University, Japan

23P1-9 **A study of Communication System for Power Electronics Controller using FPGA based Hardware Controller**
Sho Kojima, Toshiya Ishioka, Tomoki Yokoyama
Tokyo Denki University, Japan

23P1-10 **Control Design of a Multi-Module Bidirectional Converter for Battery Charging/Discharging Applications**
Dongmyung Kim, Suhan Kim, Youngbong Kang, Byungcho Choi
Kyungpook National University, South Korea

23P1-11 **Positive Sequence Tracking Phase Locked Loops: A Unified Graphical Explanation**
L. Matakas Junior[1,2], W. Komatsu[1], F. O. Martinz[1]
1) Polytechnic School of the University of Sao Paulo, Brazil, 2) Pontifical Catholic University of Sao Paulo, Brazil

23P1-12 **Series-Shunt Power Quality Compensator by Phase Follow-up Inverter Control**
Nobutoshi Sakai, Tokuo Ohnishi
The University of Tokushima, Japan

23P1-13 **Control of a High Power PWM Current Source Rectifier**
Sebastian A. Richter, Benjamin Bader, Rik W. De Doncker
RWTH Aachen University, Germany

Poster Session 23P2 Electric Machines, Actuators and Sensors 2

Chair: Akira Chiba (*Tokyo Institute of Technology)*
Shu Yamamoto (*Polytechnic University)*

23P2-14 **The Design Method to Minimize Torque Ripple in Interior Permanent Magnet Synchronous Motor with Concentrated Winding**
N. Saito, R. Kijima, S. Shimomura
Shibaura Institute of Technology, Japan

23P2-15 **Modeling Magnetic Saturation for the Design of Exterior Rotor Permanent Magnet Machines**
Hung Vu Xuan, D. Lahaye, M. J. Hoeijmakers, H. Polinder, J. A. Ferreira
Delft University of Technology, The Netherlands

23P2-16 **Analysis of Rotor Eccentricity on Permanent Magnet Synchronous Motor Characteristics**
R. Takahata[1], S. Wakui[1], K. Miyata[1], K. Noma[2], M. Senoo[2]
1) Hitachi, Ltd., Japan, 2) Hitachi Industrial Equipment Systems Co., Japan

23P2-17 **Optimization of In-wheel PM Motor by Fuzzybased Taguchi Method**
Zwe-Lee Gaing[1], Qi-Quan Wang[1], Jui-An Chiang[2]
1) Kao Yuan University, Taiwan, 2) New Widetech Industries Co. Ltd., Taiwan

23P2-18 **Structure of the PM Synchronous Motor for Low Iron Loss Characteristic in the High-speed Region**
N. Ishihara, M. Sanada, S. Morimoto
Osaka Prefecture University, Japan

23P2-19 **Development of Eco-friendly Totally Enclosed Fan Cooled Traction Motor**
Shinichi Noda, Taihei Koyama, Shigetomo Shiraishi
Toshiba Corporation, Japan

23P2-20 **A Hybrid Islanding Detection Method for Distributed Synchronous Generators**
Wen-Yeau Chang
St. John's University, Taiwan

23P2-21 **Current-based Detection of Eccentric Load Coupled to Brushless DC Motor**
T. Ishikawa, R. Toyota, M. Matsunami, N. Kurita, T. Matsuura
Gunma University, Japan

23P2-22 **Design of Axial Flux Permanent Magnet Brushless DC Motor for Robot Joint Module**
Jung-Moo Seo, Se-Hyun Rhyu, Joo-Han Kim, Jun-Hyuk Choi, In-Soung Jung
Korea Electronics Technology Institute, Korea

23P2-23 **Design Refinements and Experimental Test of Hybrid Excitation Motor for Main Spindle Drive in Machine Tools**
M. Sridharbabu, T. Kosaka, N. Matsui
Nagoya Institute of Technology, Japan

23P2-24 **Basic Research on Permanent Magnet Assisted Synchronous Reluctance Motor with Three-dimensional Gap Structure**
K. Ito, M. Sanada, S. Morimoto
Osaka Prefecture University, Japan

23P2-25 **New Generation Motor for Energy Saving**
Kazuto Sakai, Daisuke Misu, Kazuaki Yuki, Kazuya Yasui, Yutaka Hashiba, Norio Takahashi
Toshiba Corporation, Japan

23P2-26 **Congestion Control for Local Wireless Sensor Network Using Time-Delay Compensator**
Ping-Min Hsu, Chun-Liang Lin
National Chung Hsing University, Taiwan

Poster Session 23P3 Motor Control and Drives 1

Chair: Takafumi Koseki (*The University of Tokyo)*
Toshihiko Noguchi (*Shizuoka University)*

23P3-27 **Periodic Learning Suppression Control of Torque Ripple Utilizing System Identification for Permanent Magnet Synchronous Motors**
Yugo Tadano[1], Takao Akiyama[1], Masakatsu Nomura[1], Muneaki Ishida[2]
1) Meidensha Corporation, Japan, 2) Mie University, Japan

23P3-28 **Hybrid Recurrent Fuzzy Neural Network Control for Permanent Magnet Synchronous Motor Applied in Electric Scooter**
Chih-Hong Lin, Po-Hwa Chiang, Chi-Shin Tseng, Yi-Ling Liu, Mei-Yu Lee
National United University, Taiwan

23P3-29 **FPGA Based Functional Link Radial Basis Function Network Control for PMLSM Servo Drive System**
Faa-Jeng Lin[1], Po-Huan Chou[2]
1) National Central University, Taiwan, 2) National Dong Hwa University, Taiwan

23P3-30 **Analysis of Torque Ripple Caused by Current Signal Injection on the Maximum Torque Control Frame for Sensorless Control**
Takumi Ohnuma, Shinji Doki, Shigeru Okuma
Nagoya University, Japan

23P3-31 **Online Loss Minimization Control of IPMSM for Electric Scooters**
Meifen Cao
Tokyo Metropolitan College of Industrial Technology, Japan

23P3-32 **IPMSM Vector Control using an I/F Initial Operating Method**
In-Yong Ha[1], Jung-Hyo Lee[1], Jin-Ho Park[1], Taeck-Kie Lee[2], Chung-Yuen Won[1]
1) Sungkyunkwan University, Korea, 2) Hankyong National University, Korea

23P3-33 **Design and Implementation of a Dynamic Voltage Boosting Drive for Permanent Magnet Synchronous Motors**
Shinn-Ming Sue[1], Jenn-Horng Liaw[1], Yi-Shuo Huang[2], Yi-Hung Liao[3]
1) Minghsin University of Science and Technology, Taiwan, 2) Industrial Technology Research Institute, Taiwan, 3) National Penghu University of Science and Technology, Taiwan

23P3-34 **Fast Torque Control System of PMSM based on Model Predictive Control Considering Overmodulation Region**
Jun Ishida, Shinji Doki, Shigeru Okuma
Nagoya University, Japan

23P3-35 **Position Sensorless Torque Control System of PMSM in Overmodulation Range**
Daisuke Asano, Smith Lerdudomsak, Shinji Doki, Shigeru Okuma
Nagoya University, Japan

23P3-36 **Stabilization of Position Sensor-less Control for Low-Inductance and High-Speed PMSM with Reduced Order Flux Observer**
O. Hikone, H. Kubota, K. Matsuse, I. Miki
Meiji University, Japan

23P3-37 **Optimal Lead Angle Calculation for Brushless DC Motor**
Bon-Gwan Gu, Joon Sung Park, Jun-Hyuk Choi, Se-Hyun Rhyu, In-Soung Jung
Korea Electronics Technology Institute, Korea

23P3-38 **A New Control Method for Torque Ripple Compensation of Permanent Magnet Motors**
N. Nakao, K. Akatsu
Shibaura Institute of Technology, Japan

23P3-39 **Performance Improvement of IPMSM Sensorless Control in Low-Speed Region Using Voltage Compensation and Parameter Identification**
W. Niwa, Y. Inoue, S. Morimoto, M. Sanada
Osaka Prefecture University, Japan

Poster Session 23P4 Renewable Energy and Energy Saving 1

Chair: Mikihiko Matsui (*Tokyo Polytechnic University)*
Shoji Nishikata (*Tokyo Denki University)*

23P4-40 **A Novel High Step-Up Ratio Inverter for Distributed Energy Resources (DERs)**
Ching-Tsai Pan, Ching-Ming Lai, Ming-Chieh Cheng
National Tsing Hua University, Taiwan

23P4-41 **Calorimetric Power Loss Measurement for Highly Efficient Converters**
D. Christen, U. Badstuebner, J. Biela, J. W. Kolar
ETH Zurich, Switzerland

23P4-42 **A Proposal of a Multi-DC Tap Family Suited for Series-connected Low Voltage Devices**
Tatsuya Kitano[1], Akihiko Ogawa[1], Mikihiko Matsui[2]
1) Oyama National College of Technology, Japan, 2) Tokyo Polytechnic University, Japan

23P4-43 **Parallel Resonant DC-link Soft Switching Inverter based on Delta-Modulation Method**
Jun-Gu Kim[1], Kwang-Soo Choi[1], Su-Won Lee[2], Yong-Chae Jung[3], Chung-Yuen Won[1]
1) Sungkyunkwan University, Korea, 2) Sungkyunkwan University, Korea, 3) Namseoul University, Korea

23P4-44 **100kHz Single Phase Utility Interactive Inverter with FPGA based Hardware Controller**
Takahiro Saigusa, Koji Imamura, Tomoki Yokoyama
Tokyo Denki University, Japan

23P4-45 **Isolated Multiple-Input DC/DC Converter Using Alternative Pulsating Source as Building Cells**
Jie Ruan[1], Fuxin Liu[1], Xinbo Ruan[1,2], Dongsheng Yang[1], Yan Li[1], Ke Jin[1]
1) Nanjing University of Aeronautics & Astronautics, China, 2) Huazhong University of Science and Technology, China

23P4-46 **High Step-Up DC-DC Converter with Two Transformers for Low DC Renewable Energy Systems**
Jee-Hoon Jung[1], Woo-Young Choi[2], Shehab Ahmed[1]
1) Texas A&M University at Qatar, Qatar, 2) Chonbuk National University, Korea

23P4-47 **Charge and Discharge Characteristics of Lead-Acid Battery and LiFePO4 Battery**
A. Chih-Chiang Hua, B. Zong-Wei Syue
National Yunlin University of Science & Technology, Taiwan,

23P4-48 **Design of Sinusoidal Current Charger with Optimal Frequency Tracker for Li-ion Battery**
Liang-Rui Chen[1], Shing-Lih Wu[1], Chung-Ping Chou[2], Tsair-Rong Chen[1]
1) National Changhua University of Education, Taiwan, 2) National Taiwan Police College, Taiwan

23P4-49 A New Source of Renewable Energy from Lightning Stroke: A Small Scale System
M.B. Farriz[1], J.M. Herman[1], A. Jidin[1], A.M Zulkurnain[2]
1) Universiti Teknikal Malaysia Melaka (UTeM), Malaysia, 2) Universiti Teknologi Malaysia (UTM), Malaysia

23P4-50 Improved Grid-synchronization Technique based on Adaptive Notch Filter
Hoon-Young Jung[1], Young-Hyok Ji[1], Chung-Yuen Won[1], Doo-Young Song[2], Jin-Wook Kim[2]
1) Sungkyunkwan University, Korea, 2) Samsung Electro-mechanics. Co. Ltd, Korea

23P4-51 A Comparative Study on Power Generation Characteristics of Permanent Magnet Synchronous Generators
Shinji Kato, Masakazu Michihira
Kobe City College of Technology, Japan

23P4-52 Basic Analysis and Design of the Permanent Magnet Hybrid Type Magnetic Bearing for Small-sized Hydraulic Generator
Nobuyuki Kurita, Keisuke Ohshio, Takeo Ishikawa
Gunma University, Japan

Poster Session 23P5 Power Electronics Applied to Power Systems 2

Chair: Jumpei Baba (*The University of Tokyo)*
Tomoki Yokoyama (*Tokyo Denki University)*

23P5-53 Line Power Quality Improvement for Pulsed Electrostatic Precipitator Systems
Thiago Soeiro[1], Jürgen Biela[1], Jörgen Linnér[2], Per Ranstad[2], Johann W. Kolar[1]
1) ETH Zürich, Switzerland, 2) Alstom Power Sweden AB, Sweden

23P5-54 Voltage Enhancement of DC Power Supplies of Superconducting Coils of LHD
H. Chikaraishi[1], S. Takami[1], T. Inoue[1], K. Aoyama[2], T. Haga[3]
1) National Institute for Fusion Science, Japan, 2) Aichi Electric Co., Ltd., Japan, 3) Asort Co., Ltd., Japan

23P5-55 Beam Acceleration Experiment with Developed 10 MW Class High-Precision Power Supply for Accelerator Electromagnets
Choji Yamazaki[1], Eiichi Ikawa[1], Teruo Yoshino[1], Kosuke Sato[2], Fusao Saito[2], Shu Nakamura[3], Hiroshi Matsumoto[3], Hitoshi Kobayashi[3]
1) Toshiba Mitsubishi-Electric Industrial Systems Corporation (TMEIC), Japan, 2) Toshiba Corporation, Power Systems Company, Japan, 3) High Energy Accelerator Research Organization (KEK), Japan

23P5-56 Single Phase Full Bridge PWM Rectifier with Load Current Feedforward
K. Itako, T. Agari, T. Suzuki
Kanagawa Institute of Technology, Japan

23P5-57 Series Compensation of Thyristor Converters for Superconducting Magnets
Shinichi Nomura[1], Jan Arild Wiik[2], Ryuichi Shimada[3]
1) Meiji University, Japan, 2) ABB AS, Norway, 3) Tokyo Institute of Technology, Japan

23P5-58 Fine Output Voltage Control for Inverter System Having Nonlinear Load and Time-Delay
Junji Shibata[1], Kiyoshi Ohishi[1], Itaru Ando[2], Mina Ogawa[3]
1) Nagaoka University of Technology, Japan, 2) Akita National College of Technology, Japan, 3) Hitachi Medical Corporation, Japan

23P5-59 A New PWM Dimmer Using Two Active Switches for AC LED Lamp
Hye-Man Jung[1], Jong-Hyun Kim[2], Byoung-Kuk Lee[1], Dong-Wook Yoo[2]
1) SungKyunKwan University, Korea, 2) Korea Electrotechnology Research Institute, Korea

23P5-60 Measurement of an Ozone Generator Using a Phase-Shifted PWM Full Bridge Inverter
Prasopchok Hothongkham[1], Vijit Kinnares[2]
1) SIAM University, Thailand, 2) King Mongkut's Institute of Technology Ladkrabang, Thailand

23P5-61 High-Voltage High-Frequency Power Supply Using a Phase-Shifted PWM Full Bridge Inverter Fed Ozone Generator with Constant Applied Electrode Voltage
Prasopchok Hothongkham[1], Vijit Kinnares[2]
1) SIAM University, Thailand, 2) King Mongkut's Institute of Technology Ladkrabang, Thailand

23P5-62 Charge Equalization of Battery Power Modules in Series
Wei Hong, Kong-Soon Ng, Jin-Hsin Hu, Chin-Sien Moo
National Sun Yat-Sen University, Taiwan

23P5-63 **Current Control of Hybrid Energy Storage System Based on Battery and Ultracapacitor with Boost Converter Interface**
Yi-Hsien Chiang, Wu-Yang Sean
Industrial Technology Research Institute, Taiwan

23P5-64 **Inner Control of Modular Multilevel Converters - An Approach using Open-loop Estimation of Stored Energy**
Lennart Ängquist, Antonios Antonopoulos, Daniel Siemaszko, Kalle Ilves, Michail Vasiladiotis, Hans-Peter Nee
Royal Institute of Technology (KTH), Sweden

23P5-65 **A Common Single-Phase Diode Rectifier for Multi-Load System with an Auxiliary Converter**
Chung-Chuan Hou
Chung Hua University, Taiwan

Poster Session 23P6 Power Electronics and Drives Applied to Railway Systems

Chair: Keiichiro Kondo (*Chiba University)*
Hitoshi Hayashiya (*East Japan Railway Company)*

23P6-66 **A Half-Bridge Inverter Based Active Power Quality Compensator for Electrified Railways**
T. Tanaka, K. Ishibashi, N. Ishikura, E. Hiraki
Yamaguchi University, Japan

23P6-67 **Hardware Embedded Current Control PWM "Hi-PWM" to Reduce Switching Frequency for Application to Railway**
Shouji Onda[1], Katsumi Maekawa[2]
1) Toshiba Corporation, Japan, 2) Power Systems Company, Toshiba Corporation, Japan

23P6-68 **Improvement of Hardware Embedded Current Control PWM "Hi-PWM" to Control Switching Frequency**
K. Yasui, S. Onda, I. Yasuoka, K. Maekawa
Toshiba Corporation, Japan

23P6-69 **Evaluation of the Energy-saving Performance of the PMSM Drive System**
H. Kawai, Y. Tasaka
Toshiba Corp., Japan

23P6-70 **Study of EMI for Direct Drive Motor System in Railway Traction**
K. Yuuki, H. Ueda, S. Shiraishi, S. Koizumi, I. Yasuoka
Toshiba Corporation, Japan

Poster Session 23P7 Power Supply for Information and Communication Technologies

Chair: Masahito Shoyama (*Kyushu University)*
Tadahito Aoki (*NTT Facilities, Inc.)*

23P7-71 **An Auto-Tuning Digital Control for Wide Input Range Buck-Boost DC-DC Converter**
Fujio Kurokawa[1], Taku Ishibashi[1], Tadatoshi Babasaki[2]
1) Nagasaki University, Japan, 2) NTT, Japan

23P7-72 **A Novel Robust Sliding Mode Controller for Half-bridge Converter**
Lijun Hang[1], Sensen Liu[1], Zhengyu Lu[1], Miguel Castilla[2]
1) Zhejiang University, China, 2) Universitat Politècnica de Catalunya, Spain

23P7-73 **Method for Eliminating Magnetic Saturation due to Fast Transient Response in DC-DC Converter**
Teruhiko Kohama, Akio Inoue
Fukuoka University, Japan.

23P7-74 **ZCS Switched-Capacitor Bidirectional Converters with Secondary Output Power Amplifier for Biomedical Applications**
Sung-Hsin Hsiao, Yuang-Shung Lee, Pui-Fong Kong
1) Applied Science and Eng. Institute, Fu-Jen Catholic University, Taiwan

23P7-75 **Reducing Output Current Ripple of Resonant Switched-Capacitor Step-up Converter with Interleaving Technique**
Kenichiro Sano, Takuro Arai, Hideaki Fujita
Tokyo Institute of Technology, Japan

23P7-76 **Two-Phase Interleaved LLC Resonant Converter with Phase Shedding Control**
Myungbok Kim
HV PCIA, Fairchild Semiconductor Inc.

23P7-77 **A Segmented Gate Driver with Adjustable Driving Capability for Efficiency Optimization**
A. A. Fomani, W. T. Ng
University of Toronto, Canada

23P7-78 **Waveform Distortion in a Power-Factor-Corrected Constant-Voltage Constant-Current AC Power Supply Using Variable Capacitance Devices**
Akihiko Katsuki, Yuichi Sugimoto, Takuya Oki, Hidetaka Tanoue
Kyushu Institute of Technology, Japan

Wednesday, June 23: 13:30-15:10

Room A

Oral Session 23A2 (OS) Power Conditioning

Chair: Reza Iravani (*University of Toronto*)
Jinjun Liu (*Xi'an Jiaotong University*)

23A2-1 **Opportunities for Power Quality Improvement through DG-Grid Interfacing Converters**
Invited Paper Jinwei He, Md. Shirajum Munir, Yun Wei Li
13:30 *University of Alberta, Canada*

23A2-2 **Output Current Control for Grid-Connected VSI with LCL Filter**
Invited Paper River T. H. Li, Henry Shu-Hung Chung
13:55 *City University of Hong Kong, Hong Kong*

23A2-3 **Inter-harmonic Resonance Suppression with Hybrid Parallel Power Filters**
Invited Paper Li Ming, Wang Yue, Lei Wanjun
14:20 *Xi'an Jiaotong University, China*

23A2-4 **Development of a Small, High-performance, Voltage Sag Compensator COMPACT for High Voltage Users**
14:45 Toshihide Nakano[1], Kazunori Sanada[1], Sachiko Tamagawa[2], Kenji Arimatsu[3], Takashi Ohinata[3], Kunio Sakamoto[3]
1) Toshiba Mitsubishi Electric Industrial Systems Corporation, Japan, 2) Mitsubishi Electric Corporation, Japan, 3) Tohoku Electric Power Co., Inc, Japan

Room B

Oral Session 23B2 Power Conditioning System

Chair: Jason Lai (*Virginia Polytechnic Institute and State University*)
Kansuke Fujii (*Fuji Electric Holdings Co., Ltd.*)

23B2-1 **A High-Efficiency Solar Power Conditioner Using a Zigzag-Connected Chopper Converter**
13:30 Hideaki Fujita
Tokyo Institute of Technology, Japan

23B2-2 **LCL-filter Design for Grid-Connected PCS Using Total Harmonic Distortion and Ripple Attenuation Factor**
13:55 Min-Young Park[1], Min-Hun Chi[2], Jong-Hyoung Park[1], Heung-Geun Kim[1], Tae-Won Chun[3], Eui-Cheol Nho[4]
1) Kyungpook National University, Republic of Korea, 2) LS Industry System, Republic of Korea, 3) University of Ulsan, Republic of Korea, 4) PuKyong National University, Republic of Korea

23B2-3 **Harmonic Current Reduction Control for Grid-connected PV Generation Systems**
14:20 T. Ito[1], H. Miyata[1], M. Taniguchi[1], T. Aihara[1], N. Uchiyama[1], H. Konishi[2]
1) Hitachi Ltd., Japan, 2) NTT Facilities, Inc., Japan

23B2-4 **A Novel Current Control Scheme using Lyapunov Function to Control the Active and Reactive Power Flow in a**
14:45 **Single Phase Hybrid PV Inverter System Connected to the Grid**
S. Dasgupta, S. K. Sahoo, S. K. Panda
National University of Singapore, Singapore

Room C

Oral Session 23C2 Rectifier

Chair: Stephane Azzopardi (*IMS Lab. -Bordeaux University)*
Akihiko Katsuki (*Kyushu Institute of Technology)*

23C2-1 **Optimal Design of a 5kW/dm^3 / 98.3% Efficient TCM Resonant Transition Single-Phase PFC Rectifier**
13:30 J. Biela, D. Hassler, J. Miniböck, J. W. Kolar
ETH Zurich, Switzerland

23C2-2 **A New On-Time Adjustment Scheme for the Reduction of Input Current Distortion of Critical-Mode Power**
13:55 **Factor Correction Boost Converters**
Shi-Huang Tang[1], Dan Chen[1], Chun-Shih Huang[1], Chih-Yuan Liu[1], Kwang H. Liu[2]
1) National Taiwan University, Taiwan, 2) Green Mark Inc., Taiwan

23C2-3 **Interleaved Triangular Current Mode (TCM) Resonant Transition, Single Phase PFC Rectifier with High Efficiency**
14:20 **and High Power Density**
C. Marxgut, J. Biela, J. W. Kolar
ETH Zurich, Switzerland

23C2-4 **Novel Bridgeless PFC Converters with Low Inrush Current Stress and High Efficiency**
14:45 K. Mino[1], H. Matsumoto[1], S. Fujita[1], Y. Nemoto[1], D. Kawasaki[1], R. Yamada[1], N. Tawada[2]
1) Fuji Electric Holdings Co., Ltd., Japan, 2) Fuji Electric Systems Co., Ltd., Japan

Room E

Oral Session 23E2 Linear Motors and Actuators

Chair: Francis Dawson (*University of Toronto)*
Yasutaka Fujimoto (*Yokohama National University)*

23E2-1 **Frequency Response of an Actuator with Solid Iron Core**
13:30 Masashi Sawada, Masanori Kuroda, Koji Hashimoto, Masahiro Ueki, Tomoaki Tamiya, Yuji Shindo
Kawasaki Heavy Industries, Ltd., Japan

23E2-2 **Improvement of Detachable Actuator for Wall Climbing**
13:55 Kazuhisa Kikuchi[1], Hideo Tomita[1], Yukio Saito[1], Yuki Osakabe[1], Shin-ichi Motegi[2]
1) Tokyo Denki University, Japan, 2) Yanmar Co., Ltd., Japan.

23E2-3 **Asymmetric Circuit Models and Parameter Measurement for Permanent Magnet Linear Synchronous Motor**
14:20 **Considering Inductance Harmonics**
S. Yamamoto[1], T. Kano[1], T. Yamaguchi[2], H. Hirahara[3], T. Ara[1]
1) Polytechnic University, Japan, 2) Obayashi Corp., Japan, 3) Ehime Polytechnic Center, Japan

23E2-4 **Design Study of Linear Synchronous Motors using Superconducting Coils and Bulks**
14:45 Y. Terao, M. Sekino, H. Ohsaki
The University of Tokyo, Japan

Room F

Oral Session 23F2 Converters Applied to Power Systems

Chair: Wanjun Lei (*Xi'an Jiaton University)*
Noriyuki Kimura (*Osaka Institute of Technology)*

23F2-1 **450MVA GCT- STATCOM for Stability Improvement and Over-Voltage Suppression**
13:30 T. Fujii[1], K. Temma[1], N. Morishima[2], T. Akedani[3], T. Shimonosono[3], H. Harada[3]
1) Mitsubishi Electric Corporation, Japan, 2) Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan, 3) Chubu Electric Power Corporation, Japan

23F2-2 **STATCOM for Flicker Suppression from a Steel Plant Connected to a Weak 66 kV Grid**
13:55 R. Grünbaum[1], T. Gustafsson[1], J. P. Hasler[1], M. Osada[2], J. Rasmussen[1], K. Thorburn[1]
1) ABB AB, Sweden, 2) ABB K. K., Japan

23F2-3 **Hybrid Control Scheme of Power compensation and Modulation for a Three-phase to Single-phase Matrix**
14:20 **Converter with a Small Capacitor**
Y. Miura, T. Amano, T. Ise
Osaka University, Japan

23F2-4 **Forced Commutation through Series Voltage Injection for Reactive Power Reduction of Line Commutated HVDC**
14:45 **Converter Terminal**
Muhammad Jafar, Marta Molinas
Norwegian University of Science and Technology, Norway

Room G

Oral Session 23G2 (OS) Rare-Earth Free Motors and Control Techniques

Chair: Thomas M. Jahns (*University of Wisconsin - Madison)*
Tsuyoshi Higuchi (*Nagasaki University)*

23G2-1 **Brushless Synchronous Machines with Wound-Field Excitation using SMC Core Designed for HEV Drives**
Invited Paper T. Kosaka, T. Hirose, N. Matsui
13:30 *Nagoya Institute of Technology, Japan*

23G2-2 **Design and analysis of a switched reluctance motor for next generation hybrid vehicle without PM materials**
Invited Paper Yuichi Takano[1], Motoki Takeno[1], Nobukazu Hoshi[1], Akira Chiba[2], Masatsugu Takemoto[3], Satoshi Ogasawara[3], M.
13:55 Azizur Rahman[4]
1) Tokyo University of Science, 2) Tokyo Institute of Technology, 3) Hokkaido University, 4) Memorial University of Newfoundland

23G2-3 **Comparison of Permanent Magnet Drive Motor with a Cage Induction Motor Design for a Hybrid Electric**
Invited Paper **Vehicle**
14:20 D. G. Dorrell[1], M. Popescu[2], L. Evans[2], D. A. Staton[2], A. M. Knight[3]
1) University of Technology Sydney, Australia, 2) Motor Design Ltd, UK, 3) University of Alberta, Canada

23G2-4 **Induction Motor Made of Iron Powder Core**
Invited Paper Masayuki Morimoto
14:45 *Tokai University, Japan*

Room H

Oral Session 23H2 Grid Connected Wind Power Systems

Chair: Zhengyu Lu (*Zhejian University)*
Toshifumi Ise (*Osaka University)*

23H2-1 **Development of a Large-capacity PCS for Wind Turbine Generators**
13:30 Junichi Nomura[1], Manabu Souda[1], Kimiyuki Koyanagi[2], Tatsuaki Amboh[1]
1) Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan, 2) Mitsubishi Electiric Corporation, Japan

23H2-2 **SVR-based Flicker Estimation for Wind Power Systems**
13:55 Tan Luong Van, Thanh Hai Nguyen, Kyung-Hyun Kim, Dong-Choon Lee
Yeungnam University, Korea

23H2-3 **Dynamic Performance Analysis of a Wind Turbine Generating System with Series Connected Wind Generators**
14:20 **and Bypass Diodes using a Current Source Thyristor Inverter**
F. Tatsuta, S. Nishikata
Tokyo Denki University, Japan

23H2-4 **Development and Field Experiences of NAS Battery Inverter for Power Stabilization of a 51 MW Wind Farm**
14:45 Yukihisa Iijima[1], Yoshinori Sakanaka[1], Noriko Kawakami[1], Motohiro Fukuhara[2], Koji Ogawa[2], Matsuo Bando[3], Takeshi Matsuda[3]
1) Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan, 2) NGK Insulators, Ltd., Japan, 3) Japan Wind Development Co., Ltd., Japan

Room A

Oral Session 23A3 (OS) High Power Density and/or High Efficiency Chopper for HEV and EV Application

Chair: Johann Kolar (*ETH Zurich*)
Atsuo Kawamura (*Yokohama National University*)

23A3-1 **High Power SiC Modules for HEVs and PHEVs**
Invited Paper M. Chinthavali[1], L. M. Tolbert[1], H. Zhang[2], J. H. Han[3], F. Barlow[4], B. Ozpineci[1]
15:40 *1) Power Electronics and Electric Machinery Research Center Oak Ridge National Laboratory, USA, 2) Tuskegee University,, 3) Global Power Electronics, USA, 4) University of Idaho Moscow, Russia*

23A3-2 **High-Efficiency Design of Multiphase Synchronous Mode Soft-Switching Converter for Wide Input and Load Range**
Invited Paper
16:05 Jih-Sheng Lai, Ben York, Ahmed Koran, Younghoon Cho, Bret Whitaker, Hidekazu Miwa
Virginia Polytechnic Institute and State University, USA

23A3-3 **Comparative Evaluation of Soft-Switching Concepts for Bi-directional Buck+Boost Dc-Dc Converters**
Invited Paper S. Waffler, J. W. Kolar
16:30 *ETH Zurich, Switzerland*

23A3-4 **Recent Improvements of Efficiency and Power Density of DC-DC Converters for Automotive Applications**
Invited Paper Martin Pavlovsky[1,2], Yukinori Tsuruta[2], Atsuo Kawamura[2]
16:55 *1) Kanagawa Academy of Science and Technology, Japan, 2) Yokohama National University, Japan*

Room B

Oral Session 23B3 Inverters

Chair: Tzung-Lin Lee (*National Sun Yat-sen University*)
Teruo Yoshino (*Toshiba Mitsubishi-Electric Industrial Corporation*)

23B3-1 **Trans-Z-Source Inverters**
15:40 Wei Qian, Fang Zheng Peng, Honnyong Cha
Michigan State University, USA

23B3-2 **Performance of Power Converter Applied Switching Transient Waveform Modification**
16:05 T. Igarashi[1], H. Funato[1], S. Ogasawara[2], M. Hara[3], Y. Hirota[3]
1) Utsunomiya University, Japan, 2) Hokkaido University, Japan, 3) Calsonic Kansei, Corp, Japan

23B3-3 **A Novel Phase and Amplitude Controllable Voltage Regulator**
16:30 Youjun Zhang[1], Xinbo Ruan[1,2]
1) Nanjing University of Aeronautics and Astronautics, China, 2) Huazhong University of Science and Technology, China

23B3-4 **A Resonant Gate-Drive Circuit with Optically-Isolated Control Signal and Power Supply for Fast-Switching and**
16:55 **High-Voltage Power Semiconductor Devices**
Hideaki Fujita, Masanori Ishigaki
Tokyo Institute of Technology, Japan

Room C

Oral Session 23C3 DC-DC Converters 3

Chair: K. I. Hwu (*National Taipei University of Technology*)
Tadahito Aoki (*NTT Facilities Inc.*)

23C3-1 **Design Methodology for a Very High Frequency Resonant Boost Converter**
15:40 Justin M. Burkhart[1], Roman Korsunsky[2], David J. Perreault[1]
1) Massachusetts Institute of Technology, USA, 2) Texas Instruments, USA

23C3-2 **Frequency Characteristics Analysis of a Wide-Band Electronic Choke for Wire Communication System**
16:05 Akihiko Katsuki, Naoki Yamano, Takahiro Furukawa
Kyushu Institute of Technology, Japan

23C3-3 **Improvement of Output Dynamic Performance of an Average Current Mode Controlled Buck Converter with a Parallel Controller**
16:30 P. Chrin[1], S. Trakuldit[2], S. Polmai[2], C. Bunlaksananusorn[2]
1) Institute of Technology of Cambodia (ITC), Cambodia, 2) King Mongkut's Institute of Technology (KMITL), Thailand

23C3-4 **Time Delay Reduction for Improving Transient Response of Digital Controlled POL Using DSP**
16:55 Y. Nozaki[1], M. Sone[2], F. Takeda[3]
1) Shindengen Electric MFG. Co., Ltd., Japan, 2) DSP Application Technology Lab.K.K, Japan, 3) Kochi University of Technology, Japan

Room D

Oral Session 23D3 Power Semiconductor Devices and Packaging 2

Chair: Leo Lorenz (*Infineon*)
Keiji Wada (*Tokyo Metropolitan University*)

23D3-1 **High Surge Forward Current Ruggedness of 5kV Class 4H-SiC pn Diode**
15:40 S. Ogata[1], K. Asano[1], Y. Sugawara[2], A. Tanaka[1], Y. Miyanagi[1], K. Nakayama[1], T. Izumi[1], T. Hayashi[1], M. Nishimura[1]
1) The Kansai Electric Power Company, Japan, 2) SiC Power Electronics Network, Japan

23D3-2 **Development of a Dual GCT**
16:05 T. Butschen, J. Zimmermann, R. W. De Doncker
Institute for Power Generation and Storage Systems (PGS), Germany

23D3-3 **A Study on Power Device Loss of DC-DC Buck Converter with SiC Schottky Barrier Diode**
16:30 Munehisa Sekikawa[1], Tsuyoshi Funaki[2], Takashi Hikihara[1]
1) Kyoto University, Japan, 2) Osaka University, Japan

23D3-4 **A Study on the High Frequency Operation of DC-DC Converter with SiC DMOSFET**
16:55 M. Sasagawa[1], T. Nakamura[1], H. Inoue[2], T. Funaki[2]
1) Rohm Co. Ltd., Japan, 2) Osaka Univ., Japan

Room E

Oral Session 23E3 PM Machines

Chair: Tae-Won Chun (*University of Ulsan*)
Takashi Kosaka (*Nagoya Institute of Technology*)

23E3-1 **A Design Proposal of the Machine Utilizes High Permeability Magnet**
15:40 Y. Nakamura, K. Akatsu
Shibaura Institute of Technology, Japan

23E3-2 **Design of a Highly Efficient 1kW Concentric Wound IPM Machine with a Very Wide Constant Power Speed Range**
16:05 L. Chong, R. Dutta, M. F. Rahman
The University of New South Wales, Australia

23E3-3 **Design and Performance of 6-Slot 5-Pole PMFSM with Hybrid Excitation for Hybrid Electric Vehicle Applications**
16:30 E. Sulaiman[1], T. Kosaka[2], N. Matsui[2]
1) University of Tun Hussein Onn Malaysia, Malaysia, 2) Nagoya Institute of Technology, Japan

23E3-4 **Principle of a Variable Characteristic Motor with Compound Magnetomotive Forces**
16:55 T. Kato[1], K. Akatsu[2], T. Shigeta[2], M. Nakano[1], M. Tsukamoto[1], M. Arimitsu[1]
1) Nissan Motor Co.,Ltd., Japan, 2) Shibaura Institute of Technology, Japan

Room F

Oral Session 23F3 Grid Connected PV Systems

Chair: Xiangdong Sun (*Xi'an University of Technology*)
Mikihiko Matsui (*Tokyo Polytechnic University*)

23F3-1 **Development of Large-scale Power Conditioning System in Hokuto Mega-solar Project**
Invited Paper Hiroo Konishi, Takeshi Iwato, Mitsuru Kudou
15:40 *NTT Facilities Inc., Japan*

23F3-2 **Design of a Spatial Iterative Learning Controller for Single Phase Series Connected PV Module Inverter for Grid**
16:05 **Voltage Compensation**
S. Dasgupta, S. K. Sahoo, S. K. Panda
National University of Singapore, Singapore

23F3-3 **Parallel Connection of Grid-Connected LCL Inverters for MW-Scaled Photovoltaic Systems**
16:30 Rubén Inzunza, Takeshi Sumiya, Yosuke Fujii, Eiichi Ikawa
Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan

23F3-4 **A Novel Islanding Detection Method using Goertzel Algorithm in Grid-Connected System**
16:55 Jae-Hyung Kim[1], Jun-ku Kim[1], Yong-Chae Jung[2], Chung-Yuen Won[1], Tae-Hoon Kim[3]
1)Sungkyunkwan University, Korea, 2)Namseoul University, Korea, 3)Samsung Electro-Mechanics Co., Ltd, Korea

Room G

Oral Session 23G3 Reluctance Motor Drive

Chair: M. Azizur Rahman (*Memorial University of Newfoundland*)
David Dorrell (*University of Technology Sydney*)

23G3-1 **Maximum Efficiency Operation of Synchronous Reluctance Machine using Signal Injection**
15:40 Sungmin Kim[1], Seung-Ki Sul[1], Kozo Ide[2], Shinya Morimoto[2]
1) Seoul National University, Korea, 2) Yaskawa Electric Corp., Japan

23G3-2 **Hardware Real Time Simulator of Synchronous Reluctance Motor Including Three Phase PWM Inverter Model**
16:05 Tsuyoshi Hanamoto[1], Jun'ichi Yano[1], Hidehiro Ikeda[2], Teruo Tsuji[3]
1) Kyushu Institute of Technology, Japan, 2) Nishinippon Institute of Technology, Japan, 3) Fukuoka Institute of Technology, Japan

23G3-3 **An Improvement of Sensorless Control Performance by a Mathematical Modelling Method of Spatial Harmonics**
16:30 **for a SynRM**
Suk-Hwa Jung, Hisaaki Kobayashi, Shinji Doki, Shigeru Okuma
Nagoya University, Japan

23G3-4 **Self-Sensing Methods Extended to Four Phase Switched Reluctance Machines**
16:55 Ekrem Kayikci[1], Robert D. Lorenz[2]
1) Northern Power Systems, USA, 2) University of Wisconsin-Madison, USA

Room H

Oral Session 23H3 Multilevel Converters 3

Chair: Dianguo Xu (*Harbin Institute of Technology*)
Shinzo Tamai (*Toshiba Mitsubishi-Electric Industrial Systems Corporation*)

23H3-1 **Development of a Multiple Series-connected IGBT Converter for Large-capacity STATCOM**
15:40 H. Kon[1], M. Tobita[1], H. Suzuki[2], J. Kanno[2], N. Nishizawa[2], T. Murao[3], S. Irokawa[3]
1) Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan, 2) Tokyo Electric Power Company, Japan, 3) Toshiba Corporation, Japan

23H3-2 **Theoretical Analysis and Control of the Modular Multilevel Cascade Converter Based on Double-Star Chopper-**
16:05 **Cells (MMCC-DSCC)**
Makoto Hagiwara, Ryo Maeda, Hirofumi Akagi
Tokyo Institute of Technology, Japan

23H3-3 **Development of a Cascaded Multilevel DSTATCOM for Real-Time Load Power Factor Correction**
16:30 Wei-Neng Chang, Jing-Huan Liau
Chang Gung University, Taiwan

23H3-4 **Discussions on a Battery Energy Storage System Based on a Cascade PWM Converter with Star Configuration**
16:55 Laxman Maharjan, Tsukasa Yamagishi, Hirofumi Akagi
Tokyo Institute of Technology, Japan

Room A

Oral Session 24A1 (OS) Renewable Energy 1

Chair: Marta Molinas (*Norwegian University of Science and Technology)*
Paolo Tenti (*University of Padova)*

24A1-1 **Early Assessment of Grid Code Requirements for Wind Power Plant in Vestas**
Invited Paper Y. Q. Zhan, P. Zhao
9:00 *Vestas Technology R&D, Singapore*

24A1-2 **High Frequency Wind Energy Conversion from the Ocean**
Invited Paper Alejandro Garcés, Marta Molinas
9:25 *Norwegian University of Science and Technology, Norway*

24A1-3 **Modeling of WTG in Power System Studies**
Invited Paper Yu Qi Zhi, Patrick Zhao
9:50 *Vestas Technology R&D, Singapore*

24A1-4 **Control of STATCOM in Wind Power Plants based on Induction Generators during Asymmetrical Grid Faults**
Invited Paper P. Rodriguez[1], A. Luna[1], G. Medeiros[2], R. Tedorescu[3], F. Blaabjerg[3]
10:15 *1) Technical University of Catalonia, Spain, 2) Federal University of Pernambuco, Brazil, 3) Aalborg University, Denmark*

24A1-5 **Low Complexity MPPT Techniques for PV Module Converters**
Invited Paper G. Spiazzi[1], S. Buso[1], P. Mattavelli[2], P. Tenti[1]
10:40 *1) University of Padova, Italy, 2) Virginia Polytechnic Institute and State University, USA*

Room B

Oral Session 24B1 AC/DC Converters

Chair: Johann Kolar (*ETH Zurich)*
Yasuyuki Nishida (*Chiba Institute of Technology)*

24B1-1 **A Novel Voltage Doubler Rectifier for High Output Voltage Applications**
9:00 Ching-Shan Leu, Pin-Yu Huang
National Taiwan University of Science and Technology, Taiwan

24B1-2 **A Novel Control for Active Interphase Transformer using in a 24-pulse Converter**
9:25 Chung-ming Young, Ming-hui Chen, Chien-hsiang Lai, Der-Chun Shih
National Taiwan University of Science and Technology, Taiwan, R. O. C.

24B1-3 **Single Inductor Three-Level Boost Bridgeless PFC Rectifier with Nature Voltage Clamp**
9:50 Bin Su, Junming Zhang, Zhengyu Lu
Zhejiang University, China

24B1-4 **Generalized Self-Driven AC-DC Synchronous Rectification Techniques for Single- & Multi- Phase Systems**
10:15 W. X. Zhong[1], W. C. Ho[2], S. Y. R. Hui[1,3]
1) City University of Hong Kong, Hong Kong, 2) Convenientpower HK Ltd., Hong Kong, 3) Imperial College, London, UK

Room C

Oral Session 24C1 (OS) Power Semiconductor Devices and Packaging (II) High Power Density Packaging

Chair: Braham Ferreira (*Delft University of Technology)*
Tsuneo Ogura (*Toshiba Corporation)*

24C1-1 **New Physical Model for Lifetime Estimation of Power Modules**
Invited Paper I. F. Kovačević, U. Drofenik, J. W. Kolar
9:00 *ETH Zurich, Switzerland*

24C1-2 **Packaging Technologies of Direct-Cooled Power Module**
Invited Paper Toshiki Kurosu[1], Koji Sasaki[1], Atsuo Nishihara[2], Keisuke Horiuchi[2]
9:25 *1) Hitachi, Ltd. Power Systems Company, Japan, 2) Hitachi, Ltd. , Japan*

24C1-3 **Power Sandwich: an integration technology for manufacturability**
Invited Paper J. A. Ferreira, J. Popović-Gerber, I. Josifović
9:50 *Delft University of Technology, The Netherlands*

24C1-4 **Performance Evaluation of All SiC Power Converters for Realizing High Power Density of 50 W/cm^3**
Invited Paper K. Takao[1], S. Harada[2], T. Shinohe[1], H. Ohashi[2]
10:15 *1) Toshiba Corporation, Japan, 2) National Institute of Advanced Industrial Science and Technology, Japan*

24C1-5 **Thermal Analysis for Hybrid Pair Module of Si-IEGT and SiC-PiN Diode**
Invited Paper Keiji Wada[1], Jumpei Koyama[1], Kazuto Takao[2], Takeo Kanai[3], Hiromichi Oohashi[4]
10:40 *1) Tokyo Metropolitan University, Japan, 2) Toshiba Corporation, Japan, 3) Toshiba Mitsubishi-Electric Industrial Systems Corporation (TMEIC), Japan, 4) Advanced Industrial Science and Technology (AIST), Japan*

Room D

Oral Session 24D1 Electric Railway

Chair: Hitoshi Hayashiya (*East Japan Railway Company)*
Keiichiro Kondo (*Chiba University)*

24D1-1 **Drive Control of the Traction Inverter installed on the Autonomous-decentralized Hybrid Test Train**
9:00 T. Furuya, K. Ogawa, T. Yamamoto, H. Hasegawa
Railway Technical Research Institute (RTRI), Japan

24D1-2 **Basic Study on An EDLC and DC voltage Hybrid Traction System with A Direct Converter**
9:25 Keiichiro. Kondo
Chiba University, Japan

24D1-3 **Active Filter Stabilization Methods**
9:50 J. Sitar[1], V. Racek[1], P. Bauer[2], R. Hartansky[3]
1) Alexander Dubcek University of Trencin, Slovak Republic, 2) Delft University of Technology, The Netherlands, 3) Slovak University of Technology, Slovak Republic

24D1-4 **Validation of Railway Static Power Conditioner in Tohoku Shinkansen on Actual Operation**
10:15 Masataro Ohmi, Yasuhiro Yoshii
East Japan Railway Company (JR East) , Japan

24D1-5 **Single-phase STATCOM for feeding system of Tokaido Shinkansen**
10:40 Yasuhisa Horita[1], Naoki Morishima[1], Masahiko Kai[2], Mitsuru Onishi[2], Takeshi Masui[3], Masaki Noguchi[3]
1) Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan, 2) Central Japan Railway Company, Japan, 3) Mitsubishi Electric Corporation, Japan

Room E

Oral Session 24E1 Special Machines

Chair: Sanjib Kumar Panda (*National University of Singapore)*
Masahide Ooshima (*Tokyo University of Science)*

24E1-1 **Development of Variable Magnetic Flux Motor Suitable for Electric Vehicle**
9:00 G. Zhou, T. Miyazaki, S. Kawamata, D. Kaneko, N. Hino
Hitachi Ltd., Japan

24E1-2 **Torque Ripple Reduction Control of A Novel Segment Type SRM with 2-steps Slide Rotor**
9:25 Tsuyoshi Higuchi, Taku Ueda, Takashi Abe
Nagasaki University, Japan

24E1-3 **Analysis of Bundle Losses in High Speed Machines**
9:50 Patel B. Reddy, T. M. Jahns
University of Wisconsin - Maditon, USA

24E1-4 **Novel Observer Based Force Control for Active Magnetic Bearings**
10:15 Claudius M. Zingerli, Johann W. Kolar
ETH Zurich, Switzerland

24E1-5 **Decoupling Method of Radial Forces in a Dual Rotor-Type Magnetic Suspension Motor**
10:40 M. Ooshima
Tokyo University of Science, Japan

Room F

Oral Session 24F1 (OS) Motion Control and Robotics

Chair: Kiyoshi Ohishi (*Nagaoka University of Technology*)
Masaaki Shibata (*Seikei University*)

24F1-1 **Development of Multi-Legged Locomotion for Fast Walking**
Invited Paper Masaaki Shibata, Tetsuro Hoshizaki, Masahide Ito
9:00 *Seikei University, JAPAN*

24F1-2 **Power Assisting Control with Visual Interaction for Robotic Wheelchair**
Invited Paper Naoki Oda, Shouhei Mabuchi
9:25 *Chitose Institute of Science and Technology, Japan*

24F1-3 **Preservation and Reproduction of Real-World Haptic Information**
Invited Paper Seiichiro Katsura, Noboru Tsunashima, Wataru Yamanouchi, Yuki Yokokura
9:50 *Keio University, Japan*

24F1-4 **Modeling and Control of a High-thrust Direct-drive Spiral Motor**
Invited Paper Yasutaka Fujimoto, Issam A. Smadi, Hiroko Omori, Koichiro Suzuki, Hiroshi Hamada
10:15 *Yokohama National University, JAPAN*

24F1-5 **Robust Position Servo System based on Vibration Suppression Control for Industrial Robotics**
Invited Paper Kiyoshi Ohishi
10:40 *Nagaoka University of Technology, Japan*

Room G

Oral Session 24G1 Sensorless Control Strategy 1

Chair: Chandan Chakraborty (*Indian Institute of Technology*)
Shinji Shinnaka (*Kanagawa University*)

24G1-1 **Position-Sensorless Control Method at Low Speed for Permanent Magnet Synchronous Motors Using Induced**
9:00 **Voltage Caused by Magnetic Saturation**
Yoshitaka Iwaji[1], Yasuhiko Kokami[2], Minoru Kurosawa[2]
1) Hitachi, Ltd., Japan, 2) Renesas Electronics Corporation, Japan

24G1-2 **Simple Starting-up Method of BLDC Sensorless Control System for Vehicle Fuel Pump**
9:25 Quang-Vinh Tran[1], Tae-Won Chun[1], Hong-Hee Lee[1], Heung-Geun Kim[2], Eui-Cheol Nho[3]
1) University of Ulsan, Korea, 2) Kyungpook University, Korea, 3) Pukyong University, Korea

24G1-3 **An Enhanced Sensorless Control Method for PMSM in Rapid Accelerating Operation**
9:50 Myoungho Kim, Seung-Ki Sul
Seoul National University, Korea

24G1-4 **Sensorless Control of PMSG in Variable Speed Wind Energy Conversion Systems**
10:15 J. S. Thongam[1], P. Bouchard[1], R. Beguenane[2], I. Fofana[3], M. Ouhrouche[3]
1) STAS Inc., Canada, 2) Royal Military College of Canada, Canada, 3) University of Quebec at Chicoutimi, Canada

24G1-5 **Sensorless Speed Control of Inset Type Axial Gap Self-Bearing Motor Using Extended EMF**
10:40 Quang Dich Nguyen, Satoshi Ueno
Ritsumeikan University, Japan

Room H

Oral Session 24H1 Active Filter

Chair: Daniel Wojciechowski (*Gdynia Maritime University*)
Shin-ichi Hamasaki (*Nagasaki University*)

24H1-1 **Model Predictive Control for Transformerless Shunt Hybrid Power Filters**
9:00 Hua Geng[1,2], Geng Yang[1], David Xu[2], Bin Wu[2]
1) Tsinghua Univ., P. R. China, 2) Ryerson Univ., Canada

24H1-2 **Design of Resonant Current Regulation for Discrete Frequency Tuning Active Filter**
9:25 Tzung-Lin Lee, Shang-Hung Hu
National Sun Yat-Sen University, Taiwan

24H1-3 **Predictive Control of Active Filter System with LCL Coupling Circuit**
9:50 Daniel Wojciechowski, Ryszard Strzelecki
Gdynia Maritime University, Poland

24H1-4 **An Adapted Control Strategy for Dynamic Voltage Restorer to work as Series Active Power Filter**
10:15 Nguyen Xuan Tung[1], Goro Fujita[1], Kazuhiro Horikoshi[2]
1) Shibaura Institute of Technology, Japan, 2) Tohoku Electric Power Co., Inc., Japan

24H1-5 **A Novel Selective Control Algorithm for the Shunt Active Filter**
10:40 Luís F. C. Monteiro, Lucas F. Encarnação, Maurício Aredes
Federal University of Rio de Janeiro, Brazil

Thursday, June 24: 11:30-13:00

Main Hall

Poster Session 24P1 Static Power Converters 3

Chair: Kansuke Fujii (*Fuji Electric Holdings Co., Ltd.*)
Noriko Kawakami (*Toshiba Mitsubishi-Electric Industrial Systems Corporation*)

24P1-1 **Optimal Design of Resonant Converter for Electrostatic Precipitators**
Thiago Soeiro[1], Jürgen Biela[1], Jonas Mühlethaler[1], Jörgen Linnér[2], Per Ranstad[2], Johann W. Kolar[1]
1) ETH Zürich, Switzerland, 2) Alstom Power Sweden AB, Sweden

24P1-2 **General Design Method for Various Integrated Magnetics Components in CDR**
Feng Zheng, Zhengfeng Ming, Xiangcai Zheng
School of Mechano-electronic Engineering, XIDIAN University, China

24P1-3 **Auxiliary Supply Assisted Harmonic Suppression for 12-Pulse Phase-Controlled Rectifiers**
Shoji Fukuda, Shigeta Ueda[1]
1) Tomakomai National College of Technology, Japan

24P1-4 **A Soft-Switching Active Rectifier Using a Concept of Magnetic Energy Recovery Switch**
Yoshitsugu Miyaji, Takanori Isobe, Ryuichi Shimada
Tokyo Institute of Technology, Japan

24P1-5 **Analysis and Control of the Heat Distribution in a Zone-Control Induction Heating System**
Pham Ngoc Ha[1], Hideaki Fujita[1], Kazuhiro Ozaki[2], Naoki Uchida[2]
1) Tokyo Institute of Technology, Japan, 2) Mitsui Engineering & Shipbuilder Co., LTD., Japan

24P1-6 **Current Controlled Driver for a Dielectric Barrier Discharge Lamp**
A. El-Deib[1], F. Dawson[1], G. van Eerden[2], S. Bhosle[3], G. Zissis[3]
1) University of Toronto, Canada, 2) Light Controls, The Netherlands, 3) Universite de Toulouse, France

24P1-7 **A Novel Soft-Switching Full-Bridge Converter for ZVS in Light and Full Load Conditions with Current-Doubler Rectifier**
Zhong Chen, Feng Ji, Biao Ji, Xin Zhang
Nanjing University of Aeronautics & Astronautics, China

24P1-8 Transformer Synthesis for VHF Converters
Anthony D. Sagneri[1], David I. Anderson[2], David J. Perreault[1]
1) Massachusetts Institute of Technology, USA, 2) National Semiconductor Corporation, USA

24P1-9 A Study on the Performance of 10kW Grid-Connected Photovoltaic Power Conditioning System with Characteristics Variation in Inductor Core Materials
Kyoung-Jun Lee[1], Byung-Duk Min[2], Jong-Pil Lee[2], Tae-Jin Kim[2], Honnyong Cha[2], Dong-Wook Yoo[2], Hee-Je Kim[1]
1) Pusan National University, Korea, 2) Korea Electro-technology Research Institute, Korea

24P1-10 A New Modulation Strategy for Capacitor Voltage Balancing in Three-Level NPC Inverters Based on Matrix Converter Theory
Apichart Saengseethong, Somboon Sangwongwanich
Chulalongkorn University, Thailand

24P1-11 Experimental Evaluation of a New PWM Control Scheme for Matrix Converters
Tomohiko Sanada, Satoshi Ogasawara, Masatsugu Takemoto
Hokkaido University, Japan

Poster Session 24P2 Modeling, Simulation, EMI and Reliability 2

Chair: Satoshi Ogasawara (*Hokkaido University*)
Toshihisa Shimizu (*Tokyo Metropolitan University*)

24P2-12 Dynamic Modeling of Connection of a Wind Farm Using VSC-HVDC Link
Mohsen Bandarabadi[1], Hassan Aliakbarpoor[1], Mostafa Jazayeri[2]
1) Islamic Azad University, Iran, 2) University of Semnan, Iran

24P2-13 Modeling and Controlling of Zero Sequence Current in Directly Paralleled 3-phase 4-wire Inverter
Xianwei Wang[1], Fang Zhuo[1], Jing Li[1], Lin Wang[2], Hui Huang[1]
1) Xi'an Jiaotong University, China, 2) XJ Group Corporation, China

24P2-14 A First Principles Approach to Develop a Dynamic Model of Electrochemical Capacitors
Jin Hyun Chang, Francis P. Dawson, Keryn Lian
University of Toronto, Canada

24P2-15 Transformer Operation at Deep Saturation: Model and Parameters Determination
T. C. Monteiro, F. O. Martinz, L. Matakas Junior, W. Komatsu
Polytechnic School of the University of Sao Paulo, Brazil

24P2-16 The Best Suitable Multilevel Converters for Offshore Wind Power Generators Without Transformers
Sverre S. Gjerde, Tore M. Undeland
Norwegian University of Science and Technology, Norway

24P2-17 Novel AC Winding Resistance Model of Integrated Magnetics in Switched-Mode Power Supply
Zengyi Lu[1], Wei Chen[1], Yongfa Zhu[2], Dan Yang[2]
1) Fuzhou University, China, 2) Huawei Technology Co., Ltd., China

24P2-18 State Space Decoupling Approach for Feedback Controller Design of Switching Converters
E. de C. Gomes[1], L. A. de S. Ribeiro[2], J. V. M. Caracas[2], S. Y. C. Catunda[2], R. D. Lorenz[3]
1) IFMA, Brazil, 2) UFMA/IEE, Brazil, 3) University of Wisconsin - Madison, USA

24P2-19 Method for the Fast and Accurate Simulation of Switch-Mode Power Supplies
M. Schmid, M. Doebroenti, A. Bucher, T. Duerbaum
University of Erlangen-Nuremberg, Germany

24P2-20 Accuracy Evaluation of Power Hardware-in-the-loop Simulation of a Boost Chopper
Miao Hong[1,2], Lung Chien-ru[1], Yushi Miura[1], Toshifumi Ise[1]
1) Osaka University, Japan, 2) Sichuan University, China

24P2-21 Core Losses under DC Bias Condition based on Steinmetz Parameters
J. Mühlethaler[1], J. Biela[1], J. W. Kolar[1], A. Ecklebe[2]
1) ETH Zurich, Switzerland, 2) ABB Switzerland Ltd., Switzerland

24P2-22 Effects of Mix-Mode Noise Emissions on the Design Method of Power Factor Correction Boost Rectifier EMI Filters
Hung-I Hsieh
National Chiayi University, Taiwan

24P2-23 A Simulation Method Using State Transition Matrix Suitable for Real-Time Simulators
Yuki Kubo, Satoshi Ogasawara, Masatsugu Takemoto
Hokkaido University, Japan

24P2-24 A first approach on the failure mechanisms of IGBT inverters for aeronautical applications: effect of humidity-pressure combination
H. Abbad[1], S. Azzopardi[1], E. Woirgard[1], J-Y. Deletage[1], P. Rollin[2], K. Marchand[3], T. Lhommeau[4], M. Piton[5]
1) Université de Bordeaux, France, 2) Technofan, France, 3) Epsilon Ingénierie, France, 4) Hispano-Suiza., France

24P2-25 A Combined Steady State and Dynamic Model of a Proton Exchange Membrane Fuel Cell for use in DG system Simulation
S. G., Tesfahunegn[1,2], P. J. S. Vie[1], Tore M. Undeland[2], Øystein Ulleberg[1]
1) Institute for Energy Technology, Norway, 2) NTNU, Institutt for Elkraftteknikk, Norway

24P2-26 The Large-Signal SFG Model for Cascaded Multilevel Inverters with Experimental Verification
Li-Chun Liao, Ming-Yu Lin, Chi-Hung Lin
Chaoyang University of Technology, Taiwan

Poster Session 24P3 Motor Control and Drives 2

Chair: Kan Akatsu (*Shibaura Institute of Technology*)
Shinji Doki (*Nagoya University*)

24P3-27 A Carrier-Based Unbalanced PWM Method for Four-Leg Voltage Source Inverter Fed Asymmetrical Two-Phase Induction Motor
Y. Kumsuwan[1], W. Srirattanawichaikul[2], S. Premrudeepreechacharn[2], K. Higuchi[3], H. A. Toliyat[4]
1) Rajamangala University of Technology Lanna, Thailand, 2) Chiang Mai University, Thailand, 3) The University of Electro-Communications, Japan, 4) Texas A&M University, College Station, USA

24P3-28 Electric Energy Comparison of an Induction Motor Driven by Optimal Torques for Various Operation Time Periods
K. Inoue, Y. Teranishi, M. Minamiyama, T. Kato
Doshisha University, Japan

24P3-29 On Stability Limit of a Q-axis Flux Based Sensorless Vector Control for Induction Motors
Mineo Tsuji[1], Shuji Matsuda[1], Ryouhei Hashimoto[1], Sin-ichi Hamasaki[1], Shuo Chen[2]
1) Nagasaki University, Japan, 2) Fuzhou University, China

24P3-30 Suppressing of Common Mode Voltage on AC Motor with Changing Ground Point of DC Link in PWM Inverter
K. Iimori, K. Yamamoto, S. Jyosui
Kagoshima University, Japan

24P3-31 Real Time Digital Feedback Control For VFD Fed by Cascaded Multi-Cell Inverter
Lazhar Ben-Brahim[1], Mohamed Trabelsi[1], Tomoki Yokoyama[2], Takayuki Ino[2]
1) Qatar University, Qatar, 2) Tokyo Denki University, Japan

24P3-32 Torque Ripple Reduction of SRM by Optimization of Current Reference
M. Shirahase, S. Morimoto, M. Sanada
Osaka Prefecture University, Japan

24P3-33 Cache Power for Stand-alone Power Systems: Flywheel-based AC Power Solution
Miao-miao Cheng, Shuhei Kato, Hideo Sumitani, Ryuichi Shimada
Tokyo Institute of Technology, Japan

24P3-34 A Study for On-Line Transfer Function Analysis, in realizing Higher Speed Response Adjustment, in association with Variable Speed Rolling Mill Motor Drive System
Toshifumi Tamaoki, Makoto Takanezawa, Zijun Lu, Siming Xiao, Masanori Kimoto, Noboru Morita
Nippon Institute of Technology, Japan

24P3-35 Study of Boost Methods for Non-Charge-Circuit Charge-Pumping Boost Driver with EDLCs
H. Matsumoto
Fukuoka University, Japan

24P3-36 Redundancy System for Continuous Driving Large Motor Drive Equipment
M. Nakamura, M. Tsukakoshi, K. Hashimura
Toshiba Mitsubishi-electric Industrial Systems Corporation, Japan

24P3-37 Modular Sensorless Control of High Speed, Fault Tolerant Machines
J. J. Wolmarans[1], H. Polinder[1], J. A. Ferreria[1], D. Clarenbach[2]
1) Delft University of Technology, The Netherlands, 2) Aeronamic BV, The Netherlands

Poster Session 24P4 Motion Control and Robotics

Chair: Kiyoshi Ohishi (*Nagaoka University of Technology*)
Masaaki Shibata (*Seikei University*)

24P4-38 Constrained Bilateral Control by Oblique Coordinate Control Taking Priority of Tasks into Account
Sho Sakaino, Tomoya Sato, Kouhei Ohnishi
Keio University, Japan

24P4-39 Variable Contact Force Control based on Reaction Force Control with Adjustment Ratio
Tomoyuki Shimono[1], Kazuyoshi Nezu[2], Mitsuo Aboshi[2]
1) Yokohama National University, Japan, 2) Railway Technical Research Institute, Japan

24P4-40 Coordination Control of Bi-Articular Robotic Arm by Motor Drive with Planetary Gear
M. Shinohara, A. Umemura, T. Haneyoshi, Y. Saito
Tokyo Denki University, Japan

24P4-41 Controllability of Parallel Electrostatic Suspension Systems
T. Kato, T. Mizuno, Y. Ishino, M. Takasaki
Saitama University, Japan

Poster Session 24P5 Renewable Energy and Energy Saving 2

Chair: Mikihiko Matsui (*Tokyo Polytechnic University*)
Hiroshi Yamaguchi (*AIST*)

24P5-42 Control Method in a Wind Turbine driven by 3-Parallel Back-to-Back Converters using PQR Power Transformation
Yi-Kyu Kang, Hea-Gwang Jung, Kyo-Beum Lee
Ajou University, Korea

24P5-43 An Analysis of a Wind Power System Including PMG, Active Rectifier and Voltage Source Inverter
Hong-Hee Lee[1], S. Kharitonov[2], S. Brovanov[2], G. Zinoviev[2], M. Reznichenko[3]
1) Network-based Automation Research Center (NARC), Korea, 2) Novosibirsk State Technical University, Russia, 3) Nikolaev Institute of Inorganic Chemistry, Russia

24P5-44 Charging Method of EDLCs by Wind Power Generation in Stand Alone System
Yuhei Okazaki, Masanobu Yoshida, Kenichiro Fujiwara
Kochi National College of Technology, Japan

24P5-45 Prediction Maximum Power Point Tracking Method for PV-Battery Micro-Satellite Systems with Body Mounted Solar Panels
Yu-Kai Chen, Kuan-Hsiung Chen
National Formosa University, Taiwan

24P5-46 Current-Shared Photovoltaic Power System
Liang-Rui Chen[1], Chung-Ming Young[2], Neng-Yi Chu[2], Ruey-Hsun Liang[3], Wen-Ren Yang[1]
1) National Changhua University of Education, Taiwan, 2) National Taiwan University of Science & Technology, Taiwan, 3) National Yunlin University of Science & Technology, Taiwan

24P5-47 Development of a 250kW PV PCS and Adaptive MPPT Method
K. S. Lee[1], Y. Fujii[2], T. Sumiya[2], E. Ikawa[2]
1) Toshiba Corporation, Japan, 2) Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan

24P5-48 A High Efficiency Solar Array Simulator Implemented by an LLC Resonant DC/DC Converter
C. -H. Chang, C. Lin, C. -W. Ku
I-Shou University, Taiwan

24P5-49 Development of Single Converter and Single Inverter Topology and Control Algorithm for Photovoltaic-Fuel Cell Hybrid System
Jong-Soo Kim[1], Gyu-Yeong Choe[1], Byoung-Kuk Lee[1], Chung-Yuen Won[1], Tae-Won Lee[2], Ji-Won Jung[1], Jae-Sun Shim[3]
1) Sungkyunkwan University, Korea, 2) Samsung Electro-Mechanics, Korea, 3) Kangwon National University, Korea

24P5-50 Comparative Study of Power Sharing Algorithm for Fuel Cell and Photovoltaic Hybrid Generation System
Gyu-Yeong Choe[1], Jong-Soo Kim[1], Byoung-Kuk Lee[1], Chung-Yuen Won[1], Jin-Wook Kim[2], Ji-Won Jeong[1], Jae-Sun Shim[3]
1) Sungkyunkwan University, Korea, 2) Samsung Electro-Mechanics, Korea, 3) Kangwon National University, Korea

24P5-51 Two-stage Interleaved Power Conditioner for Connecting a 5 kW el. SOFC with a 750 V DC Link
A. Averberg, H. N. Tran, C. Q. Nguyen, A. Mertens
Leibniz Universität Hannover, Germany

24P5-52 Power Generation Efficiency of Photovoltaics and a SOFC-PEFC Combined Micro-grid with Time Shift Utilization of the SOFC Exhaust Heat
Abeer Galal El-Sayed, Shin'ya Obara
Kitami Institute of Technology, Japan

24P5-53 Investigation to Power Conversion Topology for Fuel Cell Power Generation System
Xiao Li, Wenping Zhang, Chengrui Du, Ke Ma, Xiaotian Wu, Dehong Xu
Zhejiang University, China

Poster Session 24P6 Power Electronics Applied to Power Systems 3

Chair: Tatsuhito Nakajima (*The University of Tokyo)*
Jumpei Baba (*The University of Tokyo)*

24P6-54 Study on Malfunction Mechanism of Semiconductor Circuit Breaker in 400V DC Power Supply System
Seiya Abe[1], Kosuke Nomura[1], Kentaro Fukushima[1], Masahito Shoyama[1], Tamotsu Ninomiya[2], Akira Matsumoto[3], Akiyoshi Fukui[3], Mikio Yamasaki[3]
1) Kyushu University, Japan, 2) Nagasaki University, Japan, 3) NTT Facilities, Japan

24P6-55 Theory Analysis of the Hypostasis of DC Voltage Balancing Control for Power Quality Conditioners with Cascaded H-bridge Inverter
Yingjie He, Yanhui Qiu, Jinjun Liu, Fang Zhuo, Guochun Xiao
Xi'an Jiaotong University, China

24P6-56 A Digital Control Strategy based on Repetitive and Multi-loop Control for an Active Voltage Quality Regulator
Guofei Teng, Guochun Xiao, Zhong Zeng, Zhuhuan Ye, Fang Zhuo, Wang Zhaoan
Xi'an Jiaotong University, P.R China

24P6-57 An Integrated Nine-Switch Power Conditioner
Lei Zhang[1], Poh Chiang Loh[1], Feng Gao[2]
1) Nanyang Technological University, Singapore, 2) Shangdong University, China

24P6-58 A Design Method of Hybrid Cascade Multilevel Structure for Active Power Filter Application in Moderate-Voltage Grid
Yingjie He, Peng Liu, Jinjun Liu, Zhaoan Wang
Xi'an Jiaotong University, China

24P6-59 Control Mechanism of Parallel Active Power Filter under Different Compensation Objectives
Zhong Chen, Yingpeng Luo, Lei Shi, Miao Chen
Nanjing University of Aeronautics and Astronautics, China

24P6-60 A Method of Reducing Dead Time Voltage in Series Voltage Compensator
Atsushi Nakata[1,2], Akihiro Torii[1], Akiteru Ueda[1]
1) Aichi Institute of Technology, Japan, 2) Momozono Densetsu Ltd., Japan

24P6-61 Dynamic Voltage Restorer Using PWM AC-AC Converter
Nam-Sup Choi[1], Byung-Moon Han[2], Eui-Cheol Nho[3], Hanju Cha[4]
1) Chonnam National University, Korea, 2) Moyungji University, Korea, 3) Pukyong National University, Korea, 4) Chungnam National University, Korea

24P6-62 DPFC design Procedure - a Case Study Using the KEPCO UPFC as an Example
Zhihui Yuan, Sjoerd W. H. de Haan, Braham Ferreira
Delft University of Technology, the Netherlands

24P6-63 Extensive Real/Reactive Power Flow Control for a Single-stage Grid-connected Inverter Integrating with Micro Storage
Zhichao Wu, Liming Liu, Hui Li
Florida State University, USA

Poster Session 24P7 Power Electronics and Drives Applied to Electric and Hybrid Vehicles

Chair: Masayuki Morimoto (*Tokai University*)
Hiroshi Fujimoto (*The University of Tokyo*)

24P7-64 **Input Current Stabilization Control of a Matrix Converter with Boost-up Functionality**
Jun-ichi Itoh, Kazuhiro Koiwa, Koji Kato
Nagaoka University of Technology, Japan

24P7-65 **A Novel Interleaved and Isolated Buck Converter with High Voltage Ratio**
Huang-Hua Chiu, Ming-Fa Tsai, Chung-Shi Tseng, Shu-Yi Yen
Minghsin University of Science and Technology, Taiwan

24P7-66 **Charge Equalization Using Quasi-Resonant Converters in Battery String for Medical Power Operated Vehicle Application**
Yuang-Shung Lee, Cheng-En Tsai, Yi-Pin Ko, Ming-Wang Cheng
Fu-Jen Catholic University, Taiwan

24P7-67 **A Novel Control Strategy for Multi-Phase Battery Chargers without Hall-Effect Current Sensors**
Ming-Yi Chen, Ming-Fa Tsai, Chung-Shi Tseng, Shu-Yi Yen
Minghsin University of Science and Technology, Taiwan

24P7-68 **Design of an Outer-Rotor-Type Permanent Magnet Motor for Electric Scooter Propulsion Systems**
Byeong-Mun Song[1], Ki-Chan Chang[2], Jang-Young Choi[3]
1) Baylor University, USA, 2) Green Motor Technology, Inc., Korea, 3) Chungnam National University, Korea

Thursday, June 24: 13:30-15:35

Room A

Oral Session 24A2 (OS) Motor Control - Sensorless Drive

Chair: Seung-Ki Sul (*Seoul University*)
Kozo Ide (*Yaskawa Electric Corporation*)

24A2-1 **An Incorporation Method of Sensorless Algorithms: Signal Injection and Back EMF Based Methods**
Invited Paper Jinseok Hong, Sungyoon Jung, Kwanghee Nam
13:30 *POSTECH, Korea*

24A2-2 **Initial Rotor Position Estimation for Sensorless Interior PMSM with Signal Injection**
Invited Paper Gaolin Wang, Rongfeng Yang, Yangwei Wang, Yong Yu, Dianguo Xu
13:55 *Harbin Institute of Technology, China*

24A2-3 **Current Sampling and Measurement in PWM Operated AC Drives and Power Converters**
Invited Paper Fernando Briz[1], David Díaz-Reigosa[1], Michael W. Degner[2], Pablo García[1], Juan Manuel Guerrero[1]
14:20 *1) University of Oviedo, Spain, 2) Ford Motor Company, USA*

24A2-4 **Hybrid Sensorless Control of IPMSM for Direct Drive Applications**
Invited Paper Hideaki Iura[1], Masanobu Inazumi[1], Takeshi Kamei[2], Kozo Ide[1]
14:45 *1) Yaskawa Electric Corporation, Japan, 2) Yaskawa Motor Corporation, Japan*

Room B

Oral Session 24B2 (OS) Matrix Converters

Chair: Jun Kang (*Yaskawa Electric (US)*)
Junichi Itoh (*Nagaoka University of Technology*)

24B2-1 **Bidirectional DC-AC Conversion Topology Using Matrix Converter Technique**
Invited Paper Sadao Ishii[1], Hidenori Hara[1], Tsuyoshi Higuchi[1], Tomohiro Kawachi[1], Katsutoshi Yamanaka[1], Noritaka Koga[1],
13:30 Tsuneo Kume[1], Jun-Koo Kang[2]
1) Yaskawa Electric Corporation, Japan, 2) Yaskawa America Inc., USA

24B2-2 **An Approach of Sparse Matrix Converter Using Z-source Network**
Invited Paper Tuyen D. Nguyen, Hoang M. Nguyen, Hong-Hee Lee, Tae-Won Chun
13:55 *University of Ulsan, Korea*

24B2-3 **Single-pulse Operation for a Matrix Converter Synchronized with the Output Frequency**
Invited Paper Junichi Itoh, Koji Maki
14:20 *Nagaoka University of Technology, Japan*

24B2-4 **Comprehensive Comparison of Three-Phase AC-AC Matrix Converter and Voltage DC-Link Back-to-Back Converter Systems**
Invited Paper Thomas Friedli, Johann W. Kolar
14:45 *ETH Zurich, Switzerland*

24B2-5 **Research in Matrix-Converter Based Three-Phase Power-Electronic Transformers**
Invited Paper Kaushik Basu, Ranjan K Gupta, Shabari Nath, Gysler F Castelino, Krushna K Mohapatra, Ned Mohan
15:10 *University of Minnesota, USA*

Room C

Oral Session 24C2 Soft-switching Converters

Chair: Leon Tolbert (*The University of Tennessee*)
Nobukazu Hoshi (*Tokyo University of Science*)

24C2-1 **A New Family of Soft Switching PWM Non-Isolated DC–DC Converters with Active Auxiliary Edge-Resonant Cell**
13:30 Tomokazu Mishima[1], Mutsuo Nakaoka[2]
1) Kobe University, Japan, 2) Kyungnam University, Korea

24C2-2 **A Magnetic Component-less Series Resonant Converter Using a Piezoelectric Transducer for Low Profile Application**
13:55 Gab-Su Seo, Jong-Won Shin, Bo-Hyung Cho
Seoul National University, South Korea

24C2-3 **A Soft-Switching Boost DC to AC Converter without Smoothing Capacitor Using a MERS Pulse Link Concept**
14:20 Takanori Isobe, Yohei Otani, Noriyuki Kazama, Ryuichi Shimada
Tokyo Institute of Technology, Japan

24C2-4 **Interleaved Switching of Parallel ZVS Hysteresis Current Controlled Inverters**
14:45 J. M. Schellekens, J. L. Duarte, M. A. M Hendrix, H. Huisman
Eindhoven University of Technology, The Netherlands

24C2-5 **Phase-shift Controlled Zero Current Switching High Frequency Inverter in the MHz Frequency Range**
15:10 H. Matsuo[1], H. Yonemori[2], Y. Yasaka[2]
1) Fuji Electric Systems Co., Ltd., Kobe-city, Japan, 2) Kobe University, Kobe-city, Japan

Room D

Oral Session 24D2 (OS) Innovative Railway Traction Systems

Chair: Hitoshi Hayashiya (*East Japan Railway Company*)
Keiichiro Kondo (*Chiba University*)

24D2-1 **Technical Trends of Railway Traction in the World**
Invited Paper Takafumi Koseki
13:30 *The University of Tokyo, Japan*

24D2-2 **Traction Technology for Chinese Railways**
Invited Paper Zhongping Yang[1], Xianjin Huang[1], Songrong Wu[2], Huishui Peng[3]
13:55 *1) Beijing Jiaotong University, China, 2) Southwest Jiaotong University, China, 3) Zhuzhou Electric Locomotive Research Institute, China*

24D2-3 **Traction Technologies for Railways in Korea**
Invited Paper Eun-Kyu Lee
14:20 *Woojin Industrial Systems Ltd., Korea*

24D2-4 **A Hybrid System for Diesel Railcar Series Ki-Ha E200**
Invited Paper N. Shiraki, H. Satou, S. Arai
14:45 *East Japan Railway Company, Japan*

24D2-5 **Traction Systems Using Power Electronics for Shinkansen High-speed Electric Multiple Units**
Invited Paper Kenji Sato, Masakatsu Yoshizawa, Takafumi Fukushima
15:10 *Central Japan Railway Company, Japan*

Room E

Oral Session 24E2 Analysis and Design of EMI 2

Chair: Pavol Bauer (*Delft University of Technology)*
Spiazzi Giorgio (*University of Padova)*

24E2-1 **Behavioral Circuit Modeling of Single- and Three-Phase Chokes for EMI Simulations**
13:30 Ivica Stevanović, Stanislav Skibin
ABB Switzerland Ltd., Switzerland

24E2-2 **A Basic Study on Inverter Output Filter for Radiative Noise Suppression**
13:55 Jun Fukuda, Satoshi Ogasawara, Masatsugu Takemoto
Hokkaido University, Japan

24E2-3 **Modeling and Analysis for Simulation of Common-mode Noises Produced by an Inverter-Driven Air Conditioner**
14:20 Yoshitsugu Koyama[1], Mitsuhiro Tanaka[1], Hirofumi Akagi[2]
1) DAIKIN INDUSTRIES, ltd., JAPAN, 2) Tokyo Institute of Technology, JAPAN

24E2-4 **Z-matched Active Common-mode Canceller for the Suppression of Common-mode Current in an Inverter**
14:45 **System**
Kazuhiro Shirakawa[1], Hiroshi Taki[1], Kazuyoshi Obayashi[1], Masami Fujitsuna[1], Toshihisa Shimizu[2]
1) DENSO CORPORATION, Japan, 2) Tokyo Metropolitan University, Japan

24E2-5 **Design and Experiment Research of Integrated EMI Filter Based on Flexible Multi-layer Foils**
15:10 Xiaofeng Wu[1], Zhiwei Wen[1], Dehong Xu[1] Yasuhiro Okuma[2], Kazuaki Mino[3]
1) Zhejiang University, China, 2) Fuji Electric Systems Co., Ltd, Japan, 3) Fuji Electric Advanced Technology Co., Ltd, Japan

Room F

Oral Session 24F2 Converters for Renewable Energy Systems

Chair: Istvan Nagy (*Budapest University of Technology and Economics)*
Shoji Fukuda (*Hokkaido University -Retired)*

24F2-1 **A High Step-up, Non-isolated DC-DC Converter with Reduced Repeated Power Processing**
13:30 Dylan D. C. Lu, Grace M. L. Chu, Vassilios G. Agelidis
The University of Sydney, Australia

24F2-2 **High-Efficiency Bidirectional Soft Switching DC-DC Converter**
13:55 Jun-Gu Kim[1], Seung-Won Park[1], Young-Ho Kim[1], Yong-Chae Jung[2], Chung-Yuen Won[1]
1) Sungkyunkwan University, Korea, 2) Namseoul University, Korea

24F2-3 **A Hybrid Cascaded Multilevel Inverter for Interfacing with Renewable Energy Resources**
14:20 Surin Khomfoi, Nattapat Praisuwanna
King Mongkut's Institute of Technology Ladkrabang, Thailand

24F2-4 **A Single-Phase Grid-Connected Inverter with Power Decoupling Function**
14:45 T. Shimizu, S. Suzuki
Tokyo Metropolitan University, Japan

24F2-5 **Dual Mode Switching Strategy of Flyback Inverter for Photovoltaic AC Modules**
15:10 Young-Hyok Ji[1], Doo-Yong Jung[1], Jae-Hyung Kim[1], Chung-Yuen Won[1], Dong-Sung Oh[2]
1) Sungkyunkwan Univ., Korea, 2) Samsung Electro-mechanics, Korea

Room G

Oral Session 24G2 (OS) Power Electronics, Control, Energy Storage and Management for Electric and Hybrid Vehicles

Chair: Akira Chiba (*Tokyo Institute of Technology)*
Hiroshi Fujimoto (*The Univrsity of Tokyo)*

24G2-1 **Future Vehicle Society Based on Electric Motor, Capacitor and Wireless Power Supply**
Invited Paper Yoichi Hori
13:30 *University of Tokyo, Japan*

24G2-2 **A Study of Vehicle Energy Analysis during Warming up Process using VHDL-AMS Multi-Domain Simulation**
Invited Paper Kimitoshi Tsuji[1], Yasunari Kido[1], Takashi Abe[2]
13:55 *1) Toyota Motor Corporation, Japan, 2) Nagasaki University, Japan*

24G2-3 **High Power DC/DC Converter using Extreme Close-Coupled Inductors aimed for Electric Vehicles**
14:20 M. Hirakawa[1], Y. Watanabe[1], M. Nagano[1], K. Andoh[1], S. Nakatomi[1], S. Hashino[1], T. Shimizu[2]
1) Honda R&D Co., Ltd., Japan, 2) Tokyo Metropolitan University, Japan

24G2-4 **Development of Power Management System for Electric Vehicle "i-MiEV"**
Invited Paper M. Kamachi, H. Miyamoto, Y. Sano
14:45 *Mitsubishi Motors Corporation, Japan*

24G2-5 **Improvement of Vehicle Stability by Reaction Force Control on Accelerator Pedal and Steering Wheel**
Invited Paper Hiraku Ogura, Toshiyuki Murakami
15:10 *Keio University, Japan*

Room H

Oral Session 24H2 Grid Connection

Chair: Marta Molinas (*Norwegian University of Science and technology)*
Yushi Miura (*Osaka University)*

24H2-1 **Development of 300 MW Frequency Converter**
13:30 T. Ohkami[1], T. Fujimoto[1], H. Ito[1], S. Konno[1], T. Tanaka[1], K. Ito[1], M. Imura[1], S. Ota[1], M. Tobita[1], A. Kawaguchi[1], N. Kawakami[1], K. Takagi[2], K. Shimada[2], H. Aizawa[2], H. Kuroda[2], T. Kobayashi[3], M. Takechi[3], K. Kato[3]
1) Toshiba Mitsubishi-Electric Industrial Systems Corporation (TMEIC), Japan, 2) Toshiba Corporation, Japan, 3) Tokyo Electric Power Company (TEPCO), Japan

24H2-2 **Control of Paralleled Power Converter Modules to Facilitate the Efficient Operation of Microgrid**
13:55 Xiaoxiao Yu, Ashwin M. Khambadkone, Huan H. Wang
National University of Singapore, Singapore

24H2-3 **Analysis of Grid Connected Converters using a Feed-forward Disturbance Decoupling Current Control**
14:20 David Reigosa, Pablo Arboleya, Juan Manuel Guerrero, Pablo García, Fernando Briz
University of Oviedo, Spain

24H2-4 **Synchronization System with Zero-Crossing Peak Detection Algorithm for Power System Applications**
14:45 Adrian Z. Amanci, Francis P. Dawson
University of Toronto, Canada

Room I

Oral Session 24I2 Motor Drive Control

Chair: Robert Lorenz (*University of Wisconsin-Madison, WEMPEC)*
Yi-Hung Liao (*National Penghu University)*

24I2-1 **New Simplification of SV-PWM Based on Conditional Rotation of the Reference Vector**
13:30 R. Cordero, J. O. P. Pinto, J. de O. Soares
Federal University of Mato Grosso do Sul, Brazil

24I2-2 **Control Method Suitable for Direct Torque Control Based Motor Drive System Satisfying Voltage and Current Limitations**
13:55 Y. Inoue, S. Morimoto, M. Sanada
Osaka Prefecture University, Japan

24I2-3 **Direct Torque Control Scheme For Dual-Three-Phase Induction Motor**
14:20 R. Zaimeddine, T. Undeland
Norwegian University of Science and Technology, Norway

24I2-4 **Vector Control of a Five-phase Induction Machine Using Synchronous Current Controller and ANN Based Space**
14:45 **Vector PWM**
A. Iqbal, Sk. M. Ahmed, H. Abu-Rub
Texas A&M University at Qatar, Qatar

Thursday, June 24: 16:05-18:10

Room A

Oral Session 24A3 Sensorless Control Strategy 2

Chair: Geng Yang (*Tsinghua University*)
Hisao Kubota (*Meiji University*)

24A3-1 **A Novel Generalized Speed-Varying Ellipse Voltage Injection Method for Sensorless Drive of Salient-Pole PMSMs**
16:05 Shinji Shinnaka
Kanagawa University, Japan

24A3-2 **Saliency Based Encoderless Predictive Torque Control without Signal Injection**
16:30 P. Landsmann, D. Paulus, P. Stolze, R. Kennel
Institute for Electrical Drive Systems and Power Electronics, Technische Universitaet Muenchen, Munich, Germany

24A3-3 **A Simplified Sensorless Vector Control Based on the Average of the DC Bus Current**
16:55 Satoshi Sumita, Kazuaki Tobari, Shigehisa Aoyagi, Daisuke Maeda
Hitachi, Ltd., Japan

24A3-4 **A New $\vec{V}^{*}\times\vec{I}$ Based Adaptive Speed Sensorless Four Quadrant Vector Controlled Induction Motor Drive**
17:20 Chandan Chakraborty[1], A. V. Ravi Teja[1], Suman Maiti[2], Yoichi Hori[3]
1) Indian Institute of Technology Kharagpur, India, 2) ABB Corporate Research Center, Sweden, 3) University of Tokyo (Kashiwa Campus), Japan

Room B

Oral Session 24B3 AC/AC Converters

Chair: Friedli Thomas (*ETH Zurich*)
Akihiro Odaka (*Fuji Electric Holdings Co., Ltd.*)

24B3-1 **Optimal Modulation of Indirect Z-Source Matrix Converter**
16:05 Xiong Liu[1], Poh Chiang Loh[1], Fang Zheng Peng[2], Peng Wang[1]
1) Nanyang Technological University, Singapore, 2) Michigan State University, USA

24B3-2 **PWM Strategy of Single-phase to Three-phase Matrix Converters for Reducing a Number of Commutations**
16:30 Tomomi Yamashita, Takaharu Takeshita
Nagoya Institute of Technology, Japan

24B3-3 **Implementation of Sensorless Direct Torque Control Using Matrix Converter Fed Interior Permanent Magnet**
16:55 **Synchronous Motor**
D. Xiao, F. M. Rahman
The University of New South Wales, Australia

24B3-4 **A Unified PWM Strategy for Matrix Converters and Its Dipolar PWM Realization**
17:20 Paiboon Kiatsookkanatorn, Somboon Sangwongwanich
Chulalongkorn University, Thailand

24B3-5 **Experimental Results of a Three-Level Four-Wire Unidirectional AC-DC-AC Converter**
17:45 J. Alahuhtala, H. Tuusa
Tampere University of Technology, Finland

Room C

Oral Session 24C3 Control of Power Converters

Chair: Somboon Sangwongwanich (*Chulalongkorn University)*
Tomoki Yokoyama (*Tokyo Denki University)*

24C3-1 **The Alternative Pulse Reduction Algorithm for Three-phase Voltage-source Inverter**
16:05 K. Takeda, M. Ichinose, M. Taniguchi, H. Miyata
Hitachi Ltd., Japan

24C3-2 **An Investigation of Damping Control Method of Power Converters to Suppress Resonance in DC Power**
16:30 **Network**
Jin Xu, Hiroki Mori, Yukihiko Sato
Chiba University, Japan

24C3-3 **Output Voltage Control for PWM Inverter with Electric Double Layer Capacitor as DC Power Supply**
16:55 Y. Nakata[1], K. Fujiwara[2], M. Yoshida[2], J. Itoh[1], Y. Okazaki[2]
1) Nagaoka University of Technology, Japan, 2) Kochi National College of Technology, Japan

24C3-4 **Adaptive Control Scheme for Interleaved DC/DC Power Converters**
17:20 Jen-Ta Su, Chih-Wen Liu, De-Min Liu
National Taiwan University, Taiwan

24C3-5 **Model Predictive Control of Three-Phase Four-Leg Neutral-Point-Clamped Inverters**
17:45 Jose Rodriguez[1], Bin Wu[2], Marco Rivera[1], Alan Wilson[1], Venkata Yaramasu[2], Christian Rojas[1]
1) Universidad Tecnica Federico Santa Maria, Chile, 2) Ryerson University, Canada

Room D

Oral Session 24D3 (OS) Power Electronics Application for On-ground Railway Power System

Chair: Hitoshi Hayashiya (*East Japan Railway Company)*
Keiichiro Kondo (*Chiba University)*

24D3-1 **Application of Energy Storage System for Railway Transportation in Japan**
Invited Paper A. Okui, S. Hase, H. Shigeeda, T. Konishi, T. Yoshi
16:05 *Railway Technical Research Institute, Japan*

24D3-2 **Energy Storage for Railway Systems, Energy Recovery and Vehicle Autonomy in Europe**
Invited Paper Alfred Rufer
16:30 *EPFL, Switzerland*

24D3-3 **Development of the Battery Charging System for the New Hybrid Train that Combines Feeder Line and the**
Invited Paper **Storage Battery**
16:55 Ichiro Masatsuki
East Japan Railway Company, Japan

24D3-4 **Electronic Frequency Converter Feeding Single-Phase Circuit for Shinkansen**
Invited Paper Ken Kunomura[1], Mitsuru Onishi[1], Masahiko Kai[1], Naotaka Iio[2], Midori Otsuki[2], Yoshinori Tsuruma[3], Naoya
17:20 Nakajima[3]
1) Central Japan Railway Company, Japan, 2) Toshiba Corporation, Japan, 3) Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan

Room E

Oral Session 24E3 Modeling and Design of Magnetics

Chair: Biela Juergen (*ETH Zurich)*
Takeo Ishikawa (*Gunma university)*

24E3-1 **New Double Sided SMT Power Inductor**
16:05 I. Josifović, J. Popović-Gerber, J. A. Ferreira
Delft University of Technology, The Netherlands

24E3-2 **Multiport Converters for Fast Chargers of Electrical Vehicles -- Focus on High-Frequency Coaxial Transformers**
16:30 G. Waltrich, J. L. Duarte, M. A. M. Hendrix
Eindhoven University of Technology, The Netherlands

24E3-3 **PEEC Modelling of Toroidal Magnetic Inductor in Frequency Domain**
16:55 I. F. Kovačević, A. Müsing, J. W. Kolar
ETH Zurich, Switzerland

24E3-4 **Optimal Design and Tradeoffs Analysis for Planar Transformer in High Power DC-DC Converters**
17:20 Ziwei Ouyang, Ole C. Thomsen, Michael A. E. Andersen
Technical University of Denmark, Denmark

24E3-5 **Investigation of Skin Effect in Laminated Steel for Motor Use**
17:45 Y. Murakami
Nissan Motor Co., Ltd., Japan

Room F

Oral Session 24F3 Wind Power and Ocean Power Generation Systems

Chair: Sanjib Kumar Panda (*National University of Singapore*)
Hiroshi Yamaguchi (*AIST*)

24F3-1 **A Dual Inverter with Integrated Energy Storage for Wind Power Systems**
16:05 S. D. G. Jayasinghe[1], D. M. Vilathgamuwa[1], U. K. Madawala[2]
1) Nanyang Technological University, Singapore, 2) The University of Auckland, New Zealand

24F3-2 **Use of Wind Turbine Emulator for the WECS Development**
16:30 Hsiang-Chun Lu, Le-Ren Chang-Chien
National Cheng Kung University, Taiwan

24F3-3 **Control of a Bristol Cylinder for Wave Energy Generation**
16:55 S. S. Ngu[1], D. G. Dorrell[2], E. Acha[1]
1) University of Glasgow, UK, 2) Mechanical and Mechatronic Systems, Australia

24F3-4 **The Potential for Grid Power Integration of Offshore Ocean Wave Energy in the UK**
17:20 T. Ahmed[1], K. Nishida[2], M. Nakaoka[3]
1) Assiut University, Egypt, 2) Ube National College of Technology, Japan, 3) Kyungnam University, Korea

Room G

Oral Session 24G3 Renewable Energy 2

Chair: Pedro Rodriguez (*Aalborg University*)
Toshihiko Tanaka (*Yamaguchi University*)

24G3-1 **1 Megawatt, 20kHz, Isolated, Bidirectional 12kV to 1.2kV DC-DC Converter for Renewable Energy Applications**
16:05 G. Ortiz, J. Biela, D. Bortis, J. W. Kolar
ETH Zurich, Switzerland

24G3-2 **An Improved Control Strategy for Hybrid Active Front-End Converters in Grid-Connected Applications**
16:30 Tzung-Lin Lee, Yen-Ching Wang
National Sun Yat-Sen University, Taiwan

24G3-3 **Characteristic Analysis of a Wind Power System with Doubly Fed Induction Generator in Considering of the**
16:55 **Tower Shadow Effect**
E. Sakasegawa[1], K. Shinohara[2], K. Yamamoto[3], M. Hombu[1]
1) Kagoshima National College of Technology, Japan, 2) Osaka Prefectural College of Technology, Japan, 3) Kagoshima University, Japan

24G3-4 **Utility Grid-Tied 3-Phase Central PV Inverter Embedding Neutral Point Voltage Shifting Principle into**
17:20 **Instantaneous Current Control Implementation**
Nobuyuki Hattori[1], Noriyuki Morotomi[1], Syuji Miyake[1], Mutsuo Nakaoka[2]
1) DAIHEN Corporation, Japan, 2) Kyungunam Univ., Korea

24G3-5 **High Efficiency Power Conditioner for Photovoltaic Power Generation System**
17:45 T. Urakabe, K. Fujiwara, T. Kawakami, N. Nishio
Mitsubishi Electric Corp., Japan

Oral Session 24H3 (OS) Wide Bandgap Power Devices

Chair: Peter Friedrichs (*SiCED Electronics Development GmbH & Co. KG*)
Takashi Shinohe (*Toshiba Corporation*)

24H3-1 **SiC power devices for industrial applications**
Invited Paper Peter Friedrichs
16:05 *SiCED Electronics Development GmbH & Co. KG, Germany*

24H3-2 **4H-SiC-DIMOSFET power device for home appliances**
Invited Paper M. Kitabatake[1], S. Kazama[1], C. Kudou[1], M. Imai[2], A. Fujita[2], S. Sumiyoshi[2], H. Omori[2]
16:30 *1) Panasonic Corporation, Japan, 2) Home Appliances Company, Panasonic Corporation, Japan*

24H3-3 **Advances in SiC VJFETs for Renewable and High-Efficiency Power Electronics Applications**
Invited Paper D. C. Sheridan, A. Ritenour, R. Kelley, V. Bondarenko, J. B. Casady
16:55 *Semisouth Laboratories, Inc., USA*

24H3-4 **3-Level Power Converter with High-Voltage Hybrid Pairs of SiC-PiN diode and IEGT**
Invited Paper Takeo Kanai[1], Kazuto Takao[2], Takashi Shinohe[2], Yasunori Tanaka[3], Hiroshi Yamaguchi[3], Hiromichi Ohashi[3],
17:20 Hironobu Akiyama[4], Kyungmin Sung[4], Keiji Wada[5]
1) Toshiba Mitsubishi-Electric Industrial System Corporation, Japan, 2) Toshiba Corporation, Japan, 3) National Institute of Advanced Industrial Science and Technology, Japan, 4) Ibaraki National College of Technology, Japan, 5) Tokyo Metropolitan University, Japan

24H3-5 **Traction Inverter that Applies Hybrid Module Using 3-kV SiC-SBDs**
Invited Paper Katsumi Ishikawa, Kazutoshi Ogawa, Hidekatsu Onose, Norifumi Kameshiro, Masahiro Nagasu
17:45 *Hitachi Ltd., Japan*