Program at a Glance

May 22 (Mon.)

Time	Room A	Room B	Room C	Room D	Room E	Room F	Room G	Room H	Room I
09:00~12:30	[Tutorial 1]	[Tutorial 2]	[Tutorial 3]	[Tutorial 4]	[Tutorial 6]	[Tutorial 7]	[Tutorial 8]	[Tutorial 9]	
12:30~14:00	Lunch								
14:00~17:30	[Tutorial 10]	[Tutorial 11]	[Tutorial 12]	[Tutorial 13]	[Tutorial 14]	[Tutorial 15]	[Tutorial 16]	[Tutorial 5]	
18:00~20:00	**Welcome Reception** (Ocean View, 5F)								

May 23 (Tue.)

Time	Room A	Room B	Room C	Room D	Room E	Room F	Room G	Room H	Room I
08:30~10:35	[TuA1] Active-bridge DC/DC Converters	[TuB1] IS: Infineon Drives Leading-edge Power Applications for Unlimited Green Energy	[TuC1] Power Modules, Packaging, and Materials	[TuD1] Renewable Energy Control and Applications	[TuE1] Wide-Band-Gap Device Applications	[TuF1] PM Machines	[TuG1] OS: Power Converters and Controls for Distributed Energy Systems	[TuH1] Permant Magnet Synchronous Machine Drives	[TuI1] Modeling and Control of Converters I
10:35~10:55	Coffee Break								
10:55~11:15	**Opening Ceremony** (Tamna Hall A, 5F)								
11:15~11:55	**[Plenary Talk I] Power Electronics – Key Enabling Technology to Realizing the Energy Transition** Rik W. De Doncker (RWTH Aachen University, Germany)								
11:55~12:35	**[Plenary Talk II] PE Modular Strategy Based on e-GMP / IMA** Jin-Hwan Jung (Hyundai Motor Company, Korea)								
12:35~13:35	Lunch								
13:35~15:40	[TuA2] High Step-up DC/DC Converters	[TuB2] IS: State of the Art Power Electronics in Electric Vehicle	[TuC2] Passive Components and Filters	[TuD2] Smart Grid and Microgrid	[TuE2] Active Gate Driver Technologies	[TuF2] Solid-State Transformers and Applications	[TuG2] OS: Advanced Control and Energy Management of Microgrids		[TuI2] Modeling and Control of Converters II
15:40~16:00	Coffee Break								
16:00~18:05	[TuA3] DC/DC Converter Applications	[TuB3] IS: Power Semiconductor and Module Solutions from ON Semiconductor	[TuC3] Inverter Topology, Design, and Components	[TuD3] Grid Interaction with Distributed Generation	[TuE3] Uncontrolled Rectifiers and AC/DC Converters	[TuF3] Modular Multi-level Converter		[TuH3] Advanced Motor Drives I	[TuI3] Modeling and Control Applications

May 24 (Wed.)

Time	Room A	Room B	Room C	Room D	Room E	Room F	Room G	Room H	Room I
08:30~10:35	[WeA1] Resonant DC/DC Converters I	[WeB1] IS: Power Modules and Components for Electric Vehicles	[WeC1] Inveter Control Techniques	[WeD1] Power Converter Technologies for Utility Interface	[WeE1] Control of Wireless Power Transfer Systems	[WeF1] Reluctance Machines	[WeG1] OS: Advanced Technology for SiC and GaN Applications: Modeling, Design and Control	[WeH1] Sensorless Motor Drives	[WeI1] OS: Control and Applications of Multilevel Converters
10:35~10:55	Coffee Break								
10:55~11:35	**[Plenary Talk III] Power Electronics in Ship Building Industries** Seung-Ki Sul (Seoul National University, Korea)								
11:35~12:15	**[Plenary Talk IV] Status and Trends of Electrification of Railway and Ships** Yongdong Li (Tsinghua University, China)								
12:15~13:15	Lunch								
13:15~14:55	**Poster Session I** (Foyer, 5F)								
14:55~16:35	[WeA2] Soft-switching DC/DC Converters I	[WeB2] IS: Green Jeju – Towards Carbon Free Island	[WeC2] IS: Latest Advancement in Hardware-In-the-Loop-Simulation Technology I	[WeD2] Grid-Forming Converter Technologies : Modeling and Control	[WeE2] Wireless Power Transfer Systems for Evs	[WeF2] Fault Detection and Tolrence Control for Multilevel Converter	[WeG2] IS: Cyber and Physical Resiliency of Power Electronic-based Power Systems	[WeH2] Advanced Motor Drives II	[WeI2] Modeling and Control of Electric Machines & Drives
16:35~16:55	Coffee Break								
16:55~18:35	[WeA3] Soft-switching DC/DC Converters II	[WeB3] IS: Transportation Electrification	[WeC3] IS: Latest Advancement in Hardware-In-the-Loop-Simulation Technology II	[WeD3] Grid-Forming Converter Control	[WeE3] Power Devices Modeling and Applications	[WeF3] Big Data and Machine Learning Applications - Battery & WPT	[WeG3] OS: Wireless Power Transfer Technologies	[WeH3] Capacitive Component Design and Analysis	[WeI3] Control of Grid-Connected Converters
19:00~21:00	**Banquet** (Tamna Hall B~C, 5F)								

May 25 (Thu.)

Time	Room A	Room B	Room C	Room D	Room E	Room F	Room G	Room H	Room I
08:30~10:35	[ThA1] Resonant DC/DC Converters II	[ThB1] IS: Power Electronics in Home Appliance & Air Solution	[ThC1] Reliability in Power Electronics System I	[ThD1] Applications in Energy Storage System	[ThE1] Power Converters and Motor Drives for Electric Vehicles	[ThF1] DC Power Systems (HVDC,MVDC,LVDC)	[ThG1] OS: Advanced Technologies for High Power Density Converters	[ThH1] OS: Power Electronics for Renewable Energy Grid Integration and Control	
10:35~10:55	Coffee Break								
10:55~11:35	**[Plenary Talk V] Power Converters and Controls for Distributed Energy Resources** Liuchen Chang (University of New Brunswick, Canada)								
11:35~12:15	**[Plenary Talk VI] How Far Have Inverters with an Efficiency of 99.9% been Able to Go?** Atsuo Kawamura (Yokohama National University, Japan)								
12:15~13:15	Lunch								
13:15~14:55	**Poster Session II** (Foyer, 5F)								
14:55~16:35	[ThA2] Isolated DC/DC Converters I	[ThB2] IS: Technolgy for LVDC distribution in the Commercial Building and Intelligent Shipboard Protection System	[ThC2] Reliability in Power Electronics System II	[ThD2] Battery Manegment System II	[ThE2] On-Board & Fast Chargers for Electric Vehicles	[ThF2] OS: High-frequency Power Converters for Emerging Applications	[ThG2] Other and Emerging Topics in Power Electronics I	[ThH2] Control of Motor Drives for ElectricVehicle	[ThI2] Test and Control based on HILS
16:35~16:55	Coffee Break								
16:55~18:35	[ThA3] Isolated DC/DC Converter II	[ThB3] OS: High Power Density Converter Design	[ThC3] PWM Inveter Applications	[ThD3] Battery Manamgement System I	[ThE3] Control Strategy for Traction Power Systems	[ThF3] Big Data and Machine Learning Applications - INV & CNV	[ThG3] Other and Emerging Topics in Power Electronics II	[ThH3] OS: Power converters for DC transmission and Distribution	[ThI3] Modeling and Control of Converters III
19:00~21:00	**Night of Jeju** (The Seaes Hotel & Resort)								

※ **The online session 'Week-After Live Q&A (WALQA)' is scheduled to be streamed on June 8th, 2023, through an online platform.**

TECHNICAL PROGRAM

[TuA1] Active-bridge DC/DC Converters

Room A (Halla Hall A, 3F) **May 23 (Tue.), 2023 / 8:30AM~10:35AM**

Session Chair(s) **Tsorng-Juu Liang** (National Cheng Kung University, Taiwan)
Ki-Bum Park (Korea Advanced Institute of Science and Technology, Korea)

8:30AM [TuA1-1] Discrete Single-Phase-Shift Control Strategy with Transition Pulses of Dual-active-bridge DC-DC Converter
Jin Sha, Xingchao Wu, Han Wang, and Yuebing Sun
Southwest Jiaotong University, China

8:55AM [TuA1-2] Deadbeat Control with Current Stress Optimization for Extended Phase-Shift Modulated DAB Converter
Tan-Quoc Duong and Sung-Jin Choi
University of Ulsan, Korea

9:20AM [TuA1-3] Time Domain Modeling of Zero Voltage Switching Behavior Considering Parasitic Capacitances for a Dual Active Bridge
Fabian Sommer[1], Nikolas Menger[1], Tobias Merz[1], Nils Soltau[2], Shiori Idaka[2], and Marc Hiller[1]
[1]Karlsruhe Institute of Technology, Germany, [2]Mitsubishi Electric Europe B.V., Germany

9:45AM [TuA1-4] A Partial-variable-frequency Modulation Scheme for DAB Converter for the all-ZVS Operation in the Full Power Range
WenHui Li, LinXiao Gong, and Yong Wang
Shanghai Jiao Tong University, China

10:10AM [TuA1-5] DAB Converter to Shorten Heating Time by Generating Trapezoidal-Wave Current for Automotive Lithium-Ion Batteries
Hyoga Hiranuma and Uno Masatoshi
Ibaraki University, Korea

[TuB1] IS: Infineon Drives Leading-edge Power Applications for Unlimited Green Energy

Room B (Halla Hall B, 3F) **May 23 (Tue.), 2023 / 8:30AM~10:35AM**

Session Chair(s) **Chang-Min Kim** (Infineon Technologies Korea, Korea)

8:30AM [TuB1-1] With SiC MOSFET, from Some KW Light Industrial Application to Some Hundred KW Drive Application Review and Those Protection Methods
Chang Ho Kim
Infineon Technologies Korea, Korea

8:55AM [TuB1-2] Introduce High Efficiency & High Density 140W USB-PD Charger/ Adaptor base on GaN
Sang Ho Jang
Infineon Technologies Korea, Korea

9:20AM [TuB1-3] Introduce 40KW / 50KW EV-charger Solution About Full SiC SixPACK, Full SiC NPC2, Hybrid NPC2 and Vienna Rectifier Solutions for the PFC Stage with Easy2B
GunHo Lee
Infineon Technologies Korea, Korea

9:45AM [TuB1-4] Introduce CoolSiC™ Benefits with Design Concepts in View of Die Technology
Kyoung Deok Kim
Infineon Technologies Korea, Korea

10:10AM [TuB1-5] Ways to Achieve High Power Density at On-Board Charger
Richard Li
Infineon Technologies Korea, Korea

[TuC1] Power Modules, Packaging, and Materials

Room C (Samda Hall A, 3F) **May 23 (Tue.), 2023 / 8:30AM~10:35AM**

Session Chair(s) **Alan Mantooth** (University of Arkansas, USA)
Sang Won Yoon (Hanyang University, Korea)

8:30AM [TuC1-1] Double-Side Direct Oil-Cooling Automotive Power Module: from Material Compatibility to Thermal Management
Ti Chen, Takeshi Tokuyama, Akihiro Namba, Takahito Muraki, Kyota Asai, Takahiro Araki, and Shintaro Tanaka
Hitachi, Ltd., Japan

8:55AM [TuC1-2] The Effect of the Ratio of Remanent Flux Density to Coercivity of Magnet on Spoke-Type Permanent Magnet Synchronous Motor (PMSM) Performance
Minyeong Choi[1], Yang-Ki Hong[1], Hoyun Won[1], Shuhui Li[1], S. Rahman[1], M. Nurunnabi[1], Woncheol Lee[1,2], and Chang-Dong Yeo[3]
[1]University of Alabama, USA, [2]Samsung Electronics, Korea, [3]Texas Tech University, USA

9:20AM [TuC1-3] IMS-based Integrated SiC-MOSFET Bidirectional Switches for Advanced CSI Implementation
Y. Lee[1], S. Avilès[2], C. Duchesne[2], P. Lasserre[2], and A. Castellazzi[1]
[1]Kyoto University of Advanced Science, Japan, [2]Deep Concept, France

9:45AM [TuC1-4] Comparative Analysis of Epoxy Molding Compound (EMC) Material Properties Used in Double-sided Cooling Power Module
Jaehyun Cho and Sang Won Yoon
Hanyang University, Korea

10:10AM [TuC1-5] Magnetic Properties of Dust Core Without Binder
S. Yokoi and K. Yun
Gifu University, Japan

[TuD1] Renewable Energy Control and Applications

Room D (Samda Hall B, 3F) May 23 (Tue.), 2023 / 8:30AM~10:35AM

Session Chair(s) **Junichi Itoh** (Nagaoka University of Technology, Japan)
Kyoung-Min Choo (Korea Electrotechnology Research Institute, Korea)

8:30AM [TuD1-1] Robust Design of Perturb & Observe Maximum Power Point Tracking
Runze Lv and Yongheng Yang
Zhejiang University, China

8:55AM [TuD1-2] Active Switched LC Converter with Voltage Multiplier Technique
Mohammad Alrefai, Ahmad Elkhateb, and Robert Best
Queen's University, UK

9:20AM [TuD1-3] Passivity-Based Multi-Sampled Single-Loop Voltage Control for Grid-Forming VSCs
Shan He and Frede Blaabjerg
Aalborg University, Denmark

9:45AM [TuD1-4] High-Conversion-Ratio Push-Pull Resonant Converter for High-Power Fuel-Cell Applications
Ji-Ho Choi, Muhammad Mubeen Khan, Tsegaab Alemayehu Wagaye, Eun-Ha Park, Su-Hyeong Kim, and Minsung Kim
Dongguk University, Korea

10:10AM [TuD1-5] Application of 10kV IGCT in 5-level ANPC Inverters Employed for 20MW Wind Turbine Systems
Taeyun Kim, Hyeoncheol Park, and Yongsug Suh
Jeonbuk National University, Korea

[TuE1] Wide-Band-Gap Device Applications

Room E (301, 3F) May 23 (Tue.), 2023 / 8:30AM~10:35AM

Session Chair(s) **Xibo Yuan** (China University of Mining and Technology, China)
Jong-Woo Kim (Konkuk University, Korea)

8:30AM [TuE1-1] Development of a PCB Embedded High Bandwidth Coil Based Current Sensor Suitable for Characterizing GaN Devices
P T Nandh Kishore, Sumit Kumar Pramanick, and Soumya Shubhra Nag
Indian Institute of Technology Delhi, India

8:55AM [TuE1-2] Design of a Closed-Loop Control to Balance Unequal Temperature Distributions of Parallel-Connected SiC MOSFETs
Christoph Lüdecke, Niklas Fritz, and Rik W. De Doncker
RWTH Aachen University, Germany

9:20AM [TuE1-3] Characteristics of SiC MOSFET Compact Models Suitable for Virtual Prototyping of Power Electronic Circuits
Paul Sochor, Andreas Huerner, Qing Sun, and Rudolf Elpelt
Infineon Technologies AG, Germany

9:45AM [TuE1-4] Multi-cell Operation of Class-PN at 6.78 MHz Using GaN Devices for Industrial Dielectric Heating
Faheem Ahmad, Asger Bjørn Jørgensen, and Stig Munk-Nielsen
Aalborg University, Denmark

10:10AM [TuE1-5] A Study on the Evolution of Solid State Transformer Technologies and Applications
Nithin Kolli, Sanket Parashar, Raj Kumar Kokkonda, Apoorv Agarwal, Anup Anurag, and Subhashish Bhattacharya
North Carolina State University, USA

[TuF1] PM Machines

Room F (302, 3F) May 23 (Tue.), 2023 / 8:30AM~10:35AM

Session Chair(s) **Ngac Ky Nguyen** (Arts et Metiers Institute of Technology, France)
Byungtaek Kim (Kunsan National University, Korea)

8:30AM [TuF1-1] Axial Stress Analysis and Comparison of the Novel Dual 3-phase Axial Flux Permanent Magnet Machines
Wenjing Zhang[1], Ngac Ky Nguyen[2], Eric Semail[2], and Yanliang Xu[1]
[1]Shandong University, China, [2]University of Lille, France

8:55AM [TuF1-2] On the Effect of Claw Geometry on the Vibration of Single-Phase Claw-Pole BLDC Machines
Nejat Saed[1,2], Shahin Asgari[1,2], and Annette Muetze[1,2]
[1]Christian Doppler Laboratory for Brushless Drives for Pump and Fan Applications, Austria, [2]Graz University of Technology, Austria

9:20AM [TuF1-3] Electromagnetic, Structural and Thermal Analysis of Interior Permanent Magnet Synchronous Motor for Electric Vehicle Application
Veena Prasanna, Sandeep V Nair, and Kamalesh Hatua
Indian Institute of Technology Madras, India

9:45AM [TuF1-4] Prediction and Measurement of Bearing Currents in an Electric Traction Drive System
Pauline Höltje[1], Lennart Jünemann[1], Benjamin Knebusch[1], Nikolaus Euler-Rolle[2], Alexander Zeiler[2], Axel Mertens[1], and Bernd Ponick[1]
[1]University Hannover, Germany, [2]Magna Powertrain GmbH & Co KG Traiskirchen, Austria

10:10AM [TuF1-5] Spoke-type PM Vernier as a Promising Candidate for MW-Scale Direct Drive Wind Turbine Applications
Abdur Rehman, and Byungtaek Kim
Kunsan National University, Korea

[TuG1] OS: Power Converters and Controls for Distributed Energy Systems

Room G (303, 3F) **May 23 (Tue.), 2023 / 8:30AM~10:35AM**

Session Chair(s) **Liuchen Chang** (University of New Brunswick, Canada)
Noriko Kawakami (Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan)

8:30AM [TuG1-1] Harmonic Analysis of SPWM Wave for Single-Phase Bridge Inverter
Shuang Xu[1], Ling Pang[1], Jinghua Zhou[1], and Liuchen Chang[2]
[1]North China University of Technology, China, [2]University of New Brunswick, Canada

8:55AM [TuG1-2] Active Power Decoupling of Single-Phase Inverter based on Input Voltage CCS-MPC
Xun Jiang, Meiqin Mao, and Wei Cheng
Hefei University of Technology, China

9:20AM [TuG1-3] A Perspective on Power Converters Design: Stability and Reliability Aspects
Ali Azizi, Saeed Peyghami, and Frede Blaabjerg
Aalborg University, Denmark

9:45AM [TuG1-4] Technologies and Future Trends of Large-Capacity Inverters for Grid-Scale PV Plants and BESS Plants
N. Kawakami, R. Inzunza, H. Li, and Y. Mitsugi
Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan

10:10AM [TuG1-5] Co-operative Control of BESS and Wind Turbines for Heavy Motor Starting on Industrial Isolated Grids
Joseph Kiran Banda[1], Ayotunde Adekunle Adeyemo[1], Francesco Marra[2], and Elisabetta Tedeschi[1,3]
[1]Norwegian University of Science and Technology, Norway, [2]Equinor ASA, Norway, [3]University of Trento, Italy

[TuH1] Permant Magnet Synchronous Machine Drives

Room H (401, 4F) **May 23 (Tue.), 2023 / 8:30AM~10:10AM**

Session Chair(s) **Dianguo Xu** (Harbin Institute ofTechnology, China)
Hyeon-Sik Kim (Gachon University, Korea)

8:30AM [TuH1-1] Online MTPA Tracking of IPMSM based on Min-Max Optimization
Jaeyeon Park, Hyung-June Cho, Jonghun Yun, and Seung-Ki Sul
Seoul National University, Korea

8:55AM [TuH1-2] High Efficiency Control Method of Singlephase Electrolytic Capacitor-less Dual Inverter-Fed IPMSM for Compressor
T. Sakurai and H. Haga
Nagaoka University of Technology, Japan

9:20AM [TuH1-3] Optimal Current Control Methods for Dual-Parallel-SPMSM with Different Parameters Using a Single Inverter
Cheonsu Park and Shinji Doki
Nagoya University, Japan

9:45AM [TuH1-4] Self-Identification of Reluctance Synchronous Machines with Analytical Flux Linkage Prototype Functions
Shih-Wei Su[1], Niklas Monzen[2], Ralph Kennel[1], and Christoph M. Hackl[2]
[1]Technical University of Munich, Germany, [2]HM Munich University of Applied Sciences, Germany

[TuI1] Modeling and Control of Converters I

Room I (402, 4F) **May 23 (Tue.), 2023 / 8:30AM~10:35AM**

Session Chair(s) **Jens Friebe** (Leibniz Universität Hannover, Germany)
Jonghoon Kim (Chungnam National University, Korea)

8:30AM [TuI1-1] Output Power Control for Isolated Secondary-Resonant AC-DC Modular Matrix Converter Using Pulse Amplitude Modulation

Kohei Budo and Takaharu Takeshita

Nagoya Institute of Technology, Japan

8:55AM [TuI1-2] A Phase-shifting Control IPOS High-voltage Generator with Low Output Voltage Ripple for X-Ray

Hongyu Feng[1], Hongyi Lin[1], Jiasheng Xu[1,2], Liang Wu[3], and Guozhu Chen[1]

[1]Zhejiang University, China, [2]Wuxi Xien Electric Co., Ltd., China, [3]Huawei Technologies Co., Ltd., China

9:20AM [TuI1-3] Synthesis of Low-Switch-Count Power Converter Topologies

M. Leibl[1], J. Huber[2], D. Menzi[2], and J. W. Kolar[2]

[1]Zünd Systemtechnik AG, Switzerland, [2]ETH Zurich, Switzerland

9:45AM [TuI1-4] Small Signal Modeling of a Series Resonant LLC Converter Under PWM Condition

Dohong Lee, Hongseok Choi, Jinsu Kim, Seongmi Park, Jong-Woo Kim, and Younghoon Cho

Konkuk University, Korea

10:10AM [TuI1-5] Identification of Common Mode Noise Current Path in a SiC Power Module

Chih-Ming Tzeng[1], Pin-Tzu Chiu[2], M.H. Pong[2], Yan-Cheng Liu[1], Chun-Jen Yao[2], Hsin-Han Lin[1], Yu-Hua Cheng[1], and Huang-Jen Chiu[2]

[1]Industrial Technology Research Institute, Taiwan, [2]National Taiwan University of Science and Technology, Taiwan

[TuA2] High Step-up DC/DC Converters

Room A (Halla Hall A, 3F) **May 23 (Tue.), 2023 / 1:35PM~3:40PM**

Session Chair(s) **Sha Jin** (Southwest Jiaotong University, China)
Sung-Jin Choi (University of Ulsan, Korea)

1:35PM [TuA2-1] Control Strategy of Mode Switching for Three Port Converter

Hao Wang[1], Wei Zhou[1], Jiang You[1], Kaiwei Hu[1], and Junli Zhao[2]

[1]Harbin Engineering University, China, [2]Beijing Research Institute of Mechanical and Electrical Technology, China

2:00PM [TuA2-2] Expandable High Step-up DC-DC Converter with the Capability of Eliminating Input Current Ripple

Zahra Saadatizadeh, Pedram Chavoshipour Heris, and H. Alan Mantooth

University of Arkansas, USA

2:25PM [TuA2-3] A Novel Current-Shunt-Input Voltage-Series-Output High Step-Up Converter with a New Coupled-Inductor Boost Module

Sung-Pei Yang, Shin-Ju Chen, Chao-Ming Huang, and Cheng-Hsuan Chiu

Kun-Shan University, Tiwan

2:50PM [TuA2-4] A Modular High-voltage Pulse Generator based on Transformer Charging with High Boosting Capability and Low-voltage DC Input

Mohsen Feizi and Bas Vermulst

Eindhoven University of Technology, The Netherlands

3:15PM [TuA2-5] A Cascoded High Step-Up DC-DC Converter with Coupled Inductor and Switched Capacitor

Tai-You Wu, Tsorng-Juu Liang, Huynh Kim Kien Nghiep, and Kai-Hui Chen

National Cheng Kung University, Taiwan

[TuB2] IS: State of the Art Power Electronics in Electric Vehicle

Room B (Halla Hall B, 3F) **May 23 (Tue.), 2023 / 1:35PM~3:15PM**

Session Chair(s) **Sewan Choi** (Seoul National University of Science and Technology, Korea)

1:35PM [TuB2-1] Development of the Next Generation Multi-Charging System for 400V/800V Using Motor-Inverter
YooJong Lee
Hyundai Motor Company, Korea

2:00PM [TuB2-2] Development of a 2-Stage Motor System Topology for EV for High Power and High Efficiency
KangHo Jeong
Hyundai Motor Company, Korea

2:25PM [TuB2-3] Development of V2X (External Power Supply) Technology for EV Using On-Board Charging System
JaeHyun Kim
Hyundai Motor Company, Korea

2:50PM [TuB2-4] Global Market Trend of EV Charging Industry
Hugh Kim
Sk Signet, Korea

[TuC2] Passive Components and Filters

Room C (Samda Hall A, 3F) **May 23 (Tue.), 2023 / 1:35PM~3:40PM**

Session Chair(s) **Jungwon Choi** (University of Minnesota Twin Cities, USA)
Wilmar Martinez (KU Leuven, Belgium)

1:35PM [TuC2-1] Orthogonal Biasing Controllable Inductor Using a Commercial Hollow Toroid Core
H. Wouters, C. Suarez, and W. Martinez
KU Leuven, Belgium

2:00PM [TuC2-2] A Stray Capacitances Model of Inductors with Partial Layer of Windings
Bingxin Xu[1,2], Zhan Shen[1,2], Chenglei Liu[1], Cungang Hu[2], Bi Liu[2], Long Jin[1], Jiangfeng Wang[1], Xin Li[1], Zhike Xu[1], Wu Chen[1], Xiaohui Qu[1], and Zhixiang Zou[1]
[1]Southeast University, China, [2]Anhui University, China

2:25PM [TuC2-3] Active EMI Filter for Medium and High Power Converters
S. Skibin[1], B. Wunsch[1], and V. Forsstrom[2]
[1]ABB Corporate Research, Switzerland, [2]ABB Oy Drives, Finland

2:50PM [TuC2-4] Integration of High Leakage Inductance Transformers Utilizing Genetically Optimized Curved Foil Windings
David Bündgen, André Thönnessen, and Rik W. De Doncker
RWTH Aachen University, Germany

3:15PM [TuC2-5] Transformer Design Considering Fringing Effect for High Frequency Application
Jong-Uk Yang[1], Gi-Young Lee[2], and Rae-young Kim[1]
[1]Hanyang University, Korea, [2]Gyeongsang National University, Korea

[TuD2] Smart Grid and Microgrid

Room D (Samda Hall B, 3F) **May 23 (Tue.), 2023 / 1:35PM~3:40PM**

Session Chair(s) **Inam Nutkani** (RMIT University, Australia)
In Kwon Park (RTDS Technologies, Canada)

1:35PM [TuD2-1] Investigation of Frequency Dependency of Residential Loads in Modern Power Systems: An Experimental Approach
Qiucen Tao, Johanna Geis-Schroer, Maëva Courcelle, Thomas Leibfried, and Giovanni De Carne
[1]Karlsruhe Institute of Technology, Germany

2:00PM [TuD2-2] Multi-Stage Multi-Objective Energy Management System for Seaport DC Microgrids
Adil Ayub Sheikh and Dong-Choon Lee
Yeungnam University, Korea

2:25PM [TuD2-3] Grid-tied Permanent Magnet Synchronous Generator with Series Voltage Compensator
Chung-Chuan Hou, Zong-Sian Lu, and Shih-Ping Liu
Chung Hua University, Taiwan

2:50PM [TuD2-4] A Decentralized Coordination of Inverter-Based Generation Units for a Bottom-up Black Start without Communication
M. Mirzadeh and A. Mertens
Leibniz University Hannover, Germany

3:15PM [TuD2-5] A Novel Series Flexible Transfer Converter Enabling Autonomous Control of Microgrids
Zhaoqi Song, Ronghui An, Jinjun Liu, and Zeng Liu
Xi'an Jiaotong University, China

[TuE2] Active Gate Driver Technologies

Room E (301, 3F) **May 23 (Tue.), 2023 / 1:35PM~3:40PM**

Session Chair(s) **Georgios Konstantinou** (The University of New South Wales, Australia)
Minho Kwon (Korea Electrotechnology Research Institute, Korea)

1:35PM [TuE2-1] Efficiency Improvement of GaN Dual-Active-Bridge DC-DC Converter with a Three-level Active Gate Driver
Jinwoo Kim, Kwonhoon Kim, Yujin Shin, Seongmi Park, Jinhyuk Heo, and Younghoon Cho
Konkuk University, Korea

2:00PM [TuE2-2] Design Optimization and Performance Analysis of a Three-Phase Three-Level MVDC Bidirectional Isolator Using Series-Connected 10kV SiC MOSFETs and 10kV SiC JBS Diodes
Sanket Parashar, Nithin Kolli, Raj Kumar Kokkonda, and Subhashish Bhattacharya
North Carolina State University, USA

2:25PM [TuE2-3] Digital Gate Driver IC with Real-Time Gate Current Change by Sensing Drain Current to Cope with Operating Condition Variations of SiC MOSFET
Dibo Zhang, Kohei Horii, Katsuhiro Hata, and Makoto Takamiya
The University of Tokyo, Japan

2:50PM [TuE2-4] Crosstalk Voltage Suppression of SiC MOSFET With An Auxiliary Bidirectional Switch
Chengmin Li and Dražen Dujić
École Polytechnique Fédérale de Lausanne, Switzerland

3:15PM [TuE2-5] Demonstration and Optimization of a 250°C LTCC-based Gate Driver for High Density, High-Temperature Power Modules
Sudharsan Chinnaiyan, David Gonzalez Castillo, Pengyu Lai, Salahaldein Ahmed, Hao Chen, Xiaoling Li, Riya Paul, Yuxiang Chen, Zhong Chen, and H. Alan Mantooth
University of Arkansas, USA

[TuF2] Solid-State Transformers and Applications

Room F (302, 3F) **May 23 (Tue.), 2023 / 1:35PM~3:40PM**

Session Chair(s) **Axel Mertens** (Leibniz University Hannover - Institute for Drive Systems and Power Electronics, Germany)
Youngjong Ko (Pukyong National University, Korea)

1:35PM [TuF2-1] A Single Carrier Rotating Modulation for Modular Multilevel Converter based Isolated DC-DC Converters in EV Charging Station
Jun-Hyung Jung[1], Sattar Bazyar[1], Hamzeh Beiranvand[1], Joao Victor Matos Farias[2], and Marco Liserre[1,2]
[1]Kiel University, Germany, [2]Fraunhofer Institute for Silicon Technology, Germany

2:00PM [TuF2-2] Study of Transient Control Performance of Cascaded NPC-DAB for Power Supply System of Data Center
Jiaxuan Niu, Xu Yang, Ding Su, Kexin Zhao, and Shangkun Li
Xi'an Jiaotong University, China

2:25PM [TuF2-3] Peak Transmitting-Power Reduction of Isolated DC-DC Converters in Solid-State-Transformer Equipped with Reduced Capacitors Utilizing Third-Order Circulating Current in Delta-Connection
Tomoyuki Mannen
University of Tsukuba, Japan

2:50PM [TuF2-4] Study of a Three-Phase Multilevel Converter Topology with Common Flying Capacitors
Maxime Pain, Guillaume Gateau, and Jean-Marc Blaquière
University of Toulouse, France

3:15PM [TuF2-5] Parameter Design Scheme for the Embedded Multiport Flexible ac Interconnector
Hongming Li[1], Jianqiao Zhou[1], Jianwen Zhang[1], Xu Cai[1], Yuwen Liu[1], Mingyang Yang[1], and Jiajie Zang[2]
[1]Shanghai Jiao Tong University, China, [2]Shanghai University of Engineering Science, China

[TuG2] OS: Advanced Control and Energy Management of Microgrids

Room G (303, 3F) **May 23 (Tue.), 2023 / 1:35PM~3:40PM**

Session Chair(s) **Yunwei Li** (Alberta University, Canada)
Meiqin Mao (Hefei University of Technology, China)

1:35PM [TuG2-1] Parameter Feasible Region Construction of Generalized Virtual Synchronous Generators with Improved Damping Capability

Rui Liu, Cheng Xue, and Yunwei (Ryan) Li
University of Alberta, Canada

2:00PM [TuG2-2] Secondary Frequency and Voltage Regulation Strategy of Microgrid based on Distributed Consensus Algorithm

Fei Zhai, Yong Shi, Bao Xie, Jianhui Su, and Xun Jiang
Hefei University of Technology, China

2:25PM [TuG2-3] Fault Diagnosis and State Evaluation of Distributed Photovoltaic Systems in Microgrids

Kai Sun[1], Xi Xiao[1], Shouzun Wu[2], and Lina Chen[3]
[1]Tsinghua University, China, [2]State Grid Gansu Electric Power Company, China, [3]Pingliang Power Supply Company of State Grid Gansu Electric Power Company, China

2:50PM [TuG2-4] Enhancing Distribution System Resilience by Dynamic Post-Disruption Microgrid Formation

Kaiyuan Pang[1], Nikos D. Hatziargyriou[2], and Fushuan Wen[1]
[1]Zhejiang University, China, [2]National Technical University of Athens, Greece

3:15PM [TuG2-5] Electric Vehicle Charging Management in Smart Energy Communities to Increase Renewable Energy Hosting Capacity

Hyunwoo Song[1], Yeongsang Lee [1], Gab-Su Seo[2], and Dongjun Won[1]
[1]Inha University, Korea, [2]National Renewable Energy Laboratory, USA

[TuI2] Modeling and Control of Converters II

Room I (402, 4F) **May 23 (Tue.), 2023 / 1:35PM~3:40PM**

Session Chair(s) **Nho-Van Nguyen** (Ho Chi Minh City University of Technology, Vietnam)
Honnyong Cha (Kyungpook National University, Korea)

1:35PM [TuI2-1] Optimized Modulation for Three-Level Boost Converters with ZVS Under Unbalanced Load

Zhou He[1,2], Hongfa Ding[1], Ziqi Zhang[1], Zhigang Yao[2,3], Fei Deng[2] and Yi Tang[2]
[1]Huazhong University of Science and Technology, China, [2]Nanyang Technological University, Singapore, [3]Southwest Jiaotong University, China

2:00PM [TuI2-2] Management System of Output Power base on Parallel-Connected Boost High Gain Converter

T. Jinati, K. Chaicharoenudomrung, and A. Bilsalam
King Mongkut's University of Technology North Bangkok, Thailand

2:25PM [TuI2-3] A Novel Primary-Side Regulation Technique for Active-Clamp Forward Converter

Junho Shin and Jong-Won Shin
Chung-Ang University, Korea

2:50PM [TuI2-4] State-Plane Diagram Analysis of Series Resonant Induction Heat

Somboon Sooksatra and Wanchai Subsingha
Rangsit University, Thailand

3:15PM [TuI2-5] Small-Signal Modeling and Control of Three-phase Hybrid Transformer Considering Practical Impedances

Taehoon Chin[1], Taehwan Ahn[1], Seungil Choi[1], Younghoon Cho[1], Hosung Kim[2], and Juwon Baek[2]
[1]Konkuk University, Korea, [2]Korea Electrotechnology Research Institute, Korea

[TuA3] DC/DC Converter Applications

Room A (Halla Hall A, 3F) **May 23 (Tue.), 2023 / 4:00PM~6:05PM**

Session Chair(s) **Chengmin Li** (EPFL STI IEM PEL, Switzerland)
Cheonyong Lim (Jeonbuk National University, Korea)

4:00PM [TuA3-1] Combined Partial Voltage and Current Power Processing DC/DC Converters for Solar PV Applications

YongDae Kwon[1,2], Francisco Freijedo[1], Thiwanka Wijekoon[1], and Marco Liserre[2]
[1]Huawei Technologies Duesseldorf GmbH, Germany, [2]Christian Universitat zu Kiel, Germany

4:25PM [TuA3-2] A Simple Gate Control Method for Output Voltage Balancing in Input-Parallel Output-Series Boost Converter

Jongyoon Chae, Minsu Lee, Jae ho Kim, Dongmin Kim, and Gun-Woo Moon
Korea Advanced Institute of Science and Technology, Korea

4:50PM [TuA3-3] Cell Voltage Equalizer with AC Internal Heating Capability for Automotive Lithium-Ion Batteries

Takumi Sugiura and Masatoshi Uno
Hitachi, Ltd., Japan

5:15PM [TuA3-4] Cost-Effective System Installed in Light Electric Vehicles with Swapping Operation

Ji-Yeon Kim and Jae-Kuk Kim
Inha University, Korea

5:40PM [TuA3-5] Reconfigurable Auxiliary Circuits for Transient Improvement in Multiprocessor Power Supplies
Yijie Qian, Xinru Wang, Lingyun Li, Shen Xu, and Weifeng Sun
Southeast University, China

[TuB3] IS: Power Semiconductor and Module Solutions from ON Semiconductor

Room B (Halla Hall B, 3F) **May 23 (Tue.), 2023 / 4:00PM~5:40PM**

Session Chair(s) **Kevin (KyuHyun) Lee** (ON Semiconductor, Korea)

4:00PM [TuB3-1] FS7 SCR IGBT with Enhaced Performance and Rugggedness for Automotive Traction Application
Hye-Mi Kim
ON Semiconductor, Korea

4:25PM [TuB3-2] Introduction of Power Solutions from Industrial Power Solution Team
Joon Song
ON Semiconductor, Korea

4:50PM [TuB3-3] Full SiC Intellgient Power Module and Power Integrated Module for Motion Control
SeungHyun Hong
ON Semiconductor, Korea

5:15PM [TuB3-4] Performance Trade-off of SiC and IGBT in Onsemi EV Traction Module
Wonjin Dylan Cho
ON Semiconductor, Korea

[TuC3] Inverter Topology, Design, and Components

Room C (Samda Hall A, 3F) **May 23 (Tue.), 2023 / 4:00PM~6:05PM**

Session Chair(s) **Dujić Dražen** (Power Electronics Laboratory, EPFL, Switzerland)
Seunghun Baek (Keimyung University, Korea)

4:00PM [TuC3-1] Variable Frequency Phase-Shift Modulation Technique for Single Stage Dual-Active-Bridge AC-DC Converter
Dongxin Guo[1], Panbao Wang[1], Chunguang Ren[2], and Josep M. Guerrero[3]
[1]Harbin Institute of Technology, China, [2]Taiyuan University of Technology, China, [3]Aalborg University, Denmark

4:25PM [TuC3-2] A Single-Stage High-Frequency-Link Microinverter with Split-Phase Structure
Xuewen Li[1], Jia Liu[1], Guozhong Zhu[2], Fangchao Ji[1], Jianyue Di[1], Yue Wang[1], and Jinjun Liu[1]
[1]Xi'an Jiaotong University, China, [2]Chint Power Systems Co., Ltd, China

4:50PM [TuC3-3] Impedance Compressing Matching Network Design Using Mode Switch in Two-Port Network System
Jimin Park, Junhyeong Lee, Hyukjae Kwon, and Jung-Ik Ha
Seoul National University, Korea

5:15PM [TuC3-4] Novel Virtual-Ground Single-Phase Buck-Boost Inverter
Fazal Akbar[1], Mohamed Elgenedy[2], Ahmad Elkhateb[1], Honnyong Cha[3], and Jung-Wook Park[4]
[1]Queen's University, UK, [2]Glasgow Caledonian University, UK, [3]Kyungpook National University, Korea, [4]Yonsei University, Korea

5:40PM [TuC3-5] A Neutral-Point-Potential Balancing Strategy of Three-Level NPC Inverters by Injecting Absolute Value of Modulation Signal
Deshuo Yu, Yuguo Li, Hao Yi, Fang Zhuo, Zhenxiong Wang, and Yihan Xie
Xi'an Jiaotong University, China

[TuD3] Grid Interaction with Distributed Generation

Room D (Samda Hall B, 3F) **May 23 (Tue.), 2023 / 4:00PM~6:05PM**

Session Chair(s) **Jinjun Liu** (Xi'an Jiaotong University, China)
Kyo-Beum Lee (Ajou University, Korea)

4:00PM [TuD3-1] Stable Control of Wind Turbine for Frequency Regulation Support by Speed Margin Coefficient
Ye-Chan Kim[1], Seung-Ho Song[1], and Yong Cheol Kang[2]
[1]Kwangwoon University, Korea, [2]Yonsei University, Korea

4:25PM [TuD3-2] Optimal Ensemble Forecasting Method for One-Day Ahead Hourly Wind Power Forecasting
Chao-Ming Huang[1], Yann-Chang Huang[2], Shin-Ju Chen[1], Sung-Pei Yang[1], and Hsin-Jen Chen[1]
[1]Kun Shan University, Taiwan, [2]Cheng Shiu University, Taiwan

4:50PM [TuD3-3] Distributed Hierarchical Control of Energy Storage Systems in a DC Microgrid under Consensus based Adaptive Droop Control Method
Abir Lahmer[1], Jae-Won Chang[1], Hakgeun Jeong[1], and Suyong Chae[2]
[1]Korea Institute of Energy Research, Korea, [2]Pohang University of Science and Technology, Korea

5:15PM [TuD3-4] Efficiency Optimization of a Two-stage Microinverter with Grid Support functions
Dongkwan Yoon[1], Jaehyeok Jang[1], Inwon Lee[1], Younghoon Cho[1], Suchang Lee[2], Juhwan Yun[2], and Jungpil Park[2]
[1]Konkuk University, Korea, [2]Hanwha QCELLS, Korea

5:40PM [TuD3-5] Formulation of a Power Quality Index of a Radial Distribution Network with Distributed Generation
L. Mendoza[1], A. Saavedra-Montes[2], and C. Ramos-Paja[2]
[1]Empresas Públicas de Medellín, Colombia, [2]Universidad Nacional de Colombia, Colombia

[TuE3] Uncontrolled Rectifiers and AC/DC Converters

Room E (301, 3F) **May 23 (Tue.), 2023 / 4:00PM~6:05PM**

Session Chair(s) **Dehong Xu** (Zhejiang University, China)
Hag-wone Kim (Korea National University of Transportation, Korea)

4:00PM [TuE3-1] Filter-less Single-Stage Resonant AC/DC Converter Employing Push-Pull Transformer
Myeong-Hwan Kim[1], Jae-Woong Park[2], Changkyu Bai[3], Dongok Moon[3], An-Yeol Jung[3], and Minsung Kim[2]
[1]LG Innotek, Korea, [2]Dongguk University, Korea, [3]Mando, Korea

4:25PM [TuE3-2] Design and Implementation of Asymmetric Half-Bridge Flyback Converter for USB Power Delivery Applications
Kai-Hung Cheng, Tsorng-Juu Liang, Huynh Kim Kien Nghiep, and Kai-Hui Chen
National Cheng Kung University, Taiwan

4:50PM [TuE3-3] Considered: A Single-Stage Isolated Matrix Rectifier with Hold-Up Time Capability and Wide Input Voltage Range for Data Center and Telecom Applications
Jahangir Afsharian[1], Dewei (David) Xu[2], and Bing Gong[3]
[1,3]Murata Power Solutions, Advanced Front-End Power Supply, Markham, Canada, [2]Electrical and Computer Engineer, Toronto Metropolitan University, Toronto, Canada

5:15PM [TuE3-4] A Digital Controlled of Duty-ratio Feedforward for Four-level Flying Capacitor Boost PFC
Yu-Chen Chung[1], Hung-Yu Wang[1], Huang-Jen Chiu[1], Yu-Chen Liu[2], and Yi-Feng Lin[3]
[1]National Taiwan University of Science and Technology, Taiwan, [2]National Taipei University of Technology, Taiwan, [3]National Ilan University, Taiwan

5:40PM [TuE3-5] A Hybrid Current Reference Control Method for PFC Converter in Server Power Supply
Jae-Sang Kim, Taewoo kim, Yeong-Hun Jeong, and Gun-Woo Moon
Korea Advanced Institute of Science and Technology, Korea

[TuF3] Modular Multi-level Converter

Room F (302, 3F) **May 23 (Tue.), 2023 / 4:00PM~6:05PM**

Session Chair(s) **Jun-Hyung Jung** (Christian-Albrechts-Universität zu Kiel, Germany)

4:00PM [TuF3-1] Comprehensive Analysis of Capacitor Voltage Ripple for Hybrid MMCs Under Over-Modulation Conditions
Xiaofei Chang, Mengfei Li, Ningbo Dong, Huan Yang, and Rongxiang Zhao
Zhejiang University, China

4:25PM [TuF3-2] A Bidirectional Current-Fed Isolated MMC with Zero-Current Switching for High Step Ratio DC-DC Applications
Philippe A. Gray, Noah J. B. Hosein, Xi Lan, and Peter W. Lehn
University of Toronto, Canada

4:50PM [TuF3-3] DC Link Capacity Enhancement for MMC-based Distribution Link Using Dynamic Voltage Operation
Robin van der Sande, Rohan Deshmukh, Aditya Shekhar, and Pavol Bauer
Delft University of Technology, Netherlands

5:15PM [TuF3-4] Selection Design of Low Frequency Voltage Ripple Suppression for MMC Sub-Module based on Split Capacitor
Y. Wang[1], S. Yang[1], F. Zhuang[1], H.Su[1], J.Gong[1], Y.Tang[2], and P. Wang[2]
[1]Southwest Jiaotong University, China, [2]Nanyang Technological University, Singapore

5:40PM [TuF3-5] PWM Carrier Effects on the Harmonic Distortion of Output Voltage in Single-Delta Bridge Cell MMC
Jae-Myeong Kim and Jae-Jung Jung
Kyungpook National University, Korea

[TuH3] Advanced Motor Drives I

Room H (401, 4F) **May 23 (Tue.), 2023 / 4:00PM~6:05PM**

Session Chair(s) **Hitoshi Haga** (Nagaoka University of Technology, Japan)
Hyun-Sam Jung (Dongguk University, Korea)

4:00PM [TuH3-1] Synchronization of Switching Transitions in Parallel Modules of Integrated Modular Motor Drives for Common Mode Noise Reduction
Philipp Marx, Boya Qi, Philipp Ziegler, Jörg Haarer, Vasken Ketchedjian, and Jörg Roth-Stielow
University of Stuttgart, Germany

4:25PM [TuH3-2] Dual Magnetic Flux Frame Direct Self Control for Open-End Winding Interior Permanent Magnet Synchronous Motor with a Constant Switching Frequency
Hyeon-Jun Park, Hyung-Woo Lee, and Kyo-Beum Lee
Ajou University, Korea

4:50PM [TuH3-3] Harmonic Current Regulation of SMPMSM by Discrete-Time Current Controller Design
Hwigon Kim[1], Jiwon Yoo[2], and Seung-Ki Sul[1]
[1]Seoul National University, Korea, [2]Hyundai Motor Company, Korea

5:15PM [TuH3-4] High-performance Micro-PMSM Control Systems Including State-estimators
T. H. Liu and T. T. Cheng
National Taiwan University of Science and Technology, Taiwan

5:40PM [TuH3-5] Injected Current Effects on Magnetic Field and Torque Characteristic of Home Appliance Switched Reluctance Motor
Muhammad R. Fabio, Jihad Furqani, Syarif Hidayat, and Umar Khayam
Bandung Institute of Technology, Indonesia

[TuI3] Modeling and Control Applications

Room I (402, 4F) **May 23 (Tue.), 2023 / 4:00PM~6:05PM**

Session Chair(s) **Tian-Hua Liu** (National Taiwan University of Science and Technology, Taiwan)
Sehwa Choe (LG Electronics, Korea)

4:00PM [TuI3-1] Conceptualization of a Cryogenic 250-A Power Supply for High-Temperature-Superconducting (HTS) Magnets of Future Particle Accelerators
D. Cao, D. Zhang, J. W. Kolar, and J. Huber
ETH Zurich, Switzerland

4:25PM [TuI3-2] Modeling of Lithium-Ion Batteries with Constant Phase Element and Butler-Volmer's Equation
T. Yamahigashi[1], J. Shimura[2], K. Shibuya[1], Y. -H. Wu[1], K. Shigematsu[1], T. Hosotani[1,2], J. Kuromi[2], J. Imaoka[1], and M. Yamamoto[1]
[1]Nagoya University, Japan, [2]Murata Manufacturing Co., Ltd., Japan

4:50PM [TuI3-3] Comparative Global Loss Analysis in low Frequency Range of Three-Phase Diode Front End (DFE) and Active Front End (AFE) Rectifier Systems
Zhaoqing Zhang and Gerd Griepentrog
Technical University of Darmstadt, Germany

5:15PM [TuI3-4] Modelling and Control of Discrete Halbach Magnetic Screw for Wave Energy Application
Doha Mustafa and Hussain A. Hussain
Kuwait University, Kuwait

5:40PM [TuI3-5] Influence of Current Measurement Error to Split Capacitor Voltage in Single-Phase Half-Bridge Grid Connected Inverter
Irham Fadlika, Wen-Yen Li, and Yaow-Ming Chen
National Taiwan University, Taiwan

[WeA1] Resonant DC/DC Converters I

Room A (Halla Hall A, 3F) **May 24 (Wed.), 2023 / 8:30AM~10:35AM**

Session Chair(s) **Taesic Kim** (Texas A&M University-Kingsville, USA)
Minsung Kim (Dongguk University, Korea)

8:30AM [WeA1-1] A Bi-directional Switch based High Step-Up Resonant Converter with Voltage-Quadrupler
Jaeseob Yea, Hyeonjun Jang, Yeonho Kim, and Byeongcheol Han
Kyungpook National University, Korea

8:55AM [WeA1-2] A 1-to-10 Fixed-Ratio Step-up Multi-Resonant Cascaded Series-Parallel (CaSP) Switched-Capacitor Converter with Zero-Current Switching
Kelly Fernandez and Robert C.N. Pilawa-Podgurski
University of California, Berkeley, USA

9:20AM [WeA1-3] A Quadruple CLLC Converter for Submodule of MMC-based SSTs with High Efficiency and Symmetric Bidirectional Power Flow
Lukas Antonio Budiwicaksana and Dong-Choon Lee
Yeungnam University, Korea

9:45AM [WeA1-4] Full-Bridge Resonant DC/DC Converter Operating Above Threshold Load
Muhammad Mubeen Khan, Ji-Ho Choi, Cheol-Hwan Kim, Shahid Atiq, Ihtisham Khan, and Minsung Kim
Dongguk University, Korea

10:10AM [WeA1-5] Triple-Mode Current-Fed Resonant DC-DC Converter for Wide Input Voltage Range with Extended Asymmetric Modulation
Sangoh Kim[1], Junseong Cho[2], Byeongju Kim[1], Youngjoon Song[1], and Byeongcheol Han[1]
[1]Kyungpook National University, Korea, [2]Hanwha Solution, Korea

[WeB1] IS: Power Modules and Components for Electric Vehicles

Room B (Halla Hall B, 3F) May 24 (Wed.), 2023 / 8:30AM~10:35AM

Session Chair(s) **Kevin (KyuHyun) Lee** (ON Semiconductor, Korea)

8:30AM [WeB1-1] Introduction of Automotive Smart Power Module Series for Automotive High Voltage Auxiliary Motor Drive Applications
Jinwoo Park
ON Semiconductor, Korea

8:55AM [WeB1-2] Active Short Circuit Temperature Estimation
Jaewon Choi
ON Semiconductor, Korea

9:20AM [WeB1-3] Unprecedented Levels of Miniaturization in Automotive Power Electronics
Gregory Green
Vicor, USA

9:45AM [WeB1-4] Increased Transient Response in a Vehicle Enabling Removal of the 12V Battery
Yeonkyu Choi
Vicor, Korea

10:10AM [WeB1-5] Gen7 FRD Technology with Improved Efficiency and Performance in High-Power Applications
Chan Heo
ON Semiconductor, Korea

[WeC1] Inveter Control Techniques

Room C (Samda Hall A, 3F) May 24 (Wed.), 2023 / 8:30AM~10:35AM

Session Chair(s) **Sang Min Kim** (Hyundai Mobis, Korea)

8:30AM [WeC1-1] Dual Switching-frequency Hybrid Si-SiC Y-Inverter
H. J. Jaber, K. Horie, S. Domae, and A. Castellazzi
Kyoto University of Advanced Science, Japan

8:55AM [WeC1-2] A Voltage-current Hybrid Control Scheme to Improve the Output Currents Quality of Virtual Synchronous Generators Under Distorted Grid Voltages
Bo Yang, Mingjian Du, Hao Liu, Song Xu, and Shuai Lu
Chongqing University, China

9:20AM [WeC1-3] Current Limiting Strategy of Single-Phase Standalone Inverter for Direct-On-Line Starting of Induction Motor
Kihyang Kim and Yongsoon Park
Gwangju Institute of Science and Technology, Korea

9:45AM [WeC1-4] A Small Signal Rotating Frame Model of a Selfsynchronizing Single-phase Grid-tied Inverter
R. Agrawal, B. P. McGrath, C. A. Teixeira, and R. H. Wilkinson
RMIT University, Australia

10:10AM [WeC1-5] Design and Control of Interleaved T-type Inverter without Damping
Zhigang Yao[1,2], Xinyu He[2], Haoxin Yang[1], Fei Deng[1], and Yi Tang[1]
[1]Nanyang Technological University, Singapore, [2]Southwest Jiaotong University, China

[WeD1] Power Converter Technologies for Utility Interface

Room D (Samda Hall B, 3F) May 24 (Wed.), 2023 / 8:30AM~10:35AM

Session Chair(s) **Shan He** (Aalborg University, Denmark)
Joon-Hee Lee (Korea Institute of Energy Technology, Korea)

8:30AM [WeD1-1] A Sensorless Grid Voltage Estimation Scheme for a Single-phase Voltage Source Inverter
A. A. Mirza, I. U. Nutkani, C. A. Teixeira, and B. P. McGrath
RMIT University, Australia

8:55AM [WeD1-2] Direct Individual-Phase Reactive Current Control Method for an Active Power-Line Conditioner in Three-Phase Four-Wire Distribution Feeders
Y. Sabi[1], Y. Yamada[1], T. Tanaka[1], F. Ikeda[2], M. Okamoto[2], and S. R. Lee[3]
[1]Yamaguchi University, Japan, [2]Ube College, Japan, [3]Kunsan National University, Korea

9:20AM [WeD1-3] Study on Low-Frequency Ripple Voltage Suppression for Cascaded Three-Phase Solid-State-Transformer
Xiaolei Luo, Min Chen and Changsheng Hu
Zhejiang University, China

9:45AM [WeD1-4] Impact of Centralized and Distributed Control Structures on the Harmonic Stability of Modular Multilevel Converter based on DQ Reference Frame Impedance Assessment
Semih Isik and Subhashish Bhattacharya
North Carolina State University, USA

10:10AM [WeD1-5] Seamless Transfer Control of Single-Phase Energy Storage System with AC Power Supply Function
Jung-yong Lee[1], Dongmin Choi[1], Jaehyeok Jang[1], Hongseok Choi[1], Sunwoo Rhee[1], and Younghoon Cho[1]
Konkuk University, Korea

[WeE1] Control of Wireless Power Transfer Systems

Room E (301, 3F) **May 24 (Wed.), 2023 / 8:30AM~10:35AM**

Session Chair(s) **C. Q. Jiang** (City University of Hong Kong, Hong Kong)
Seung-Hwan Lee (University of Seoul, Korea)

8:30AM [WeE1-1] Secondary Periodic Energy Control for LCC-S Compensated Wireless Power Transfer Systems

Tianlu Ma, Chaoqiang Jiang, Jingchun Xiang, Xiaosheng Wang, Chen Chen, Jiayi Geng, and Yibo Wang

City University of Hong Kong, Hong Kong

8:55AM [WeE1-2] Phase Control for Frequency Adaptation in Wireless Power Transfer Systems for Electric Vehicles

Myrel Tiemann, Marcel Stein, and Benedikt Schmuelling

University of Wuppertal, Germany

9:20AM [WeE1-3] Mutual Inductance Estimation of Series-Series Tuned Inductive Power Transfer System

Sangmin Lee and Seung-Hwan Lee

University of Seoul, Korea

9:45AM [WeE1-4] A Novel Control Method of Maximum Efficiency Point Tracking for Series-Series Wireless Power Transfer System

Woonjung Hong, Sangmin Lee, and Seung-Hwan Lee

University of Seoul, Korea

[WeF1] Reluctance Machines

Room F (302, 3F) **May 24 (Wed.), 2023 / 8:30AM~10:35AM**

Session Chair(s) **Kan Akatsu** (Yokohama National University, Japan)
In-Soung Jung (Korea Electronics Technology Institute, Korea)

8:30AM [WeF1-1] Study on the Estimation of Motor Electromagnetic Force and Improvement of Estimation Accuracy

H. Oka and K. Akatsu

Yokohama National University, Japan

8:55AM [WeF1-2] Analytical Tool for Preliminary Design of Switched Reluctance Machine

Anupam Verma, S. S. Ahmad, and G. Narayanan

Indian Institute of Science, India

9:20AM [WeF1-3] Design of Direct Current Excited Reluctance Motor for Torque Density Improvement

Y. Koishi and H. Goto

Utsunomiya University, Japan

9:45AM [WeF1-4] Speed Performance of a Modular Stator, Segmented Rotor Switched Reluctance Motor

Ramon Florentino L. Santos, Belle S. Sermeno, and Lew Andrew R. Tria

University of the Philippines Diliman, Philippines

10:10AM [WeF1-5] Design Proposal and Optimization Potential for an Electric Drive Motor in a 50 PAX Hybrid-electric Regional Aircraft Application

M. Meindl[1], XJ. Liu[2], F. Hilpert[2], Valerio Marciello[3], Mario Di Stasio[3], and M. Maerz[1]

[1]Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany, [2]Fraunhofer Institute for Integrated Systems and Device Technology IISB, Gemany, [3]University of Naples "Federico II", Italy

[WeG1] OS: Advanced Technology for SiC and GaN Applications: Modeling, Design and Control

Room G (303, 3F) **May 24 (Wed.), 2023 / 8:30AM~10:35AM**

Session Chair(s) **Shiqi Ji** (Tsinghua University, China)
Hiroki Watanabe (Nagaoka University of Technology, Japan)

8:30AM [WeG1-1] SiC MOSFET Crosstalk Modelling with Suppression Considering Impacts of dv/dt and di/dt

Wenhao Xie[1], Shiqi Ji[1], Zhengming Zhao[1], and Xin Mo[1,2]

[1]Tsinghua University, China, [2]Tsinghua Sichuan Energy Internet Research Institute, China

8:55AM [WeG1-2] Overview of GaN HEMT Technology for High Frequency Applications

Zhilong Tian[1], Youchen Wei[1], Junyi Bao[1], Zixian Ge[1], Jiangfeng Wang[2], and Hongfei Wu[1]

[1]Nanjing University of Aeronautics and Astronautics, China, [2]Southeast University, China

9:20AM [WeG1-3] Junction Temperature and Current Synchronous Sensing for SiC MOSFETs Based on Electroluminescence Hyperspectral

Yuting Jin, Shuoyu Ye, Qiang Wu, Haoze Luo, Wuhua Li, and Xiangning He

Zhejiang University, China

9:45AM [WeG1-4] Loop Height Effects on Bond Wire Reliability Under Power Cycling for SiC Power Module

Enyao Xiang[1], Haoze Luo[1], Huan Yang[1], Xiangning He[1], Naoto Fujishima[2], Haruhiko Nishio[2], and Hitoshi Sumida[2]

[1]Zhejiang University, China, [2]Fuji Electric Co., Ltd., Japan

10:10AM [WeG1-5] Design and Control of High-Frequency Resonant Inverter for Wide Load Variation

Junhyeong Lee and Jung-Ik Ha

Seoul National University, Korea

[WeH1] Sensorless Motor Drives

Room H (401, 4F) **May 24 (Wed.), 2023 / 8:30AM~10:10AM**

Session Chair(s) **Ralph M Kennel**
(Technische Universitaet Muenchen, Germany)
Yongsoon Park
(Gwangju Institute of Science and Technology, Korea)

8:30AM [WeH1-1] Speed as Perturbation in Anisotropy based Sensorless Control Methods

Zhao. Zhao and Roberto. Leidhold

Otto-von-Guericke University of Magdeburg, Germany

8:55AM [WeH1-2] Low-order Harmonic Suppression Strategy in Sensorless Starting Control of Wound-Rotor Synchronous Starter/Generator

ChongZhao Ma and Shuai Mao

Northwestern Polytechnical University, China

9:20AM [WeH1-3] Signal Injection Sensorless Control with Separated Signal Injection and Control Angles Exploiting an Angle Compensation

Hyun-Jun Lee, Je-Eok Joo, and Young-Doo Yoon

Hanyang University, Korea

9:45AM [WeH1-4] Position Sensorless Control of Long-Cable-Fed PMSM Drive System Using Sine-wave Filter

Hanyoung Bu, Inwon Lee, Jinsu Kim, Byungju Bae, Dongkwan Yoon, and Younghoon Cho

Konkuk University, Korea

[WeI1] OS: Control and Applications of Multilevel Converters

Room I (402, 4F) **May 24 (Wed.), 2023 / 8:30AM~10:10AM**

Session Chair(s) **Nho-Van Nguyen**
(Ho Chi Minh City University of Technology, Vietnam)
Tuyen Dinh Nguyen
(Ho Chi Minh City University of Technology, Vietnam)

8:30AM [WeI1-1] Wide Range Multi-level DC-DC Converter with TCM for High Voltage Applications

Takashi Ohno[1], Rintaro Kusui[1], Hiroki Watanabe[1], Jun-ichi Itoh[1], and Takuya Kataoka[2]

[1]Nagaoka University of Technology, Japan, [2]Mitsubishi Electric Corp., Japan

8:55AM [WeI1-2] Switching-Cell Paralleled H-Bridge Multilevel Current Source Inverter

Faramarz Faraji and Honnyong Cha

Kyungpook National University, Korea

9:20AM [WeI1-3] A Single-Phase Seven-Level Inverter with Triple Boosting Ability

Dai-Van Vo[1], Minh-Khai Nguyen[2], Truong-Duy Duong[3], Van-Cuong Bui[1], Young-Cheol Lim[1], and Joon-Ho Choi[1]

[1]Chonnam National University, Korea, [2]General Motors, USA, [3]Wayne State University, USA

9:45AM [WeI1-4] Hybrid Pulse-width Modulation Strategy with Reduced CMV Frequency and Improved Switching Loss for Three-Level NPC Converters

Khoa Dang Pham[1] and Nho-Van Nguyen[2]

[1]Ho Chi Minh City University of Technology, Vietnam, [2]Vietnam National University Ho Chi Minh City, Vietnam

[WeA2] Soft-switching DC/DC Converters I

Room A (Halla Hall A, 3F) **May 24 (Wed.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Jongwon Shin** (Chung-Ang University, Korea)
Ho-Sung Kim
(Korea Electrotechnology Research Institute, Korea)

2:55PM [WeA2-1] High Efficiency of Asymmetric Half-Bridge Converter with Simple SR Switch Control Under Light Load Condition

Jeongchan Park[1], Taewoo Kim[1], Seung-Hyun Choi[1], Jae-in Lee[1,2], and Gun-Woo Moon[1]

[1]Korea Advanced Institute of Science and Technology, Korea, [2]Agency for Defense Development, Korea

3:20PM [WeA2-2] New Two-Transformer Phase-Shift Full-Bridge Converter With Low Conduction Loss

Seok-Woo Jeong, Seung-Hoon Lee, and Jae-Kuk Kim

Inha University, Korea

3:45PM [WeA2-3] ZVT Interleaved Boost Converter for Fuel Cell Electric Vehicles Using Single Resonant Inductor of Soft Switching Cell for High Power Density

Seung Hyun Kang, Yun Seong Hwang, Man Jae Kwon, and Byoung Kuk Lee

Sungkyunkwan University, Korea

4:10PM [WeA2-4] Leg Integrated Phase Shift Full Bridge Converter with Extended Zero Voltage Switching Range

Jeongjun Seo[1], Jehyun Yi[2], Sunghyuk Choi[1], and Jung-ik Ha[1]

[1]Seoul National University, Korea, [2]SK Signet, Korea

[WeB2] IS: Green Jeju – Towards Carbon Free Island

Room B (Halla Hall B, 3F) **May 24 (Wed.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Joon-Hee Lee** (Korea Institute of Energy Technology, Korea)

2:55PM [WeB2-1] Introduction to CFI Projects to Increase System Flexibility in Jeju Power System
Jeonghoon Shin
Korea Electric Power Corporation, Korea

3:20PM [WeB2-2] Feasibility Test on 3MW Calss Green Hydrogen Water Electrolysis Infrastructure
Ho Min Kim
Jeju Energy Corporation, Korea

3:45PM [WeB2-3] Stategy for Utilizing ESS for The Activation of Wind Power Generation in Jeju Island
Sang Heon Chae
Korea Battery Industry Association, Korea

4:10PM [WeB2-4] LS Electric's Advanced Power Electronics Solutions for a Greener Future
Kiwoo Park
LS Electric, Korea

[WeC2] IS: Latest Advancement in Hardware-In-the-Loop-Simulation Technology I

Room C (Samda Hall A, 3F) **May 24 (Wed.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Yongsug Suh** (Jeonbuk National University, Korea)

2:55PM [WeC2-1] Efficient Models for Power Converters in Real-time Simulation
Jost Allmeling
Plexim, Switzerland

3:20PM [WeC2-2] How to Eatablish Effective and Practical Interface between RTDS and External World
In Kwon Park
RTDS Technologies Inc., USA

3:45PM [WeC2-3] Typhoon HIL – Model-based Test Solutions for Digital Power
Ljubomir Novic
Typhoon HIL, USA

4:10PM [WeC2-4] High-fidelity Real-time Simulation of Dual-active Bridge(DAB) Converter
Yongjin Joo
Realtimewave, Korea

[WeD2] Grid-Forming Converter Technologies : Modeling and Control

Room D (Samda Hall B, 3F) **May 24 (Wed.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Heng Wu** (Aalborg University, Denmark)
Jae-Jung Jung (Kyungpook National University, Korea)

2:55PM [WeD2-1] Adaptive Virtual Synchronous Machine Control for Asynchronous Grid Connections
Felix Wald and Giovanni De Carne
Karlsruhe Institute of Technology, Germany

3:20PM [WeD2-2] An Optimal Design Method to tune Damping Parameters in a Virtual Synchronous Machine
Chaeyoung Jeong[1], Geon Heo[2], and Yongsoon Park[2]
[1]LS Electric, Korea, [2]Gwangju Institute of Science and Technology, Korea

3:45PM [WeD2-3] Active Power Control Strategy for a Virtual Synchronous Machine Under Overload Conditions
Geon Heo[1], Yongsoon Park[1], Kyungkyu Lee[2], and Hoseon Ryu[2]
[1]Gwangju Institute of Science and Technology, Korea, [2]Korea Electric Power Research Institute, Korea

4:10PM [WeD2-4] Performance Evolution of Combined Grid-Forming and Grid-Following Inverters with Different Filtering Mechanisms
Md Nurunnabi, Shuhui Li, Hahnemann Mondal, Yang-Ki Hong, Minyeong Choi, and Hoyun Won
The University of Alabama, USA

[WeE2] Wireless Power Transfer Systems for Evs

Room E (301, 3F) **May 24 (Wed.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Yeonho Jeong** (University of Rhode Island, USA)

2:55PM [WeE2-1] Control and Soft Switching Analysis of a Single-Stage Wireless DC Motor Drive System
Xin Chen, Chi K. Tse, and Chaoqiang Jiang
City University of Hong Kong, Hong Kong

3:20PM [WeE2-2] Analysis and Design of Resonant Compensation Network for Bidirectional Inductive Power Transfer Systems in Electric Vehicles
Won-Jin Son and Byoung Kuk Lee
Sungkyunkwan University, Korea

3:45PM [WeE2-3] Magnetic Characteristics-based Selective Driving Algorithm of IPT EV Systems with DDQ Power Pad for High-Efficiency Operation and Wide Misalignment Tolerance
Hyeonu Jo, Ju-A Lee, Dong Hyeon Sim, Won-Jin Son, and Byoung Kuk Lee
Sungkyunkwan University, Korea

4:10PM [WeE2-4] A Load-Independent ZVS Class-E2 Wireless Power Transfer with Receiver-side Constant-Frequency PWM Power Control
Tomokazu Mishima[1], Shoma Shimizu[1], and Ching-Ming Lai[2]
[1]Kobe University, Japan, [2]National Chung Hsing University, Taiwan

[WeF2] Fault Detection and Tolrence Control for Multilevel Converter

Room F (302, 3F) **May 24 (Wed.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Saeed Peyghami** (Aalborg University, Denmark)
Eui-Cheol Nho (Pukyong National University, Korea)

2:55PM [WeF2-1] A Novel Discontinuous PWM Strategy for Fault Tolerant Control and Neutral Point Voltage Control in T-Type Three-Level Inverter
Xianzhe Pang, Alian Chen, and Xiaoyan Li
Shandong University, China

3:20PM [WeF2-2] A Novel Fault Tolerant Control based on Overmodulation for Three-Phase Cascaded H-Bridge Inverters
Minsol Kim and Youngjong Ko
Pukyong National University, Korea

3:45PM I[WeF2-3] Experimental Investigation and Analytical Modeling of Half-Bridge Switching Losses in Reconfigurable Lithium-Ion Cells
Christian Hanzl[1,2], Julia Stöttner[2], Markus Hölzle[2], and Christian Endisch[2]
[1]Universität der Bundeswehr München, Germany, [2]Technische Hochschule Ingolstadt, Germany

4:10PM [WeF2-4] A Fast and Generalized Space-Vector Modulation Scheme for Cascaded H-bridge Multilevel Converters Under Faulty Conditions
Wanxing Wang, Yan Zhang, Chaomin Xiao, Yang Li, Chaoqun Ma, and Jinjun Liu
Xi'an jiaotong University, China

[WeG2] IS: Cyber and Physical Resiliency of Power Electronic-based Power Systems

Room G (303, 3F) **May 24 (Wed.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Junho Hong** (University of Michigan-Dearborn, USA)

2:55PM [WeG2-1] Secure HVDC Grid Operation and Control Solutions
Reynaldo Nuqui
ABB/Hitachi, USA

3:20PM [WeG2-2] Operational Anomaly Detection System from a Control Center to DER Aggregators
Seong Choi
National Renewable Energy Laboratory, USA

3:45PM [WeG2-3] Distributed Energy Resource (DER) Inverter Cybersecurity Standard/Recommendation, Testing, and Certification
Taesic Kim
Texas A&M University-Kingsville, USA

4:10PM [WeG2-4] Resilient High Power Electric Vehicle (EV) Charging Infrastructure
Junho Hong
University of Michigan-Dearborn, USA

[WeH2] Advanced Motor Drives II

Room H (401, 4F) **May 24 (Wed.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Xiaotao Zhang** (The University of Manchester, UK)
Younghoon Cho (Konkuk University, Korea)

2:55PM [WeH2-1] Sensorless Control for IPMSM in Entire Speed Range based on HF Voltage Signal Injection and Virtual BEMF
Taehyeong Kim, Hwigon Kim, and Seung-Ki Sul
Seoul National University, Korea

3:20PM [WeH2-2] Analysis of Current Control Bandwidth in Current Source Type Motor Emulator
Gensui Tanaka[1], Katsuki Miura[1], Keita Ohata[1], Hitoki Watanabe[1], Jun-ichi Itoh[1], and Ikuya Sato[2]
[1]Nagaoka University of Technology, Japan, [2]Fuji Electric Co., Ltd., Japan

3:45PM [WeH2-3] Estimation Technique for Rotor Time Constant of Induction Machines During I/f Speed Control
Yun-Jai Oh[1], Young-Doo Yoon[1], Chan-Ook Hong[2], and Seung-Cheol Choi[2]
[1]Hanyang University, Korea, [2]LS Electric, Korea

4:10PM [WeH2-4] Modulated Model Predictive Current Control of Four-Switch Voltage Source Inverter-fed Brushless DC Motor
Xuliang Yao, Qi Guan, Hai He, Jingfang Wang, and Ruoqi Gao
Harbin Engineering University, China

[WeI2] Modeling and Control of Electric Machines & Drives

Room I (402, 4F) **May 24 (Wed.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Ton Do** (Nazarbayev University, Kazakhstan)
Young-Doo Yoon (Hanyang University, Korea)

2:55PM [WeI2-1] Reduced Sizing and Control of Shunt Active Power Filter for Rectifier-capacitor Fed Motor Drives Using Conservative Power Theory
Joseph Kiran Banda[1] and Elisabetta Tedeschi[1,2]
[1]Norwegian University of Science and Technology, Norway, [2]University of Trento, Italy

3:20PM [WeI2-2] Analysis of the Radial Suspension Force of the Integrated Winding Bearingless Permanent Magnet Synchronous Motor
Caiquan Wu[1], Weiwei Geng[1], and Yu Wang[2]
[1]Nanjing University of Science and Technology, China, [2]Fudan University, China

3:45PM [WeI2-3] Iterative Learning Control Design of PMSGS for Hybrid Vehicles
Jinuk Kim, Sangsoo Park, Sangyong Kim, Junha Hwang, and Jin-Su Gwon
Hanwha Aerospace, Korea

4:10PM [WeI2-4] Diesel Generator Speed Control based on Variable Forgetting Factor Iterative Learning Method
Manlei Huang and Xinglei He
Harbin Engineering University, China

[WeA3] Soft-switching DC/DC Converters II

Room A (Halla Hall A, 3F) **May 24 (Wed.), 2023 / 4:55PM~6:35PM**

Session Chair(s) **Kai-Jun Pai** (National Taiwan Normal University, Taiwan)
Minsung Kim (Dongguk University, Korea)

4:55PM [WeA3-1] Multi Pulse Controller For Increasing Power Density In Fully Soft-Switching Quasi-Resonant Converters
Kumar Joy Nag and Aleksandar Prodić
University of Toronto, Canada

5:20PM [WeA3-2] Series-Stacked Ripple-Free Resonant DC/DC Converter for Low Voltage Fuel-Cell Applications
Cheol-Hwan Kim[1], Gyeong-Seop Lim[2], Joo-Han Park[2], Muhammad Umer Amjad[1], Minsung Kim[1], and Sang-Won Lee[2]
[1]Dongguk University, Korea, [2]Kongju National University, Korea

5:45PM [WeA3-3] Phase-Shifted Full-Bridge Converter with an Improved Coupled Inductor Rectifier
Jae-Hyun Ahn and Jae-Kuk Kim
Inha University, Korea

6:10PM [WeA3-4] A Control Method of Two-Switch Forward Converter for High Efficiency Under Light Load Conditions
Donghyeon Yu, Dongmin Choi, Jaeho Kim, Jihun Bang, and Gun-Woo Moon
Korea Advanced Institute of Science and Technology, Korea

[WeB3] IS: Transportation Electrification

Room B (Halla Hall B, 3F) **May 24 (Wed.), 2023 / 4:55PM~6:35PM**

Session Chair(s) **Luciana Caminha Afonso** (Infineon Technologies, Germany)

4:55PM [WeB3-1] The Promise of Integrated Modular Motor Drives in Future Electrified Aircraft Propulsion Systems
Thomas M. Jahns
University of Wisconsin – Madison, USA

5:20PM [WeB3-2] Vehicle Electrification; Traction Inverter and Its Thermal Management
Ayush Lal
Aptiv, USA

5:45PM [WeB3-3] Electrification of Heavy Duty Vehicles – A Lifetime Challenge
Luciana C. Afonso
Infineon Technologies, Germany

6:10PM [WeB3-4] Power Master Semiconductor's SiC Products Development & Performance Benchmark
Jaegil Lee
Power Master Semiconductor, Korea

[WeC3] IS: Latest Advancement in Hardware-In-the-Loop-Simulation Technology II

Room C (Samda HallA, 3F) **May 24 (Wed.), 2023 / 4:55PM~6:10PM**

Session Chair(s) **Yongsug Suh** (Jeonbuk National University, Korea)

4:55PM [WeC3-1] Real-World Applications of PHIL Testing with Dynamic Motor Emulator
Yong-Cheol Kwon
PLECKO Co., Ltd., Korea

5:20PM [WeC3-2] An Integrated HILs Environment to Support Research Advancement
Hyeoncheol Park
Storm Solutions, Korea

5:45PM [WeC3-3] Overview of P-HILS: Key Components and Use Cases
Daesu Han
WithBEER Co., Ltd., Korea

[WeD3] Grid-Forming Converter Control

Room D (Samda Hall B, 3F) **May 24 (Wed.), 2023 / 4:55PM~6:35PM**

Session Chair(s) **Heng Wu** (Aalborg University, Denmark)
Shenghui Cui (Seoul National University, Korea)

4:55PM [WeD3-1] Seamless Transitions Between Grid-Following and Grid-Forming Control: A Novel Switching Method
Xian Gao, Dao Zhou, Amjad Anvari-Moghaddam, and Frede Blaabjerg
Aalborg University, Denmark

5:20PM [WeD3-2] Optimization Strategy of VSG Active Power Fast Tracking Control based on Power Command Feedforward Compensation
Haizhen Xu[1], Changzhou Yu[1], Chen Chen[1], Hong Zhu[2], Binglei Lu[1], Qinglong Wang[1], and Fudong Nian[1]
[1]Hefei University, China, [2]China Energy Engineering Group Anhui Electric Power Design Institute Co. Ltd., China

5:45PM [WeD3-3] Asymmetric Virtual Impedance for Improving Transient Stability of Grid-Forming Inverters based on Virtual Reluctance Torque
Zhaoyue Zou[1], Chao Wu[1], Yong Wang[1], Yu Lu[2], Qiang Zou[2], and Nannan Wang[2]
[1]Shanghai Jiao Tong University, China, [2]NR Electric Co., Ltd., China

6:10PM [WeD3-4] Development of a Multi-Parallel Inverter with Grid-forming Capability for a Power-to-gas System
Gedeon Rusatira[1,2], Gawoo Park[2], and Kyungsoo Lee[1]
[1]Tech University of Korea, Korea, [2]G-Philos Co., Ltd., Korea

[WeE3] Power Devices Modeling and Applications

Room E (301, 3F) **May 24 (Wed.), 2023 / 4:55PM~6:35PM**

Session Chair(s) **Jongwon Choi** (Hannam University, Korea)

4:55PM [WeE3-1] Wide Bandwidth Current Sensors and the Influence on the Switching Loss Characterization
Philipp Ziegler, Jan Linzmaier, Jörg Haarer, Philipp Marx, Mattea Eckstein, and Jörg Roth-Stielow
University of Stuttgart, Germany

5:20PM [WeE3-2] High-Voltage (8.5 kV) Asymmetric IGCT for MVD and HVDC Applications
U. Vemulapati[1], D. Johannesson[2], T. Wikström[1], T. Stiasny[1], C. Corvace[1], and C. Winter[1]
[1]Hitachi Energy, Switzerland, [2]Hitachi Energy, Sweden

5:45PM [WeE3-3] Fast Voltage-Dip Detection Method With Single-Phase PLL in Bidirectional Battery Charger for EVs
Fuka Ikeda[1], Shun Okamoto[1], Masayuki Okamoto[1], Hiroaki Yamada[2], and Toshihiko Tanaka[2]
[1]Ube College, Japan, [2]Yamaguchi University, Japan

6:10PM [WeE3-4] Influence of Gate to Emitter Voltage on the IGBT Fault Current Interruption Capabilities in a Hybrid DC Breaker
Waqas Ali[1], Ara Bissal[2], and Martin März[1]
[1]Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany, [2]Huawei Technologies Düsseldorf, Germany

[WeF3] Big Data and Machine Learning Applications - Battery & WPT

Room F (302, 3F) **May 24 (Wed.), 2023 / 4:55PM~6:35PM**

Session Chair(s) **Tomokazu Mishima** (Kobe University, Japan)
Eunsoo Lee (Hanyang University, Korea)

4:55PM [WeF3-1] Online Battery Data Analytics Pipeline Using Bigdata Tools for Electric Vehicles
Alve Akash[1], Divya Yendluri[1], Joonchul Kim[2], Taesic Kim[1], Eunsong Kim[2], Jung-Hwan Park[2], Kyoung-Tak Kim[2], Joung-Hu Park[2], and Kyoungmin Min[2]
[1]Texas A&M University-Kingsville, USA, [2]Soongsil University, Korea

5:20PM [WeF3-2] State of Charge Estimation of Lithium Iron Phosphate Battery Using Bidirectional Long Short-Term Memory
Daeung Jeong, Jongwook Park, Yohan Jang, and Sungwoo Bae
Hanyang University, Korea

5:45PM [WeF3-3] Magnetics Design Optimization for LLC Converter Employing Machine Learning
Nguyen Tan Tung, Man-Hay Pong, and Huang-Jen Chiu
National Taiwan University of Science and Technology, Taiwan

6:10PM [WeF3-4] EV Wireless Power Transfer Core Design for High Magnetic Coupling Designed by Reinforcement Learning
Min S. Jeong, Ki H. Pyo, Jin H. Jang, and Eun S. Lee
Hanyang University, Korea

[WeG3] OS: Wireless Power Transfer Technologies

Room G (303, 3F) **May 24 (Wed.), 2023 / 4:55PM~6:35PM**

Session Chair(s) **Sen-Tung Wu** (National Formosa University, Taiwan)
Huang-Jen Chiu (National Taiwan University of Science and Technology, Taiwan)

4:55PM [WeG3-1] A Comparative Study of Compensation Topologies for Capacitive Power Transfer based on Sensitivity Analysis
Ying Liu[1], Xiaolu Lucia Li[2], Chi K. Tse[2], and Chunbo Zhu[1]
[1]Harbin Institute of Technology, Korea, [2]City University of Hong Kong, Hong Kong

5:20PM [WeG3-2] A New Dual-Active Single-Ended 6kW Bidirectional WPT Systems with Phase-Shift Control Methods for Vehicle to Homes
H. Omori[1], M. Tsuno[2], and T. Mishima[1]
[1]Kobe University, Japan, [2]Nichicon Co., Ltd., Japan

5:45PM [WeG3-3] An Intelligent Renewable Energy Distribution Strategy for Off-line Fare Meter
Sen-Tung Wu[1], Yong-Ye Lin[1], Feng-Chen Wu[1], Pin-He Liu[2], Yen-Chih Liu[2], and Ching-Chun Chuang[1]
[1]National Formosa University, Taiwan, [2]Far Easy Pass Ltd., Taiwan

6:10PM [WeG3-4] Design of Battery Charger with USB Type-C Power Delivery Interface
Thanh Nhat Trung Tran, Jian-Min Wang, Ching-Chun Chuang, and Sen-Tung Wu
National Formosa University, Taiwan

[WeH3] Capacitive Component Design and Analysis

Room H (401, 4F) **May 24 (Wed.), 2023 / 4:55PM~6:35PM**

Session Chair(s) **Hong-Je Ryoo** (Chung-Ang University, Korea)

4:55PM [WeH3-1] Resonance Type Auto Bias Electrical Variable Capacitor with Improved Switch Reliability for 13.56MHz RF Plasma System
Juhwa Min[1], Heewon Choi[2], and Yongsug Suh[2]
[1]MKS Power Solutions Asia, Korea, [2]Jeonbuk National University, Korea

5:20PM [WeH3-2] Ecap-less 800V On-board Battery Charger based on Unbalanced Half-bridge Split Capacitors Power Decoupling Circuit
Tuyen D. Nguyen[1,2], Long Nguyen[1,2,4], Dong Tran[4], Ravi Nath Tripathi[3], and Hai N. Tran[4]
[1]Ho Chi Minh City University of Technology, Vietnam, [2]Vietnam National University Ho Chi Minh City, Vietnam, [3]Kyoto University of Advanced Science, Japan, [4]XEVTECH Co., Ltd., Vietnam

5:45PM [WeH3-3] Electrical Variable Capacitor for RF Plasma Systems with a Short Capacitance Variable Time
Hong-Min Kim, Cheong-Hyeon Hwang, and Cheon-Yong Lim
Jeonbuk National University, Korea

6:10PM [WeH3-4] Impact of Junction Capacitor and Transfer Characteristic on EMI Prediction
Wenxia Chen, Wenjie Chen, Pengyuan Ren, and Rui Cheng
Xi'an jiaotong University, China

[WeI3] Control of Grid-Connected Converters

Room I (402, 4F) **May 24 (Wed.), 2023 / 4:55PM~6:35PM**

Session Chair(s) **Kan Akatsu** (Yokohama National University, Japan)
Gab-Su Seo (National Renewable Energy Laboratory, USA)

4:55PM [WeI3-1] System Identification of the LCL Filter Parameters in Grid-Tied Voltage Source Inverters
Salman Ahmadi and Brendan Peter McGrath
RMIT University, Australia

5:20PM [WeI3-2] Advanced Voltage Support Control Method in Grid-connected 3-level NPC Converter Under Grid Fault Conditions
Jaehoon Choi and Yongsug Suh
Jeonbuk National University, Korea

5:45PM [WeI3-3] Consideration of Control-Loop Interaction in Transient Stability of Grid-Following Inverters Using Bandwidth Separation Method
Yifan Zhang[1], Yitong Li[2], Yunjie Gu[1], and Timothy C. Green[1]
[1]Imperial College London, UK, [2]Xi'an Jiaotong University, China

6:10PM [WeI3-4] Dynamic Voltage Control of Converters with LC-filters Using Model Predictive Control: Impacts on Grid-Forming and Grid-Following Control
Min Jeong and Jürgen Biela
ETH Zurich, Switzerland

[ThA1] Resonant DC/DC Converters II

Room A (Halla Hall A, 3F) May 25 (Thu.), 2023 / 8:30AM~10:35AM

Session Chair(s) **Tuyen Dinh Nguyen** (Ho Chi Minh City University of Technology, Vietnam)
Mina Kim (Korea Electronics Technology Institute, Korea)

8:30AM [ThA1-1] Research on An Interleaved Phase-Shift Half-Bridge LLC Resonant Converter
Shu-Po Wang[1], Min-Rui Hong[1], Ping-Tsang Wu[1], Ching-Chun Chuang[1], and Shiue-Der Lu[2]
[1]National Formosa University, Taiwan, [2]National Chin-Yi University of Technology, Taiwan

8:55AM [ThA1-2] A Natural Current Sharing in LLC Resonant Converter and Analysis of the Current Sharing Error
Taewoo Kim, Jeongchan Park, Donghyeon Yu, Joonsu Kim, and Gun-Woo Moon
Korea Advanced Institute of Science and Technology, Korea

9:20AM [ThA1-3] Multi-Phase Reconfigurable LLC Resonant Converter with Passive Current Balancing and Wide Voltage Gain Range
Yuta Arakawa and Masatoshi Uno
Ibaraki University, Korea

9:45AM [ThA1-4] High Step-Up Ripple-Free Resonant DC/DC Converter Without Auxiliary Inductor
Tsegaab Alemayehu Wagaye[1], Hamid Raheem[1], Changkyu Bai[2], Dongok Moon[2], An-Yeol Jung[2], and Minsung Kim[1]
[1]Dongguk University, Korea, [2]Mando, Korea

10:10AM [ThA1-5] Design of A Second Harmonic Current based High Step-down 48V-to-1V Resonant DC-DC Converter
Ziheng Liu[1], Jinyan Wang[1], Ju Gao[1], Jiayin He[1], Chengyu Huang[1], Xin Wang[1], Chen Wang[1], Bin Zhang[1], Yandong He[1], and Yong Xie[2]
[1]Peking University, China, [2]Dongke Semiconductor Co., Ltd., China

[ThB1] IS: Power Electronics in Home Appliance & Air Solution

Room B (Halla Hall B, 3F) May 25 (Thu.), 2023 / 8:30AM~10:35AM

Session Chair(s) **Sangyoung Kim** (LG Electronics, Korea)

8:30AM [ThB1-1] An Overview of Power Conversion Technology in Home Appliances
Seong-chon Choi
LG Electronics, Korea

8:55AM [ThB1-2] Power Electronics Technologies in the Air Solution Industry
Sehwa Choe
LG Electronics, Korea

9:20AM [ThB1-3] Design of High Efficiency Permanent Magnet Synchronous Motor for Air Solution Industry
Jae-Han Sim
LG Electronics, Korea

9:45AM [ThB1-4] Prediction of Noise and Vibration Induced by Electromagnetic Force Considering with Static and Dynamic Eccentricity
Junggu Lee
LG Electronics, Korea

10:10AM [ThB1-5] Motor Design and Direction of Low Vibration and Low Noise Design
Gyeongjae Park
LG Electronics, Korea

[ThC1] Reliability in Power Electronics System I

Room C (Samda Hall A, 3F) May 25 (Thu.), 2023 / 8:30AM~10:35AM

Session Chair(s) **Hidemine Obara** (Yokohama National University, Japan)
Ui-Min Choi (Seoul National University of Science and Technology, Korea)

8:30AM [ThC1-1] Degradation Diagnosis During Active Power Cycling via Frequency-Domain Thermal Impedance Spectroscopy
Sven Kalker[1], Johannes Holz[2], Isabel Austrup[1], and Rik W. De Doncker[1]
[1]RWTH Aachen University, Germany, [2]Fraunhofer Institute for Structural Durability and System Reliability, Germany

8:55AM [ThC1-2] Influence of Temperature on Bond Wire Fatigue of Gate Loops in IGBT Modules under Sinusoidal Vibration Stress
Cao Zhan[1], Yaxin Zhang[1], Yizheng Tang[1], Francesco Iannuzzo[2], Lingyu Zhu[1], Shengchang Ji[1], and Frede Blaabjerg[2]
[1]Xi'an Jiaotong University, China, [2]Aalborg University, Denmark

9:20AM [ThC1-3] Real-time Temperature Estimation of SiC MOSFETs Using Gate Voltage at Zero-current Switching for Inverter Applications

Raul R. Rodriguez G., Mahfuzul Islam, Takashi Hisakado, and Osami Wada

Kyoto University, Japan

9:45AM [ThC1-4] Verification of Hygrothermal Simulations Using Silicone Encapsulated Climate Sensors in Continuously Operated IGBT Power Modules

Sören Fröhling[1,2], Benedikt Kostka[1], Johannes C. Wenzel[1], Katharina Fischer[2], Jan-Hendrik Peters[3], Michael Hanf[3], Christian Zorn[2], Kirsten Dehning[4], Stefan Zimmermann[4], Nando Kaminski[3], and Axel Mertens[1]

[1]University Hannover, Germany, [2]Fraunhofer Institute for Wind Energy Systems, Germany, [3]University of Bremen, Germany, [4]Leibniz University Hannover, Germany

10:10AM [ThC1-5] Analysis of Overcurrent Protection for Topology Morphing LLC Converters by Diode Clamping Applicable to EV Chargers

Jiho Kwak, Ki-Bum Park, and In Gwun Jang

Korea Advanced Institute of Science and Technology, Korea

[ThD1] Applications in Energy Storage System

Room D (Samda Hall B, 3F) **May 25 (Thu.), 2023 / 8:30AM~10:35AM**

Session Chair(s) **Sang-Won Lee** (Kongju National University, Korea)
Byeongcheol Han (Kyungpook National University, Korea)

8:30AM [ThD1-1] Seamless Mode Transfer Control Strategy of Two-stage Energy Storage Converter Under Time-sharing Operation Mode

Xiao Zhang, Yueqian Bai, Ya Wen, Zhenxiong Wang, Hao Yi, and Fang Zhuo

Xi'an Jiaotong University, China

8:55AM[ThD1-2] A Nonlinear Droop Control for Supercapacitor-Hybrid Uninterruptible Power Supplies in DC Microgrids

Seung-Hyun Choi[1], Jae-Sang Kim[1], Jongyoon Chae[2], Juyeon Sim[1], and Gun-Woo Moon[1]

[1]Korea Advanced Institute of Science and Technology, Korea, [2]Hyundai Motor Company, Korea

9:20AM [ThD1-3] SiC Power Module and PCS for Commercial ESS

Xuancai Zhu[1], Tao Wang[2], Xiaoyu Jia[1], Bin Qi[1], Zhi Yang[1], and Yuming Zhang[1]

[1]Wanbang Digital Energy Co., Ltd., China, [2]Suzhou Sizhi Technology Co., Ltd., China

9:45AM [ThD1-4] Closed-loop Control of MOSFET Gate Voltage for Charge Balance in a Smart Li-ion Battery Cell

Abhijit Kulkarni and Remus Teodorescu

Aalborg University, Denmark

10:10AM [ThD1-5] A Distribution of Relaxation Time Approach on Equivalent Circuit Model Parameterization to Analyse Li-ion Battery Degradation

E. Aguilar Boj[1], S. Azizighalehsari[1], P. Venugopal[1], G. Rietveld[1,2], and T. Batista Soeiro[1]

[1]University of Twente, The Netherlands, [2]VSL, The Netherlands

[ThE1] Power Converters and Motor Drives for Electric Vehicles

Room E (301, 3F) **May 25 (Thu.), 2023 / 8:30AM~10:35AM**

Session Chair(s) **Thomas Jahns** (University of Wisconsin-Madison, USA)
Hong-Je Ryoo (Chung-Ang University, Korea)

8:30AM [ThE1-1] Study on Traction Control in 4-wheel Drive Electric Vehicle Using a Driving Simulator

Michinao Saito, Kantaro Yoshimoto, and Tomoki Yokoyama

Tokyo Denki University, Japan

8:55AM [ThE1-2] An Assist Control Using an Electric Motor for One-wheel Cart

Tatsuhiko Tobari, Kantaro Yoshimoto, and Tomoki Yokoyama

Tokyo Denki University, Japan

9:20AM [ThE1-3] Parameter Optimization of Spread Spectrum Modulation to Minimize EMI Filter for Interleaved Totem-Pole PFC Converters

Jiho Song[1], Chang-Yeob Chu[1], Youngseok Lee[1], Dong-In Lee[2], Han-Shin Youn[2], and Ki-Bum Park[1]

[1]Korea Advanced Institute of Science and Technology, Korea, [2]Incheon National University, Korea

9:45AM [ThE1-4] A Study of Non-Isolated Resonant Step-Down Converter with Peak Charge Control for High Power Density

Chang-Yeob Chu[1], Youngseok Lee[1], Sangcheol Moon[2], and Ki-Bum Park[1]

[1]Korea Advanced Institute of Science and Technology, Korea, [2]Samsung Electronics, Korea

10:10AM [ThE1-5] Open-circuit Fault Diagnosis and Fault-tolerant Control Strategy for Parallel Three-phase Rectifiers

Pengcheng Han[1], Ying Lou[1], Lijuan Zhang[1], Yanbo Wang[2], and Li Zeng[3]

[1]Luoyang Institute of Science and Technology, China, [2]Aalborg University, Denmark, [3]Southwest Jiaotong University, China

[ThF1] DC Power Systems (HVDC,MVDC,LVDC)

Room F (302, 3F) **May 25 (Thu.), 2023 / 8:30AM~10:10AM**

Session Chair(s) **Jian Sun** (Rensselaer Polytechnic Institute, USA)
Dongsul Shin (Korea Electrotechnology Research Institute, Korea)

8:30AM [ThF1-1] Open-Circuit Fault Diagnosis for CPS-PWM-based Modular Multilevel Converters with Reduced Voltage Sensors

J. Gong[1], S. Yang[1], H. Sun[1], H. Wang[1], F. Zhuang[1], Y. Tang[2], and P. Wang[2]
[1]Southwest Jiaotong University, China, [2]Nanyang Technological University, Singapore

8:55AM [ThF1-2] Analysis of Cooperative Droop Characteristics on Plug-and-Play DC Distribution System Across Multi Level Virtual Conductor

Yasushi Eto[1], Yuichi Noge[1], Masahito Shoyama[1], and Tadatoshi Babasaki[2]
[1]Kyushu University, Japan, [2]NTT Facilities, Inc., Japan

9:20AM [ThF1-3] Wireless Distributed Control with Open-Phase Fault-Tolerance for Delta-Connected Three-Phase Three-Wire Solid-State Transformers

Keita Ohata, Koki Yamanokuchi, and Jun-ichi Itoh
Nagaoka University of Technology, Japan

9:45AM [ThF1-4] Decoupled Sequential Power Flow Study in MT-MVDC Distribution Systems based on Novel NR/ Estimation-Correction Algorithm

Pingyang Sun[1], Rongcheng Wu[2], Gen Li[3], Muhammad Khalid[4], Graham Town[5], and Georgios Konstantinou[1]
[1]The University of New South Wales, Australia, [2]University of Technology Sydney, Australia, [3]Technical University of Denmark, Denmark, [4]King Fahd University of Petroleum & Minerals, Saudi Arabia, [5]Macquarie University, Australia

[ThG1] OS: Advanced Technologies for High Power Density Converters

Room G (303, 3F) **May 25 (Thu.), 2023 / 8:30AM~10:10AM**

Session Chair(s) **Junichi Itoh** (Nagaoka University of Technology, Japan)
Keiji Wada (Tokyo Metropolitan University, Japan)

8:30AM [ThG1-1] Modeling and Design of High-Frequency Magnetic Components with Large Air Gaps for Electric Vehicle Charger Application

Zheyuan Yi, Zengyang Liu, Kai Sun, and Xi Xiao
Tsinghua University, China

8:55AM [ThG1-2] Circuit and Control Scheme of Converter-Based Emulation for Control Testing of AC Microgrid

Jiashi Wang[1], Ke Ma[1], Tingting Liu[2], Siyu Cao[1], Kejing Liang[1], Shaolun Xu[1], and Xu Cai[1]
[1]Shanghai Jiao Tong University, China, [2]Shanghai University, China

9:20AM [ThG1-3] High-Performance Driving of SiC MOSFETs to Implement Short-Time Operation for Inverter Circuits

Shin-Ichiro Hayashi[1] and Keiji Wada[2]
[1]Chiba Institute of Technology, Japan, [2]Tokyo Metropolitan University, Japan

9:45AM [ThG1-4] Switched Flyback PFC Converter for Wide AC Input Voltage Range

Yuki Kawai, Naoto Kikuchi, Hiroki Watanabe, Keisuke Kusaka, and Jun-ichi Itoh
Nagaoka University of Technology, Japan

[ThH1] OS: Power Electronics for Renewable Energy Grid Integration and Control

Room H (401, 4F) **May 25 (Thu.), 2023 / 8:30AM~10:35AM**

Session Chair(s) **Shinzo Tamai** (TMEIC, Japan)
Gab-Su Seo (National Renewable Energy Laboratory, USA)

8:30AM [ThH1-1] Adjusting the Number of In-use Cells for Higher Efficiency of A DC Solid State Transformer

Haoyuan Weng, Yongshan Jiang, Min Chen, and Dehong Xu
Zhejiang University, China

8:55AM [ThH1-2] A Single-Stage Soft-Switched LVDC to Three-Phase MVAC Converter for MV Grid Integration of Utility-Scale Solar PV

Surjakanta Mazumder[1], Anirban Pal[2], and Kaushik Basu[1]
[1]Indian Institute of Science, India, [2]GE Aerospace, India

9:20AM [ThH1-3] Design Guideline for PWM Converter Implementing Periodic VSFPWM - A Comprehensive Analysis on the Harmonics Spectrum

Yang Wu[1], Zian Qin[1], Thiago Bastia Soeiro[2], and Pavol Bauer[1]
[1]Delft University of Technology, The Netherlands, [2]University of Twente, The Netherlands

9:45AM [ThH1-4] Novel Hybrid Current Limiter for Grid-Forming Inverter Control During Unbalanced Faults

Nathan Baeckeland and Gab-Su Seo
National Renewable Energy Laboratory, USA

10:10AM [ThH1-5] Universal Passive Synchronization Method for Grid-Forming Inverters without Mode Transition
Heather Chang[1], Nathan Baeckeland[1], Abhishek Banerjee[2], and Gab-Su Seo[1]
[1]National Renewable Energy Laboratory, USA, [2]Siemens, USA

[ThA2] Isolated DC/DC Converters I

Room A (Halla Hall A, 3F) **May 25 (Thu.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Yu-Chen Liu** (Taipei Tech National Taipei University of Technology, Taiwan)
Jee-Hoon Jung (Ulsan National Institute of Science and Technology, Korea)

2:55PM [ThA2-1] Derivation of Isolated Outputs from a Boost and Buck-Boost Topology
Debjit Rana and Santanu K. Mishra
Indian Institute of Technology Kanpur, India

3:20PM [ThA2-2] A Bidirectional Hybrid DC Transformer with High Power Transmission
Yilun Zhang, Xiaodong Zhao, Binbin Li, and Dianguo Xu
Harbin Institute of Technology, China

3:45PM [ThA2-3] A Reconfigurable Phase-Shift Full-Bridge Converter for the Wide Output Voltage EV Charging Application
Dingsihao Lyu[1], Thiago Batista Soeiro[2], and Pavol Bauer[1]
[1]Delft University of Technology, The Netherlands, [2]University of Twente, The Netherlands

4:10PM [ThA2-4] Current Source High Step-Up Push-Pull Resonant Converter for Low Wide-Input Source based on Front-End Photovoltaic Cells Application
P. Prakaivichien[1], C. Ekkaravarodome[2], and A. Bilsalam[1]
King Mongkut's University of Technology North Bangkok, Thailand

[ThB2] IS: Technolgy for LVDC distribution in the Commercial Building and Intelligent Shipboard Protection System

Room B (Halla Hall B, 3F) **May 25 (Thu.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Young Ho Park** (HD Hyundai Electric, Korea)

2:55PM [ThB2-1] Development of the AC/DC Converter for 1MW LVDC Converter Station
Seong-Yong Lee
HD Hyundai Electric, Korea

3:20PM [ThB2-2] Application of the Triple Active Bridge based DC-DC Converter in the LVDC Distribution
Seung-Ho Lee
HD Hyundai Electric, Korea

3:45PM [ThB2-3] Protection Strategies and System Engineering for the LVDC Distribution System
Jong-Hyun Lee
HD Hyundai Electric, Korea

4:10PM [ThB2-4] Intelligent Protection Scheme for Closed-Bus Operation on Dynamic Positioning Vessels
Seongil Kim
HD Hyundai Electric, Korea

[ThC2] Reliability in Power Electronics System II

Room C (Samda Hall A, 3F) **May 25 (Thu.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Ke Ma** (Shanghai Jiao Tong University, China)
Eunsoo Lee (Hanyang University, Korea)

2:55PM [ThC2-1] Effect of Operating Conditions on Condition Monitoring of Power Electronic Converters and a Review of Normalization Schemes
Prasanth Sundararajan, Marif Daula Siddique, and Sanjib Kumar Panda
National University of Singapore, Singapore

3:20PM [ThC2-2] DC-link Capacitance Estimation based on Discharge Profile of Inverter for EV Application
Xing Wei[1], Yingzhou Peng[2], Bo Yao[1], and Huai Wang[1]
[1]Aalborg University, Denmark, [2]Hunan University, China

3:45PM [ThC2-3] Optimal Modulation Method for Reducing Ripple Current and Power Loss of DC-link Capacitor in Multi-drive Systems
Bo Yao[1], Zhongting Tang[1], Dinesh Kumar[2], Haoran Wang[3], and Huai Wang[1]
[1]Aalborg University, Denmark, [2]Danfoss Drives A/S, Denmark, [3]Three Gorges Intelligent Industrial Control Technology Co., Ltd., China

4:10PM [ThC2-4] Evaluation of Arm Reliability in Modular Multilevel Converters with Multiple Sub-modules for MVDC Applications
Yumeng Tian and Georgios Konstantinou
The University of New South Wales, Australia

[ThD2] Battery Manegment System II

Room D (Samda Hall B, 3F) **May 25 (Thu.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Woojin Choi** (Soongsil University, Korea)

2:55PM [ThD2-1] Real-time OCV and Capacity Estimation Algorithm for Reusable Lithium-ion Battery without Pre-experiment

Jong-Hun Lim, Je-Yeong Lim, Hyeon-Ho Lee, Eui-Seong Han, Dong Hwan Kim, and Byoung Kuk Lee

Sungkyunkwan University, Korea

3:20PM [ThD2-2] A High-Speed Measurement Technique for the Ohmic Resistance of Lithium-Ion Batteries

Muhammad Sheraz and Woojin Choi

Soongsil University, Korea

3:45PM [ThD2-3] Statistical Post-Processing in Ensemble Learning-based State of Health Estimation for Lithium-Ion Batteries

Xin Sui, Shan He, and Remus Teodorescu

Aalborg University, Denmark

4:10PM [ThD2-4] SOH Estimation Method for Lithium-ion Batteries based on Partial Charging Voltage Segments

Xinwei Liu[1], Kai Lyu[1], Siwen Chen[1], Yilong Guo[1], Shiyou Xing[1], Di Wang[2], and Jinlei Sun[1]

[1]Nanjing University of Science and Technology, China, [2]State Grid Harbin Power Supply Company, China

[ThE2] On-Board & Fast Chargers for Electric Vehicles

Room E (301, 3F) **May 25 (Thu.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Cheonyong Lim** (Jeonbuk National University, Korea)
Byoung Kuk Lee (Sungkyunkwan University, Korea)

2:55PM [ThE2-1] High Efficiency and High-Power Quality Modulation Strategy for Single-Stage Electrolytic Capacitor-less On-board EV Charger

Million Gerado Geda, Tat-Thang Le, Sunju Kim, Kihoon Kim, Huu-Phuc Kieu, and Sewan Choi

Seoul National University of Science and Technology, Korea

3:20PM [ThE2-2] An Isolated Grid-Connected Charger with Reduced DC-Link Capacitor and Grid Filter Requirement

Chandrima Chatterjee[1], Shova Neupane[2], Soumya Shubhra Nag[1], Anandarup Das[1], William Greenbank[2], Luciana Tavares[2], and Thomas Ebel[2]

[1]Indian Institute of Technology Delhi, India, [2]University of Southern Denmark, Denmark

3:45PM [ThE2-3] High Efficiency Dual-Bridge LLC Resonant Converter with Adaptive Frequency Control for On-Board Charger Applications

Tuyen D. Nguyen[1,2], Trinh Nguyen[1,2], Ravi Nath Tripathi[3], Long H. B. Nguyen[4], Minh V. Vo[4], and Hai N. Tran[4]

[1]Ho Chi Minh City University of Technology, Vietnam, [2]Vietnam National University Ho Chi Minh City, Vietnam, [3]Kyoto University of Advanced Science, Japan, [4]XEVTECH Co., Ltd., Vietnam

4:10PM [ThE2-4] Power Sharing based Control Strategy for a 350 kW Multiport EV Charging System

Abhijit Choudhury, Yuichi Mabuchi, and Kimihisha Furukawa

Hitachi Ltd., Japan

[ThF2] OS: High-frequency Power Converters for Emerging Applications

Room F (302, 3F) **May 25 (Thu.), 2023 / 2:55PM~4:10PM**

Session Chair(s) **Jungwon Choi** (University of Minnesota Twin Cities, USA)
Euihoon Chung (Myongji University, Korea)

2:55PM [ThF2-1] High Efficiency High Power Density Cellular 1MHz 380V-12V DCX for Future Data Centers

Guangcan Li[1], Yue Han[2], and Xinke Wu[1]

[1]Zhejiang University, China, [2]Beijing Institute of Spacecraft System Engineering, China

3:20PM [ThF2-2] Design and Analysis of Active Class-E Rectifier with Variable Resonant Capacitor Cell

Gyu Cheol Lim, Gwangyol Noh, and Jung-Ik Ha

Seoul National University, Korea

3:45PM [ThF2-3] Digital Control of Bidirectional Class-E2 Converter with Dual ON-OFF Frequencies and Phase Shifts for Energy Storage Applications

Kamlesh Sawant and Jungwon Choi

University of Minnesota Twin Cities, USA

[ThG2] Other and Emerging Topics in Power Electronics I

Room G (303, 3F) **May 25 (Thu.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Sanjib Kumar Panda** (National University of Singapore, Singapore)
Chang-Yeol Oh (Korea Electrotechnology Research Institute, Korea)

2:55PM [ThG2-1] An Overview of Power Conversion Systems in Contemporary Grid-Interactive Efficient Buildings (GEBs)

Jaydeep Saha, Marif Daula Siddique, Prasanth Sundararajan, and Sanjib Kumar Panda

National University of Singapore, Singapore

3:20PM [ThG2-2] A Power-Control based Transactive Energy Mechanism for HVACs in Grid-Interactive Buildings
Ramanand Kaippilly Radhakrishnan[1], Thang Ka Fei[2], Jaydeep Saha[1], and Sanjib Kumar Panda[1]
[1]National University of Singapore, Singapore, [2]Asia Pacific University, Malaysia

3:45PM [ThG2-3] Regenerative Loading Method Used for Heavy Load Measurement and Burn-in Testing
Fritz Cyrill Gonzales[1,2] and Lew Andrew Tria[1]
[1]University of the Philippines Diliman, Philippines, [2]Analog Devices General Trias, Philippines

4:10PM [ThG2-4] A Novel Power Measurement Method Using Lock-in Amplifiers with a Frequency-Locked-Loop
Abdur Rehman, Kangcheol Cho, Hamid Ali, and WoojinChoi
Soongsil University, Korea

[ThH2] Control of Motor Drives for Electric Vehicle

Room H (401, 4F) **May 25 (Thu.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Koji Orikawa** (Hokkaido University, Japan)
Young-Doo Yoon (Hanyang University, Korea)

2:55PM [ThH2-1] Full Torque Operation Range Fault-Tolerant Control with Minimum Copper Loss for Dual Three-Phase PMSM
Haolin Zheng, Xiaoze Pei, and Chris Brace
University of Bath, UK

3:20PM [ThH2-2] Performance Comparison of Long-Horizon FCS-MPC for IPMSM Considering THDi and Inverter Loss
Jongseok Kim[1], Youngseok Lee[1], Kyunghwan Choi[2], Jiho Song[1], and Ki-Bum Park[1]
[1]Korea Advanced Institute of Science and Technology, Korea, [2]Gwangju Institute of Science and Technology, Korea

3:45PM [ThH2-3] Parameter-Free Predictive Current Control for Open-Winding Permanent Magnet Linear Synchronous Machine Drives
Chenwei Ma, Wensheng Song, Ping Yang, Rong Feng, Jiayao Li, and Li Huang
Southwest Jiaotong University, China

4:10PM [ThH2-4] Modulated Model Predictive Control of Fault-Tolerant PMSM Drives with Four Switches
Seungil Choi, Taehoon Chin, Byungju Bae, Jinhyuk Heo, and Younghoon Cho
Konkuk University, Korea

[ThI2] Test and Control based on HILS

Room I (402, 4F) **May 25 (Thu.), 2023 / 2:55PM~4:35PM**

Session Chair(s) **Chao Wu** (Shanghai Jiaotong University, China)
Suyong Chae (Pohang University of Science and Technology, Korea)

2:55PM [ThI2-1] HILS Validation of Integral Super Twisting Sliding Mode Control for Induction Motor Drive with Thermal Model Coupling
Hamza Ahmad[1], Irfan Sami[2], Trung-Kien Vu[2], Dong-Hyun Lim[2], and Ki-Bum Park[1]
[1]Korea Advanced Institute of Science and Technology, Korea, [2]Milim Syscon Co., Ltd., Korea

3:20PM [ThI2-2] When FPGAs Meet ADMM with High-level Synthesis (HLS): A Real-time Implementation of Long-horizon MPC for Power Electronic Systems
Min Jeong, Manuel Schoen, and Jürgen Biela
ETH Zurich, Switzerland

3:45PM [ThI2-3] Effective Test Method of QAB Converter-Based LVDC Distribution System Using Power HIL Simulation Test-bed
Jae-Wook Lim, Kyung-Wook Heo, and Jee-Hoon Jung
Ulsan National Institute of Science and Technology, Korea

4:10PM [ThI2-4] Study on Impedance Measurement Device for Grid-Connected Converters based on Model Predictive Control
Yihan Xie, Deshuo Yu, Yuguo Li, Zhilong Zhang, Hao Yi, and Fang Zhuo
Xi'an Jiaotong University, China

[ThA3] Isolated DC/DC Converter II

Room A (Halla Hall A, 3F) **May 25 (Thu.), 2023 / 4:55PM~6:35PM**

Session Chair(s) **Katherine Kim** (National Taiwan University, Taiwan)
Jongwon Shin (Chung-Ang University, Korea)

4:55PM [ThA3-1] Novel Clamp Diode to Mitigate the Voltage Oscillation of Low Voltage Rectifier Diodes in Asymmetric Half-Bridge Converter
Minsu Lee[1], Dongmin Choi[1], Jongyoon Chae[2], Kyunghwa Park[3], and Gun-Woo Moon[1]
[1]Korea Advanced Institute of Science and Technology, Korea, [2]Hyundai Motor Company, Korea, [3]Defense Agency for Technology and Quality, Korea

5:20PM [ThA3-2] Rectifier-Integrated Printed-Circuit-Board Winding Structure of Secondary-Side Center-Tapped Transformer for Suppressing Parasitic Resonance Between Decoupling Capacitors

Hiromu Saeki[1], Kazuhiro Umetani[1], Tomohide Shirakawa[2] Masataka Ishihara[1], and Eiji Hiraki[1]
[1]Okayama University, Japan, [2]Ariake National College of Technology, Japan

5:45PM [ThA3-3] Active Clamp Forward Converter With a New Switch Control Technique for Reducing Transient Voltage Overshoot

Dae-Hun Kown and Jae-Kuk Kim
Inha University, Korea

6:10PM [ThA3-4] Operation and Performance of DC-DC Converter Using Multiple Cascaded Choppers for Future DC Power Grids

Tian Luo, Yu-Chen Su, and Makoto Hagiwara
Tokyo Institute of Technology, Japan

[ThB3] OS: High Power Density Converter Design

Room B (Halla Hall B, 3F) May 25 (Thu.), 2023 / 4:55PM~6:35PM

Session Chair(s) **Kai-Jun Pai** (National Taiwan Normal University, Taiwan)
Huang-Jen Chiu (National Taiwan University of Science and Technology, Taiwan)

4:55PM [ThB3-1] Dual-Active-Bridge Converter with Triple Phase Shift Control for a Wide Operating Voltage Range

Yi-Hsuan Chen[1], Ta-Wei Huang[1], Shih-Hao Kuo[1], Yu-Chen Chang[1], Huang-Jen Chiu[1], Serafin Bachman[2], and Marek Jasiński[2]
[1]National Taiwan University of Science and Technology, Taiwan, [2]Warsaw University of Technology, Poland

5:20PM [ThB3-2] Implementation of a Current Linear Regulator based on a GaN HEMT for Laser Diode Manipulations

Kai-Jun Pai[1] and Chang-Hua Lin[2]
[1]National Taiwan Normal University, Taiwan, [2]National Taiwan University of Science and Technology, Taiwan

5:45PM [ThB3-3] A Switching Capacitor Control in Single-Stage AC-DC Reconfigurable RGB-LED Driver

Pang-Jung Liu, Ho-Hua Yu, and Zhi-Yuan Hong
National Taipei University of Technology, Taiwan

6:10PM [ThB3-4] Dual Constant Voltage Mode Control for Resonant Current Reduction in E-Bike's Low-Profile Wireless Charging System

Laskar Pamungkas[1], Bo-Chih Shih[2], Yu-Chen Chang[2], and Huang-Jen Chiu[2]
[1]Green Energy Technology Co., Ltd., Taiwan, [2]National Taiwan University of Science and Technology, Taiwan

[ThC3] PWM Inveter Applications

Room C (Samda Hall A, 3F) May 25 (Thu.), 2023 / 4:55PM~6:35PM

Session Chair(s) **Dujić Dražen**
(Power Electronics Laboratory, EPFL, Switzerland)
Hiroki Watanabe
(Nagaoka University of Technology, Japan)

4:55PM [ThC3-1] High-Performance Discontinuous Pulse Width Modulation Strategy for 3-level Asymmetric T-NPC Inverter

Nam Xuan Doan[1,2,3], Luong Tan Van[3], and Nho Van Nguyen[1,2]
[1]Ho Chi Minh City University of Technology, Vietnam, [2]Vietnam National University-Ho Chi Minh City, Vietnam, [3]Ho Chi Minh City University of Food Industry, Vietnam

5:20PM [ThC3-2] Experimental Verification of Maximum Operating Frequency for a SiC-MOSFET in Class-D ZVS Inverter

Yi Xiong, Senanayake Thilak, Yu Yonezawa, Jun Imaoka, and Masayoshi Yamamoto
Nagoya University, Japan

5:45PM [ThC3-3] High Reliable Transformer-less Deadtime Less Inverter for Grid-connected Applications

Silumin Senanayake, Thilak Senanayake, Jun Imaoka, and Masayoshi Yamamoto
Nagoya University, Japan

6:10PM [ThC3-4] Analytical Loss Modeling for MOSFET-based Modular High Frequency Converters

K. Manos and A. Antonopoulos
National Technical University of Athens, Greece

[ThD3] Battery Manamgement System I

Room D (Samda Hall B, 3F) **May 25 (Thu.), 2023 / 4:55PM~6:10PM**

Session Chair(s) **Sung Yeul Park** (University of Connecticut, USA)
Hwa-Pyeong Park (Kumoh National Institute of Technology, Korea)

4:55PM [ThD3-1] Advanced Battery Management System for Standalone VRFB Applications

Vishnu. K[1], Phani Teja Bankupalli[2], Sumit Pramanick[1], and Anil Verma[1]

[1]Indian Institute of Technology Delhi, India, [2]SRM Institute of Science and Technology, India

5:20PM [ThD3-2] Feasibility of EIS on Module Level Li-ion Batteries for Echelon Utilization

A. Savca[1], S. Azizighalehsari[1], P. Venugopal[1], G. Rietveld[1,2], and T. Batista Soeiro[1]

[1]University of Twente, The Netherlands, [2]VSL, The Netherlands

5:45PM [ThD3-3] A Hybrid Thermoelectric Generator – Battery Power Supply System Toward Replacement-Free Battery

S. Tanabe[1], Y. Sakamoto[1], H. Uchida[2], and T. Tanzawa[1]

[1]Shizuoka University, Japan, [2]Zeon Corp., Japan

[ThE3] Control Strategy for Traction Power Systems

Room E (301, 3F) **May 25 (Thu.), 2023 / 4:55PM~6:35PM**

Session Chair(s) **Kyo-Beum Lee** (Ajou University, Korea)

4:55PM [ThE3-1] Power Coordination and Line Loss Optimization Strategy of Advanced Traction Power Supply System based on Improved Droop Control

Yalei Wang, Li Zeng, Jingying Lin, and Xiaoqiong He

Southwest Jiaotong University, China

5:20PM [ThE3-2] An Active Power Coordinated Control Strategy based on Droop Control for the Advanced Traction Power Supply System

Shuang Yang, Li Zeng, Hongmo Song, and Xiaoqiong He

Southwest Jiaotong University, China

5:45PM [ThE3-3] Optimization of the Hybrid-switch Inverter by Decoupling SiC and Si

Michael Walter and Mark-M. Bakran

University of Bayreuth, Germany

6:10PM [ThE3-4] High-bandwidth Control Structure for Solid-State-Transformers with EtherCAT Protocol

DongUk Kim[1], Jaehong Lee[2], Seung-Hwan Lee[2], and Sungmin Kim[1]

[1]Hanyang University, Korea, [2]University of Seoul, Korea

[ThF3] Big Data and Machine Learning Applications - INV & CNV

Room F (302, 3F) **May 25 (Thu.), 2023 / 4:55PM~6:35PM**

Session Chair(s) **Sungwoo Bae** (Hanyang University, Korea)

4:55PM [ThF3-1] Hybrid Model of Power MOSFET for Soft Failures Estimation based on Time Domain Reflectometry and Machine Learning

Valentyna Afanasenko, Kanuj Sharma, Simon Kamm, and Ingmar Kallfass

University of Stuttgart, Germany

5:20PM [ThF3-2] PWM-PFM Hybrid Modulation for DAB Converter based on RL Algorithm

Sungmin Lee, Bonggook Kim, Kwonhoon Kim, Yujin Shin, and Younghoon Cho

Konkuk University, Korea

5:45PM [ThF3-3] FCS-MPC based Dual-module ANN Controller for Three-level Converter

Kun Wang[1], Xinliang Yang[1], Shuiqi Chen[2], and Ki-Bum Park[1]

[1]Korea Advanced Institute of Science and Technology, Korea, [2]University of California, USA

6:10PM [ThF3-4] Machine-Learning Based Optimal Design of a Wireless Power Transfer Coil for Battery-Powered Tram

Eunchong Noh[1], Junhyuk So[2], and Seung-Hwan Lee[1]

[1]University of Seoul, Korea, [2]Pohang University of Science and Technology, Korea

[ThG3] Other and Emerging Topics in Power Electronics

Room G (303, 3F) **May 25 (Thu.), 2023 / 4:55PM~6:10PM**

Session Chair(s) **Chang-Yeol Oh** (Korea Electrotechnology Research Institute, Korea)
Jee-Hoon Jung (Ulsan National Institute of Science and Technology, Korea)

4:55PM [ThG3-1] A Single-Phase Buck-Boost Derived Common-Ground Inverter

Duc-Tri Do[1], Vinh-Thanh Tran[1], Tuyet-Dan Bui Thi[1], Ngoc-Han Vuong Thi[1], and Minh-Khai Nguyen[2]

[1]Ho Chi Minh City University of Technology and Education, Viet Nam, [2]General Motors, USA

5:20PM [ThG3-2] Grid-Converter Stability Analysis based on Bus Admittance Phase

Shan Jiang and Georgios Konstantinou

University of New South Wales, Australia

5:45PM [ThG3-3] Triangular Conduction Mode (TCM) Operation of 4-level Flying Capacitor Boost Converter In PV Solar Application

Yu-Chen Liu, Nguyen Dinh Phuc, and Yu-Chun Lee
National Taipei University of Technology, Taiwan

[ThH3] OS: Power converters for DC transmission and Distribution

Room H (401, 4F) **May 25 (Thu.), 2023 / 4:55PM~6:35PM**

Session Chair(s) **Shenghui Cui** (Seoul National University, Korea)
Jae-Jung Jung (Kyungpook National University, Korea)

4:55PM [ThH3-1] The DC Terminal Dynamic Model of Resonant Converter

Zehui Jia, Zhiyuan Wang, Xiaodong Zhao, Yingzong Jiao, Binbin Li, and Dianguo Xu
Harbin Institute of Technology, China

5:20PM [ThH3-2] Universal Flux Balancing Control to Suppress Transient DC-Bias of Phase-Shift Modulated Multi-Active-Bridge Converters

Jingxin Hu[1], Shenghui Cui[2], and Yuying He[3]
[1]Nanjing University of Aeronautics and Astronautics, China, [2]Seoul National University, Korea, [3]Hohai University, China

5:45PM [ThH3-3] Split Capacitor Ripple Reduction Method of 3-Level NPC Converter Using Zigzag Transformer

Geum Seop Song[1], Shenghui Cui[2], and Jae-Jung Jung[1]
[1]Kyungpook National University, Korea, [2]Seoul National University, Korea

6:10PM [ThH3-4] On Features of Direct Current Transformers

Renan Pillon Barcelos and Dra˘zen Duji´
École Polytechnique Fédérale de Lausanne

[ThI3] Modeling and Control of Converters III

Room I (402, 4F) **May 25 (Thu.), 2023 / 4:55PM~6:35PM**

Session Chair(s) **Wataru Kitagawa**
(Nagoya Institute of Technology, Japan)
Se-Kyo Chung (Gyeongsang National University, Korea)

4:55PM [ThI3-1] Accurate State Space Resonators for the Implementation of Integral Dominant Voltage Controllers for LC Filter based Inverters

H. Siraj, B.P. McGrath, and I.U. Nutkani
RMIT University, Australia

5:20PM [ThI3-2] A Simple Modulated Model Predictive Control of Single-Phase HERIC Active Power Filter

Dongmin Choi, Bonggook Kim, Sun Woo Rhee, Jinsu Kim, Jungyoung Lee, and Younghoon Cho
Konkuk University, Korea

5:45PM [ThI3-3] A Study of 10 MHz Multi-Sampling SVPWM Method for Three Phase Inverter Using USPM Controller

S. Takeuchi, K. Sato, and T. Yokoyama
Tokyo Denki University, Japan

6:10PM [ThI3-4] A Frequency Multiplier based Isometric Sampler for Second-Order Transfer Functions with Wide Frequency Variation Range

Ying-Chun Chen, Guan-Ling Chen, and Woei-Luen Chen
University of Taipei, Taiwan

[P1] Poster Session I

Foyer, 5F **May 24 (Wed.) / 1:15PM~2:55PM**

Session Chairs: **Shin-Ichiro Hayashi** (Chiba Institute of Technology, Japan)
Tomoyuki Mannen (University of Tsukuba, Japan)
Rae-Young Kim (Hanyang University, Korea)
Sang-Il Kim (Sunchon National University, korea)

[P1-001] Dynamic on Resistance Measurement of High Power GaN Under Hard/Passive Switching

Huizhong Sun[1], Zhihao Lin[1], Jing Yuan[2], and Huai Wang[1]

[1]Aalborg University, Denmark, [2]Schneider Electric, Denmark

[P1-002] Design and Current Balancing Optimization of A 1700V/1000A Multi-chip SiC Power Module

Junhui Yang[1], Yongmei Gan[1], Laili Wang[1], Cheng Zhao[1], Yan Nie[1] and Li Ran[2]

[1]Xi'an Jiaotong University, China, [2]University of Warwick, UK

[P1-003] Kelvin Source Package to Maximize 1200V SiC MOSFET Performance in Solar Inverter Applications

Wonsuk Choi, Dongwook Kim, Dongkook Son, and Sungnam Kim

Power Master Semiconductor, Korea

[P1-004] Dynamic Simulation of Pacific Island Microgrid with Integrated 1MW OTEC plant

Alexandr Lim[1], Yong-Rae Kim[1], Ye-Chan Kim[1], Seung-Ho Song[1], Ju-Yeop Choi[1], Jong-Beom Seo[2], Jung-Hyun Moon[2], and Hyeon-Ju Kim[2]

[1]Kwangwoon University, Korea, [2]Korea Research Institute of Ships and Ocean Engineering, Korea

[P1-005] A Novel Approach for a Distributed TCM Modulator

Jörg Haarer, Nicolas Lomberg, Philipp Ziegler, Philipp Marx, André Haspel, and Jörg Roth-Stielow

University of Stuttgart, Germany

[P1-006] Introducing the New 600 V CIPOSTM Tiny IM323 Intelligent Power Module for Home Appliances with 3-Phase Motor Drives

Lee Ki Hyun, Lee Taejin, Jo David, and Song BK

Infineon Technologies Korea, Korea

[P1-007] Design Methodology of Bidirectional Resonant CLLC Converter with Dual Resonant Frequencies for Wide Voltage Range

Cheol-Hee Jo, Seung-Min Kim, Min-Yeong Choe, So-Jeong Kang, and Dong-Hee Kim

Chonnam National University, Korea

[P1-008] Enhanced Efficiency Improvement Scheme for Domestic Induction Cooktop Using Variable DC-Link Voltage Control

ManJae Kwon, Seung Hyun Kang, Yun Seong Hwang, and Byoung Kuk Lee

Sungkyunkwan University, Korea

[P1-009] Fabrication of Low-Resistance Sn Ohmic Contacts on n-type InxGa1-xAsyP1-y for Optoelectronic Devices

Umar Jamil, Dongho Han, Jaehyeong Lee, and Jonghoon Kim

Chungnam National University, Korea

[P1-010] An Active Gate Driver for SiC to Meet Requirements in EMI and Switching Loss by Slew Rate Control

Xizhi Sun, Shuaiqing Zhi, Yuanchao Hao, Mingcheng Ma, and Dianguo Xu

Harbin Institute of Technology, China

[P1-011] Comparative Analysis and Evaluation of Gate Driver Topologies for Paralleling Silicon Carbide (SiC) Power Modules

Yan Li, Xibo Yuan, Yonglei Zhang, Kai Wang, Yipu Xu, and Zihao Wang

China University of Mining and Technology, China

[P1-012] Hardware Design and Decoupled Three-Loop Control for a 10kV/400V ISOP-DAB Converter

Shanglong Li[1], Zijian Wang[1,2], Yonglei Zhang[1], Lijing Sun[3], Kai Wang[1], Xiaojie Wu[1], and Xibo Yuan[1]

[1]China University of Mining and Technology, China, [2]State Grid Suqian Power Supply Company, China, [3]State Grid Shanghai Energy Internet Research Institute Co., Ltd., China

[P1-013] A Simple Gate Driver Design for SiC MOSFET Paralleled Operation

Liyang Du, Xia Du, Hui Cao, Haodong Yang, and H. Alan Mantooth

University of Arkansas, USA

[P1-014] Power Devices Embedded Printed Circuit Broads for Future Highly Integrated Power Electronics

Feng Zhou, Tianzhu Fan, and Jae Lee

Toyota Motor North America, USA

[P1-015] Development of A Medium-Voltage Isolated Excitation Coil for A Transformerless Multilevel Inductive Power Transfer System

Jaehong Lee, Eunchong Noh, and Seung-Hwan Lee

University of Seoul, Korea

[P1-016] Parasitic Inductance Cancellation for EMI Filter Capacitors Using Mutual Coupling
Pinhe Wang, Bima Nugraha Sanusi, Chao Liu, Jiasheng Huang, Ziwei Ouyang, Tiberiu Gabriel Zsurzsan, and Michael A. E. Andersen
Technical University of Denmark, Denmark

[P1-017] Comparative Study of Two Analytical Methods for Calculating the Parasitic Capacitance in Toroidal Transformers
Mohsen Feizi and Bas Vermulst
Eindhoven University of Technology, The Netherlands

[P1-018] A DC Differential Method for Core Loss Measurement Under Sinusoidal Excitation
Deqiu Yang, Binhao Wang, and Junming Zhang
Zhejiang University, China

[P1-019] A Coupled-Inductor-Based Input-Parallel Output-Parallel Quasi-Resonant Single-Stage DC-DC Converter to Mitigate Current Discrepancy
Fei Li and Laili Wang
Xi'an jiaotong University, China

[P1-020] A Single-Event Parasitic Inductance Characterization Method based on Parallel Resonance Principle for Power Modules
Hongchang Cui[1], Fengtao Yang[1], Hang Kong[1], Chenxu Zhao[1], Junhui Yang[1], Yan Nie[1], Feng Wang[1], Laili Wang[1], and Kai Gao[2]
[1]Xi'an Jiaotong University, China, [2]State Grid Shanghai Electric Power Research Institute, China

[P1-021] Non-Coupled Inductors for Dual-Buck and Differential-Buck Single-Phase Inverters
Tobias Brinker[1], Lennart Hoffmann[1,2], and Jens Friebe[2]
[1]Leibniz University Hannover, Germany, [2]University of Kassel, Germany

[P1-022] Forced Air Cooled Heat Sink Design for Sic 1kV and 3.3kV Power Module Using Multi-objective Optimization
Rounak Siddaiah[1], Juan Ordonez[2], and Robert M. Cuzner[1]
[1]University of Wisconsin Milwaukee, USA, [2]Florida State University, USA

[P1-023] A Study on 3-phase Synchronous Machine Parameters Representations by Various Assumptions
In Kwon Park[1], Gilsoo Jang[2], and Yi Zhang[1]
[1]RTDS Technologies Inc., Canada, [2]Korea University, Korea

[P1-024] HiL Platform for Synchronous Reference Frame Impedance Measurement and Stability Assessment of Three-Phase Power Electronics Systems
Qilin Peng[1], Jiajun Yang[2], Sandro Guenter[2], Giampaolo Buticchi[1], Nadia M. L. Tan[1,3], and Patrick Wheeler[4]
[1]University of Nottingham Ningbo China, China, [2]Nottingham Ningbo China Beacons of Excellence Research and Innovation Institute, China, [3]Universiti Tenaga Nasional, Malaysia, [4]University of Nottingham, UK

[P1-025] High Bandwidth Power Amplifier with A Shunt Correction Cell
Marziyeh Hajiheidari, Bas Vermulst, Jeroen van Duivenbode, and Henk Huisman
Eindhoven University of Technology, The Netherlands

[P1-026] Three-Port Small-Signal Admittance Modeling and Stability Analysis of Grid-Forming MMC
Pengkun Li, Yue Wang, Fengmo Li, Bole Feng, Yi Liu, and Runtian Li
Xi'an Jiaotong University, China

[P1-027] Multi-source Energy Harvesting for Low-power Applications
Maaen Marji[1], Woonki Na[1], and Jonghoon Kim[2]
[1]California State University, USA, [2]Chunagnam National University, Korea

[P1-028] Pre-heating Method Employing Pulse Current Excitation for Effective Charging of LiB in Low-Temperature Environment
Nguyen-Anh Nguyen, Phuong-Ha La, and Sung-Jin Choi
University of Ulsan, Korea

[P1-029] Modeling and Analysis of Circulating Current Ripples in Power-Electronics-Based Mission Profile Emulation System
Shihao Xia[1], Ke Ma[1], Aiguo Wang[2], Xinqiang Li[2], and Luhai Zheng[2]
[1]Shanghai Jiao Tong University, China, [2]Shanghai Electrical Apparatus Research Institute Co., Ltd., China

[P1-030] Minimum Deviation Low-Frequency Ripple Shaping Controller for the Non-Inverting Buck-Boost Converter with Smooth Mode Transitions
Ksenija Josipovic[1], Aleksandar Prodic[1], Giacomo Calabrese[2], and Florian Neveu[2]
[1]University of Toronto, Canada, [2]Texas Instruments, Germany

[P1-031] Averaged Model of Single-Ended Primary Inductor Converter in Discontinuous Inductor Current Mode
Jongun Baek and Jong-Won Shin
Chung-Ang University, Korea

[P1-032] Digital Linear Slope Control Method for Improving the Load Transient Response of a Buck Converter
Seokwon Kim and Jong-Won Shin
Chung-Ang University, Korea

[P1-033] Developing a Laptop Power Adaptor for 12 V and 24 V Solar PV Source
L. Chilumba[1,2], A.T. Mushi[1], and B.M.M. Mwinyiwiwa[1]
[1]University of Dar es Salaam, Tanzania, [2]Vocational Education Authority of Tanzania, Tanzania

[P1-034] Power Loss Analysis of a Single-Phase Differential Buck Inverter with Power Decoupling Utilizing Energy Stored in Output Capacitors
Lennart Hoffmann[1,2], Tobias Brinker[2], and Jens Friebe[1,2]
[1]University of Kassel, Germany, [2]Leibniz University Hannover, Germany

[P1-035] Small-Signal Dynamics of Current-Mode Controlled Active Clamp Forward Converter with Main Switch Current Feedback
Dongheon Lee[1], Yonghan Kang[2], Byungcho Choi[1], and Honnyong Cha[1]
[1]Kyungpook National University, Korea, [2]Cisco Systems, Inc., USA

[P1-036] A Frequency Coupling Suppression Strategy for Three-Phase Grid-Connected Converters Considering DVC Dynamics
Tong Wu, Jinjun Liu, Yihan Zhou, Jiazhi Wang, and Zeng Liu
Xi'an Jiaotong University, China

[P1-037] THD Analysis of Modular Multi-level Converter with BESS
Su-Han Pyo[1], Sang-Jung Lee[1], Dong-Sul Shin[1], Dea-Wook Kang[1], Jong-Pil Lee[1], and Tae-Sik Park[2]
[1]Korea Electrotechnology Research Institute, Korea, [2]Mokpo National University, Korea

[P1-038] An Average Circuit Model of a Single-phase Grid-connected Inverter
Somenath Banerjee and Santanu. K. Mishra
Indian Institute of Technology, India

[P1-039] Power-Electronics-Based Mission Profile Emulator for OBC with Simplified BP Models
Jinyu Yu, Lidan Zhou, Ke Ma, Shihao Xia, and Gang Yao
Shanghai Jiao Tong University, China

[P1-040] Bidirectional GaN based Step-up/down Partial
Chao Liu[1] , Zhe Zhang[2] , Ziwei Ouyang[1] , Chuang Liu[3] , Michael A. E[1] . Andersen[1] , Shujun Mu[4] and You Zhou[4]
[1]Technical University of Denmark, Denmark, [2]Hebei University of Technology, China, [3]Northeast Electric Power University, China, [4]National Institute of Clean-and-Low-Carbon Energy, China

[P1-041] Carrier-Based Minimum-Loss Discontinuous PWM for Three-Level Inverters
Hyeon-Sik Kim[1], Hyung-June Cho[2], and Seung-Ki Sul[2]
[1]Gachon University, Korea, [2]Seoul National University, Korea

[P1-042] An Improved Filter Inductor Design Strategy based on Virtual Space Vector Modulation for Grid-Connected Three-Level Inverter
Lingchao Kong, Chao Wu, Zhichong Shao, and Yong Wang
Shanghai Jiao Tong University, China

[P1-043] Experimental Validation of the Quasi-Three-Level Operation Mode for a Hybrid Modular Multilevel Converter with Series-Connected Clamping Switches
Malte Lorenz and Axel Mertens
University Hannover, Germany

[P1-044] The Control Stage of a Modular Multilevel Converter-based Arbitrary Wave Shape Generator for Dielectric Testing of High Voltage Grid Assets
Dhanashree Ashok Ganeshpure[1], Thiago Batista Soeiro[3], Mohamad Ghaffarian Niasar[1], and Peter Vaessen[1,2]
[1]Delft University of Technology Mekelweg, The Netherlands, [2]KEMA Laboratories, The Netherlands, [3]University of Twente, The Netherlands

[P1-045] Transformer Saturation Analysis and Mitigation for MMC-Based Grid Emulator
Xingxing Chen[1], Zejie Li[1], Fangzhou Zhao[1], Xiongfei Wang[1], Martin Geske[2], and Rayk Grune[2]
[1]Aalborg University, Denmark, [2]R&D Test Systems, Germany

[P1-046] Power-Flow-Related Admittance Characterization of Two-Level and Modular Multilevel Converters
Ye Zhu, Shan Jiang, and Georgios Konstantinou
The University of New South Wales, Australia

[P1-047] Improved Capacitor Voltages Balancing Control for Five-level Hybrid Flying-capacitor Inverters
Min-Seok Kim[1], Jae-Ho Hyun[2], and Dong-Choon Lee[2]
[1]Hyundai Motor Company, Korea, [2]Yeungnam University, Korea

[P1-048] Replacement of Arm Inductors by Leakage Inductance of Input Transformers in QAB-CLLC-based MMC
Anupam Nigam and Dong-Choon Lee
Yeungnam University, Korea

[P1-049] System Parameter Design Method based on a Serial-Shunt Type Soft Normally Open Point
Haohua Peng, Jianwen Zhang, Jianqiao Zhou, Gang Shi, Xu Cai, Mingyang Yang, and Zhuyong Li
Shanghai Jiao Tong University, China

[P1-050] Control of Modular Multilevel Converter for Photovoltaic Generation System Considering Partial Shading
Tzung-Lin Lee, Wei-Ting Zheng, and Chen-Han Lin
National Sun Yat-sen University, Taiwan

[P1-051] Distributed Control Architecture for a Low-Voltage Modular Multilevel Converter with Partial Energy Storage Integration
Zoe Blatsi, Sebastián Neira, Paul Judge, Stephen Finney, and Michael Merlin
The University of Edinburgh, Scotland

[P1-052] Capacitor Voltage Ripple and Capacitance Evaluation in a Direct Three-phase to Single-phase AC/AC MMC
Ygor Pereira Marca, Maurice G. L. Roes, and Korneel G. E. Wijnands
Eindhoven University of Technology, The Netherlands

[P1-053] DC link Current Ripple Reduction for Five-level Hybrid ANPC Converters Using Double-based PWM Switching Method
Laith M. Halabi and Kyo-Beum Lee
Ajou University, Korea

[P1-054] Elimination of Abnormal Time-Delay in Phase-Shift-Based PWM for Five-Level Hybrid Active NPC Inverters
Samer Saleh Hakami and Kyo-Beum Lee
Ajou University, Korea

[P1-055] Reduction Method of Circulating Current for Parallel Connected Inverters Using Proportional Resonant Control
Hye-Won Choi and Kyo-Beum Lee
Ajou University, Korea

[P1-056] Development of a Monolithic Five-Level Flying Capacitor Converter with Extendability for the Number of Levels
Hidemine Obara
Yokohama National University, Japan

[P1-057] Analysis and Design Optimization of Surface Permanent Magnet Motor to Improve Torque Density and Ripple
Yussuf Shakhin[1], Kulash Talapiden[1], Nguyen Gia Minh Thao[2], Mehdi Bagheri[1], and Ton Duc Do[1]
[1]Nazarbayev University, Kazakhstan, [2]Toyota Technological Institute, Japan

[P1-058] Design and Simulation of High-Bandwidth 4-DOF Fast Steering Mirror
Chien-Sheng Liu[1], Kun-Cheng Jiang[1], Ming-Fu Chen[2], and Po-Ming Lin[2]
[1]National Cheng Kung University, Taiwan, [2]National Applied Research Laboratories, Taiwan

[P1-059] Design of Wireless Micro-temperature Sensor System for Measuring Inductor Temperature
Yongchen Liao, Ruwen Wang, Gang Wen, and Yu Chen
Huazhong University of Science and Technology, China

[P1-060] Characteristic Analysis and Optimization of Stator Structure in Electromagnetic Bone Conduction Devices Considering Artificial Mastoid
Yuki Kondo[1], Wataru Kitagawa[1], Takaharu Takeshita[1], Akihiro Masuda[2], Ryuhei Masuda[2], and Masahiro Nakashima[2]
[1]Nagoya Institute of Technology, Japan, [2]SANKO MOLD Co., Ltd., Japan

[P1-061] Shape Optimization for Flux Barrier of Synchronous Reluctance Motor by Using MOGP
Keiji Goto, Wataru Kitagawa, and Takaharu Takeshita
Nagoya Institute of Technology, Japan

[P1-062] Design Study on Light-weight Quasi-coreless SPMSM Using CFRP, Small Amount of SMC Core and Aluminum Winding
T. Kosaka, C. Higashihama, T. Ishihara, H. Matsumori, and N. Matsui
Nagoya Institute of Technology, Japan

[P1-063] A 12-Slot 10-Pole Induction Motor with Wave Winding Rotor
Y. Yokoi
Nagasaki University, Japan

[P1-064] Vibration Suppression of Dual Three-Phase Permanent Magnet Synchronous Motor in Five Degree of Freedom Magnetic Levitation System
Sixuan Liu, Xin Cao, Qiang Yu, Zhenyang Hao, and Zhiquan Deng
Nanjing University of Aeronautics and Astronautics, China

[P1-065] Performance Evaluation of Axial-Flux Machine with Water-Cooling and Fractional-Slot Distributed-Winding
Qixu Chen, Guoli Li, Zhe Qian, Zehui Sun, and Qunjing Wang
Anhui University, China

[P1-066] Kinematic Analysis and Dynamics Modeling of a Novel Ball Joint Actuator with Three-degree-of-freedom
Yan Wen[1], Yong Wang[1], Guoli Li[1], Qunjing Wang[1], Qiubo Ye[2], Qian Zhang[1], and Fang Xie[1]
[1]Anhui University, China, [2]Jimei University, China

[P1-067] A Knotted-Ribbon Model for Estimation of Anisotropic Thermal Conductivities of Windings with Rectangular Wires
Zehui Sun, Qunjing Wang, Zhe Qian, Qixu Chen, Wenzhe Deng, and Guoli Li
Anhui University, China

[P1-068] Rotor Magnet Temperature Estimation Using Magnet Flux and Energy Information
Sang Min Kim, Jinqyu Seo, Yoonmo Sung, Kwangjin Lee, Kyungmook Lim, and Taesuk Kwon
Hyundai Mobis, Korea

[P1-069] Sensorless Drive of Six-phase PMSM based on Signal Injection with Torque Ripple Cancellation Algorithm
Seong Hoon Kim, Kwan Yuhl Cho, and Hag Wone Kim
Korea National University of Transportation, Korea

[P1-070] Fast-Speed Power Reserve Control Scheme for Gird-Connected Photovoltaic Systems with Unitary Regression-based Real-Time MPP Estimation
Yinxiao Zhu[1,2], Huiqing Wen[1], Yuhan Zhang[1,2], Qinglei Bu[1], and Xue Wang[1,2]
[1]Xi'an Jiaotong-Liverpool University, China, [2]University of Liverpool, UK

[P1-071] Chance Constrained Optimization in Active Distribution Network Considering Virtual Power Lines
Dongwon Lee[1], Changhee Han[2], Sungwoo Kang[1], and Gilsoo Jang[1]
[1]Korea University, Korea, [2]University of California, USA

[P1-072] Power Adaptive Low-voltage Ride-through Control Strategy of Two-stage Photovoltaic Inverter With Improved Disturbance Observation Algorithm
Dian lang Wang[1], Peng Zhang[1], Xiaoguai Cao[1], Jing Chen[1], Rui Zhang[1], Hong Cao[1], Hui Lai[2], Hong Miao[2], Chengbi Zeng[2], and Xiao Yang[2]
[1]CSG EHV Power Transmission Company, China, [2]Sichuan University, China

[P1-073] Transient Overvoltage Analysis of Grid-Following VSCs During Fault Recovery
Xinshuo Wang[1], Heng Wu[1], and Xiongfei Wang
[1]Aalborg University, Denmark, [2]KTH Royal Institute of Technology, Sweden

[P1-074] Single Switch based Boost Converters with a Tapped Inductor for Highly Efficient ZVZCS Operation
Jae J. Kim[1], Joon H. Jeon[2], Sin S. Kyoung[2], and Eun S. Lee[1]
[1]Hanyang University, Korea, [2]PowerCubeSemi Co., Ltd., Korea

[P1-075] Anti-Islanding Scheme of PV System Under Parallel Operation of PCS
Yeong-Min Jo, Yong-Rae Kim, Seung-Ho Song, and Ju-Yeop Choi
Kwangwoon University, Korea

[P1-076] Instantaneous Power Filtering Optimization Strategy of Grid-Forming New Energy Inverter based on Droop Control
Haizhen Xu, Xinlin Yin, Binglei Lu, Changzhou Yu, Weixuan Wang, and Yihao Chen
Hefei University, China

[P1-077] Limitations of the PV-Battery-Integrated Quasi-Z-Source Inverter with Virtual Synchronous Generator Control
Hao Ruan, Yinxiao Zhu, and Yongheng Yang
Zhejiang University, China

[P1-078] Analysis and Benchmarking of Grid-forming Control for Power Converters
Jianbing Yin[1], Junhai Wang[1], Lin Chen[1], Mingchang Wang[1], Hao Luo[2], and Yongheng Yang[2]
[1]State Grid Zhejiang Hangzhou Power Supply Co., Ltd., China, [2]Zhejiang University, China

[P1-079] Effective Approximation of the Photovoltaic Characteristic Curves Using a Double-shaped Superellipse
Tofopefun Nifise Olayiwola and Sung-Jin Choi
University of Ulsan, Korea

[P1-080] Power Sharing Strategy of Paralleled Converters Considering Efficiency and Operation Cost in Islanded DC Microgrids
Xiangchen Zhu[1], Yanbo Wang[1], Yanjun Tian[2], Guohui Zeng[3], and Zhe Chen[1]
[1]Aalborg University, Denmark, [2]North China Electric Power University, China, [3]Shanghai University of Engineering Science, China

[P1-081] Data-Driven Electrolyzer Modeling: Adaptive Model Considering Operating Conditions Using K-means Clustering
Seungchan Jeon, and Sungwoo Bae
Hanyang University, Korea

[P1-082] Construction of Grid-Tied System for PV Using Universal Smart Power Module
K. Kawashima, K. Nakamura, K. Yoshimoto, and T. Yokoyama
Tokyo Denki University, Japan

[P1-083] Comparison of Controllable Photovoltaic Emulation Methods for Real-Time Hardware Experiments
Darsana Deo, F. Selin Bagci, and Katherine A. Kim
National Taiwan University, Taiwan

[P1-084] System Optimized Electronic Design for Photovoltaic Module Integrated Micro-Inverters
Tobias Manthey[1], Tobias Brinker[1], and Jens Friebe[2]
[1]Leibniz University Hannover, Germany, [2]University of Kassel, Germany

[P1-085] LED Performance for Light Intensity Modulation Impedance Spectroscopy of Photovoltaic Modules
Desmon Simatupang, Alexander Agrios, John Ayers, and Sung-Yeul Park
University of Connecticut, USA

[P1-086] Cross-Coupling Effects of Voltage Control and Active Power Control on Small-Signal Stability of Virtual Synchronous Generator
Jingzhe Xu, Weihua Zhou, and Behrooz Bahrani
Monash University, Australia

[P1-087] HIL Model-Based Control and Fault Detection of DC Microgrid
Mali Bijen and Dong-Choon Lee
Yeungnam University, Korea

[P1-088] A High-Efficiency Single-Stage DAB Microinverter with New Switching Modulation and Integrated Transformer
Sunju Kim[1], Kunwoo Kang[1], Million Gerado Geda[1], Huu-Phuc Kieu[1], Sewan Choi[1] and Suchang Lee[2], Juhwan Yun[2], and Jungpil Park[2]
[1]Seoul National University of Science and Technology, Korea, [2]Hanhwa Solution, Korea

[P1-089] Operation of the SDBC based STATCOM Integrated with One Single-Phase Converter Allowing Active Power Control Under Unbalanced Grid Conditions
Yu-Chen Su, Kento Okumura, and Makoto Hagiwara
Tokyo Institute of Technology, Japan

[P1-090] 10 kVac/270 Vdc Medium-Voltage-Connecting Power Supply for Data Centers
Xin Wu, Haihong Long, Yongshan Jiang, Jinyi Deng, and Dehong Xu
Zhejiang University, China

[P1-091] Evaluation of the Front-End AC/DC Converter Circuits for Medium-Voltage-Connected Power Supply Systems
Haihong Long, Jinyi Deng, Xin Wu, Yi Zhou,Yuying Wu, and Dehong Xu
Zhejiang University, China

[P1-092] A DC Power Connector with Voltage Spike Suppression
Yan-Yu Cheng[1], Yu-Chen Chiu[1], You-Chun Huang[1], Hung-Liang Cheng[2], and Yao-Ching Hsieh[1]
[1]National Sun Yat-sen University, Taiwan, [2]I-SHOU University, Taiwan

[P1-093] Low-Capacitance Solid-State Transformer Control Using an Analytic Filter
Radhika Sarda[1], Ezequiel Rodriguez[1], Naga Brahmendra Gorla Yadav[2], Glen G. Farivar[3], Josep Pou[1], V. B. Sriram[1], and Anshuman Tripathi[1]
[1]Nanyang Technological University, Singapore, [2]Indian Institute of Technology, India, [3]University of Melbourne, Australia

[P1-094] Load Sharing Control of Grid Forming Converter based on Virtual Synchronous Generator
Chi-Hwan Bae, Hak-Soo Kim, and Eui-Cheol Nho
Pukyong National University, Korea

[P1-095] Learning-based Grid Impedance Shaping Method Applied for High-Accuracy Power Hardware-in-the-Loop
A. Oshnoei[1], R. L. A. Ribeiro[2], A. Anvari-Moghaddam[1], and F. Blaabjerg[1]
[1]Aalborg University, Denmark, [2]Federal University of Rio Grande do Norte, Brazil

[P1-096] Switched-Capacitor Bidirectional Three-Port DC-DC Converter with High Voltage Conversion Ratio
Zahra Saadatizadeh, Pedram Chavoshipour Heris, and H. Alan Mantooth
University of Arkansas, USA

[P1-097] Topology Reconfiguration Method for IPT Pad Stress Measurement in a Limited Laboratory Environment
Seungjin-Jo, Guangyao Li, Junchen Xie, Chang-Su Shin, and Dong-Hee Kim
Chonnam National University, Korea

[P1-098] Cascaded-Loop Wireless Power Transfer for Multiple Magnetic Fields Generation
Zhan Liu and Ming Liu
Shanghai JiaoTong University, China

[P1-099] A 5MHz LC-LC Resonant Wireless Power Transfer System
Che-Yu Lu[1], Hung-Chi Chen[2], and Chin-Wei Chan[2]
[1]National United University, Taiwan, [2]National Yang Ming Chiao Tung University, Taiwan

[P1-100] A Load Detection Method in Multi-transmitter Dynamic Wireless Power Transfer Systems without Extra Sensors and Communication
Chenxu Zhao, Zhangwei Xiang, Min Wu, Lei Zhu, Zhengchao Yan, Guochun Xiao, and Laili Wang
Xi'an Jiaotong University, China

[P1-101] Development of a Wireless Charging System based on LLC Resonant Converter for Underwater Drone
Jia-Wei Liu[1], Yu-Shan Cheng[1], and Kun-Che Ho[2]
[1]National Taiwan Ocean University, Taiwan, [2]National Formosa University, Taiwan

[P1-102] Design and Control of Optimized Switched Capacitor for EV Wireless Power Transfer Systems Considering Wide Coupling Coefficient Range
Dong Hyeon Sim, Hyeon-Woo Jo, Ju-A Lee, Won-Jin Son, and Byoung Kuk Lee
Sungkyunkwan University, Korea

[P1-103] A Non-Resonant Multi-Output Half-Bridge Inverter for Flexible Cooking Surfaces
Felix Rehm and Marc Hiller
Karlsruhe Institute of Technology, Germany

[P1-104] A Quasi Z-Source Inverter based Single Stage Wireless Charger Integrating Solar Array and Auxiliary Battery
Subhranil Barman and Kishore Chatterjee
Indian Institute of Technology Bombay, India

[P1-105] An Enhanced Harmonic Model of Bidirectional Inductive Power Transfer System with Guaranteed ZVS at Light Load
Fei Xu and Yanjie Guo
Hebei University of Technology, China

[P1-106] An Isolated Multi-Port Converter with Hybrid Power Flow Control
Cheng-Yu Tang[1], Yu-Long Wei[2], and Sheng-Yuan Ou[1]
[1]National Taipei University of Technology, Taiwan, [2]Delta Electronics, Taiwan

[P1-107] A Novel Test Method for Switching Loss Measurement of Reverse-Blocking Semiconductor Switches in Current-Source Inverters
Benedikt Riegler and Annette Mütze
Graz University of Technology, Austria

[P1-108] Stability Enhancement of Power Synchronisation Control based Inverter Using Power Decoupling Strategies
Chalitha Liyanage, Inam Nutkani, Lasantha Meegahapola, and Mahdi Jalili
RMIT University, Australia

[P1-109] Prediction and Analysis of Energy Consumption Considering the Operating Environment of Radon Mitigation System
Kyunghee Han[1], Jun-Yeong Jang[2], and Tae kwon Hwang[2]
[1]Halla University, Korea, [2]Taesung Co., Ltd., Korea

[P1-110] Comprehensive Evaluation Method for Key Components of Charging Equipment based on Improved Grey Relational Decision
Xuan Zhang[1], Chen Dong[1], Jiande Ye[1], Xvling Li[1], Xi Chen[2], and Xiulan Liu[2]
[1]State Grid Electric Power Research Institute, China, [2]SGCC Beijing Electric Power Research Institute, China

[P1-111] Enhanced Voltage Injection Control for Capacitor Voltage Balancing of MMC Under Low-Frequency Operation
Seung-yong Lee[1], Shenghui Cui[2], and Jae-Jung Jung[1]
[1]Kyungpook National University, Korea, [2]Seoul National University, Korea

[P2] Poster Session II

Foyer, 5F **May 25 (Thu.) / 1:15PM~2:55PM**

Session Chairs: **Hong-Je Ryoo** (Chung-Ang University, Korea)
Woojin Choi (Soongsil University, Korea)
Suyong Chae (Pohang University of Science and Technology, Korea)

[P2-001] Zero Common-mode Voltage Modulation in Novel Flying-capacitive VIENNA Rectifier
Hui Liu, Xuan Zhao, Dong Jiang, Min Zhou, and Shuyu Zhang
Huazhong University of Science and Technology, China

[P2-002] Near Unity Power Factor Using Non-inverting Boost-Buck Converter with Programmed PWM
Somboon Sooksatra and Sarawut Janpong
Rangsit University Pathumthani, Thailand

[P2-003] Evaluation of Efficiency and Power Factor in 3-kW GaN-based CCM/CRM Totem-Pole PFC Converters for Data Center Application
Chen Song and Hui Li
University of Electronic Science and Technology of China, China

[P2-004] Second-Order Sliding Mode Control Strategy With Enhanced DC-link Voltage Stability for PWM Rectifier
Yuqi Shen, Qicai Ren, and Alian Chen
Shandong University, China

[P2-005] Boost-SEPIC Interleaved PFC Converter
Thien-Dung Tran[1], Honnyong Cha[1], Viet-Chan Nguyen[2], Van-Dai Bui[1], and Juyeong Park[1]
[1]Kyungpook National University, Korea, [2]Ho Chi Minh University of Technology, Vietnam

[P2-006] Lumped Parameter Model of Cockcroft-Walton Voltage Multiplier in Resonant Converters
Seong-Ho Son[1], Tae-Hyun Kim[1], Chang-Hyun Kwon[1], Sung-Roc Jang[1,2], Chan-Hun Yu[1], and Hyoung-Suk Kim[1,2]
[1]University of Science and Technology, Korea, [2]Korea Electrotechnology Research Institute, Korea

[P2-007] Active du/dt Filtering for Three Phase Motor Drive Applications
Benedikt Kohlhepp, Tianlun Ye, and Thomas Dürbaum
Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

[P2-008] Single-Phase 3-Level and 5-Level Boost Inverters without High-Frequency Common-Mode Voltage
Sze Sing Lee[1], Reza Barzegarkhoo[2], Yam P. Siwakoti[2], Felipe B. Grigoletto[3], and Kyo-Beum Lee[4]
[1]Newcastle University, Singapore, [2]University of Technology Sydney, Australia, [3]Federal University of Pampa, Brazil, [4]Ajou University, Korea

[P2-009] Three-phase Four-wire Voltage Converter with D-Σ Control and Phase-Amplitude Compensation
Tsai-Fu Wu, Yun-Hsiang Chang, Chien-Chih Hung, and Jui-Yang Chiu
National Tsing Hua University Hsinchu, Taiwan

[P2-010] Multi-mode Energy Management Method of Integrated Photovoltaic Energy Storage System
Zhichong Shao, Yuxuan Bi, Bin Liang, Houji Li, and Yong Wang
Shanghai Jiaotong University, China

[P2-011] Switching Capacitor Strategy for Fully Exploiting Potential of EMI Filters
Anyu Wang, Feng Zheng, Zhiqiang Wang, and Tian Gao
Xidian University, China

[P2-012] Stability Analysis of LCL-type Grid-Connected Inverters with Digital Delay based on Loop Gain Reconfiguration
Jiang Xin, Yi Hao, Li Yuguo, Zhuo Fang, Wang Feng, and Wang Zhenxiong
Xi'an Jiaotong University, China

[P2-013] A Ripple Suppression Method based Differential Spilt Capacitors for Two-stage Single-phase Inverter
Qian Liang, Yan Zhang, and Zhenchao Li
Xi'an Jiaotong University, China

[P2-014] Online Minimum Switching Frequency Tracking Technique for Improving Reliability of IPOS Induction Heating Systems
Kyung-Wook Heo[1], Hyunjun Choi[2], and Jee-Hoon Jung[1]
[1]Ulsan National Institute of Science and Technology, Korea, [2]Korea Electronics Technology Institute, Korea

[P2-015] Resonant Tank Comparison of LC, LCC, and LCLC with Paralleled Inverter for Possible Surface Treatment Applications
Anumeha Kumari, Tsai-Fu Wu, Yun-Hsiang Chang, and Jui-Yang Chiu
National Tsing Hua University, Taiwan

[P2-016] Three-Phase Four-Wire Inverter for Grid Emulator Under Wide Filter Inductance Variation
Tsai-Fu Wu, Yun-Hsiang Chang, Jui-Yang Chiu, Chang-Yang Chou, and Chien-Chih Hung
National Tsing Hua University, Taiwan

[P2-017] DC-bus Neutral Voltage Balancing Based on DΣ Control Method
Yun-Hsiang Chang and Tsai-Fu Wu
National Tsing Hua University, Taiwan

[P2-018] Stability Analysis and Optimal Control Design for Dual-Loop Voltage-Controlled Grid-Connected Inverters
Jiang Xin, Yi Hao, Li Yuguo, Zhuo Fang, Wang Feng, and Wang Zhenxiong
Xi'an jiaotong University, China

[P2-019] Design Method to Minimize Current Stress for Auxiliary Resonant Commutated Pole Inverter
Mingi Oh and Iqbal Husain
North Carolina State University, USA

[P2-020] Compensation of Non-Ideal Characteristics of Switch Elements in Voltage Source Inverter
Ga-Young Kim, Seo-Hyun Hong, and Seung-Ho Song
Kwangwoon University, Korea

[P2-021] Simple Injection Voltage Modification Methods for Improving the Performance of Saliency-based Sensorless Control without Prediction in a Single Shunt Current Sensing Drive System
Yongsu Han[1], Byung Ryang Park[2], Gyu Cheol Lim[2], and Jung-Ik Ha[2]
[1]Myongji University, Korea, [2]Seoul National University, Korea

[P2-022] Reliability Assessment of Fault-Tolerant Multilevel Inverter Topologies with Reduced Switch Count
Marif Daula Siddique, Prasanth Sundararajan, and Sanjib Kumar Panda
National University of Singapore, Singapore

[P2-023] An Efficiency Improvement Method of High-step-down Converter
Yeu-Torng. Yau and Thanh-Phu. Luu
National Chin-Yi University of Technology, Taiwan

[P2-024] A High-step-down Converter with Negative Output Voltage
Yeu-Torng. Yau and Thanh-Phu. Luu
National Chin-Yi University of Technology, Taiwan

[P2-025] High Voltage Gain Interleaved DC-DC Converter with Voltage-Lift and Three-Winding Coupled-Inductor Techniques
Shin-Ju Chen, Sung-Pei Yang, Chao-Ming Huang, Ping-Sheng Huang, and Cheng-Hsuan Chiu
Kun Shan University, Taiwan

[P2-026] A Variable-Frequency ZVS Modulation for Four-Switch Buck+Boost Converters with Seamless Step-up/down Mode Transition
Guangyao Yu[1], Jianning Dong[1], Thiago Batista Soeiro[2], and Pavol Bauer[1]
[1]Delft University of Technology, The Netherlands, [2]University of Twente, The Netherlands

[P2-027] Bi-directional Operation Mode of LLC/CLLC DC/DC Converter for on Board Charger of 800V Battery Systems
Anyeol Jung, Dongok Moon, Changkyu Bai, Jongho Jang, Minseuk Oh, Sanghyun Lee, Sunmin Hwang, and Hyungtae Moon
HL MANDO, Korea

[P2-028] A Novel Fast Transient Current Scheme for Three Phase Dual Active Bridge with Asymmetrical Phase-Shift Control
Hui Chen, Jinjun Liu, Sixing Du, Cong Li, and Zhifeng Deng
Xi'an Jiaotong University, China

[P2-029] High-gain Floating Double Series-capacitor Boost Converter
Van-Dai Bui[1,2], Honnyong Cha[1], and Thien-Dung Tran[1]
[1]Kyungpook National University, Korea, [2]Thuyloi University, Vietnam

[P2-030] Characteristics Analysis and Loss Optimization of the Turn-on Clamp Circuit for IGCT based DC Transformer
Yiqing Ma, Xueteng Tang, Long Zhang, Liang Dong, Fang Cai, Bin Cui, and Biao Zhao
Tsinghua University, China

[P2-031] Model-based Dynamic Control of Two Degrees-of-freedom Modulation for Dual Active Half-bridge Converter
Gun-Su Kim, Su-Bin Kang, Hyeon-Sik Kim, and Jehyuk Won
Gachon University, Korea

[P2-032] Optimizing Current-Fed, GaN-Based DC-DC Converters for Electrolysis Applications
Niklas Fritz, Tudor Sechel, Paul Kowalewski, and Rik W. De Doncker
RWTH Aachen University, Germany

[P2-033] 1.5kW LLC Resonant Converter with Improved Interleaved Winding Structure and Core Structure
Yuhang Xu, Xu Yang, Jiwen Wei, Suchen Dong, Wenjie Chen, and Kangping Wang
Xi'an Jiaotong University, China

[P2-034] Power Decoupling Strategy of QAB Converters for DC Microgrids with Islanding Operations
Chang-Woo Yun[1], Jun-Suk Lee[2], Kyung-Wook Heo[2], and Jee-Hoon Jung[2]
[1]Hyundai Motors, Korea, [2]Ulsan National Institute of Science and Technology, Korea

[P2-035] An IGBT-based ZCS Buck Converter for High Efficiency
Young-Dal Lee[1] and Chong-Eun Kim[2]
[1]Wipowerone, Korea, [2]Korea National University of Transportation, Korea

[P2-036] Implementation of the 160kV High Voltage DC/DC Converter
W.C. Jeong, J.Y. Lee, M.K. Choi, and H.J Ryoo
Chung-Ang University, Korea

[P2-037] A Phase Shift Full Bridge Converter with Information Integrated for Battery Charger
Ruwen Wang, Siyu Tong, Qingfeng Zhang, and Yu Chen
Huazhong University of Science and Technology, China

[P2-038] Modeling Method for Conducted Noise from Power Converter for Power Line Communication
Naoki Kojima, Takato Hattori, Wataru Kitagawa, and Takaharu Takeshita
Nagoya Institute of Technology, Japan

[P2-039] Analysis of Capacitor Parasitic Effects on Output Voltage Ripple and Load Transient of DAB Converters
Chanh-Tin Truong and Sung-Jin Choi
University of Ulsan, Korea

[P2-040] An Online Efficiency Optimization Strategy based on Variable-Frequency Phase-Shift Modulation for Dual-Active-Bridge Converters
Yanxiang Yin, Wei Wang, Nan Wang, and Alian Chen
Shandong University, China

[P2-041] An ANPC based High-Power Medium-Voltage Triple Active Bridge (TAB) DC-DC Converter with Enhanced Modulations
Hui Cao, Feng Guo, Zhuxuan Ma, Liyang Du, Yue Zhao, and H. Alan Mantooth
University of Arkansas, USA

[P2-042] Analysis and Implementation of a DAB DC-DC Converter for OBC Application with Wide Output Voltage Range
Siddhant Bikram Pandey[1], Tat-Thang LE[1], Sunju Kim[1], Tuan Nguyen Manh[1], Sewan Choi[1], Junyeong Park[2], and Jonathan Hong[2]
[1]Seoul National University of Science and Technology, Korea, [2]LG Innotek, Korea

[P2-043] Boost-SEPIC Interleaved Converter with Integrated Magnetics
Juyeong Park and Honnyong Cha
Kyungpook National University, Korea

[P2-044] Operation Characteristic Analysis of an Asymmetrical Half-Bridge Converter with Half-Wave Rectifier
Yerin Lee, Jungho Jeon, and Paul Jang
Tech University of Korea, Korea

[P2-045] Solving Duty-ratio Limitation for Four-phase Input-Parallel Output-Series DC-DC Converter with Asymmetrical PWM Scheme
Van-Dai Bui[1,2] and Honnyong Cha[1]
[1]Kyungpook National University, Korea, [2]Thuyloi University, Vietnam

[P2-046] A Three-Port Hybrid-Bridge Based Bidirectional Series-Resonant Converter with Wide Voltage Conversion Gain
Jiahui Wu[1], Dong Liu[2], Yanbo Wang[1], Thiago Pereira[3], Marco Liserre[3], and Zhe Chen[1]
[1]Aalborg University, Denmark, [2]Group of Power Electronics, The Netherlands, [3]Kiel University, Germany

[P2-047] Real-Time Discrete Model of Dual Active Bridge Converter with Integrated Loss Model of SiC MOSFETs
Yoganandam Vivekanandham Pushpalatha, Daniel Alexander Philipps, and Dimosthenis Peftitsis
Norwegian University of Science and Technology, Norway

[P2-048] On the Limit Cycle Caused by Controller Saturation in Synchronous Buck Converter
Ying Xu[1], Xuehua Wang[1], Yuying He[2], and Hao Zhang[1]
[1]Huazhong University of Science and Technology, China, [2]Hohai University, China

[P2-049] Compact Magnetron Power Supply for Industrial Heating Applications
Shansong Wei, Alan J. Watson, Rishad Ahmed, and Jon Clare
University of Nottingham, UK

[P2-050] Design of On-board Power Supply for Tether Drone Applications
Taewan Kim, Jinri Kim, and Se-Kyo Chung
Gyeongsang National University, Korea

[P2-051] Output Voltage Overshoot Reduction Techniques for Cascade Buck-Boost Converters
Seung-Woo Baek[1], Su-Jin Choi[2], Hag-Wone Kim[2], Kwan-Yuhl Cho[2], and Kyung-Ahn Kwon[1]
[1]Techcross, Korea, [2]Korea National University of Transportation, Korea

[P2-052] Multi-objective Optimization Design of Hybrid Excitation Doubly Salient Motor based on Taguchi Method
Xiangyun Gao, Xiaoli Meng, Ao Shen, Xufei Zhang, and Qiwei Wu
Nanjing University of Aeronautics and Astronautics, China

[P2-053] A Novel Design of Low Pass Filter in Disturbance Observer for Speed Tracking of Permanent Magnet Synchronous Motors
Kanat Suleimenov and Ton Duc Do
Nazarbayev University, Kazakhstan

[P2-054] Harmonic Current Controller Design for Anisotropic Synchronous Machines based on a Machine Model in Harmonic Reference Frame
A. Haspel, K. Kaiser, V. Ketchedjian, and J. Roth-Stielow
University of Stuttgart, Germany

[P2-055] A Two-Degree-of-Freedom Current Loop Parameter Tuning Method based on Bandwidth and Phase Margin
Qing Zhang, Junyu Zhao, and Dianguo Xu
Harbin Institute of Technology, China

[P2-056] Sensorless Control of SynRM based on Dual-oriented Active EMF Models and Adaptive Fading Kalman Filter
Fengtao Gao, Zhonggang Yin, Cong Bai, and Yanqing Zhang
Xi'an University of Technology, China

[P2-057] Commutation Torque Ripple Reduction for Direct DC-link Current Control by Applying Multilevel Hysteresis Controller and Proper Voltage Vectors
R. Heidari, K.-I. Jeong, and J.-W. Ahn
Kyungsung University, Korea

[P2-058] 6th and 12th Order Vibration Suppression of IPMSM by Harmonic Current Injection
Y. Yamano and K. Akatsu
Yokohama National University , Japan

[P2-059] Voltage and Current Limited Maximum Torque Algorithm of SPMSM in Traction Applications
Gabriel M. Pauka, Li Ding, Rui Liu, and Yunwei (Ryan) Li
University of Alberta, Canada

[P2-060] Parametric Co-design of Machine-Inverter Using Wide Band Gap and Three-level ANPC Inverter for 800V Traction System
Jaedon Kwak and Alberto Castellazzi
Kyoto University of Advanced Science, Japan

[P2-061] Active Discharging Method of PMSM Using Flux Map-based Torque Control
Youngeun Oh and Jongwon Choi
Hannam University, Korea

[P2-062] A Novel Modulation Method for Three-phase Inverter with Pausable Switching During Arbitrary Periods in an Arbitrary Phase
Keitaro Kawarazaki and Nobukazu Hoshi
Tokyo University of Science, Japan

[P2-063] A Medium-Voltage High-Power Cascaded Motor Drive System with Low Voltage Fluctuation in the DC Bus
Xin Peng[1], Yonglei Zhang[1,2], Kai Wang[1], Jianguo Jiang[1,2], and Xibo Yuan[1]
[1]China University of Mining and Technology, China, [2]Ministry of Education, China

[P2-064] Speed Response Analysis of Servo Motor and Control Strategy for Fast Transient Response
Cheolmin Hwang, Gyu Cheol Lim, Sangwon Lee, and Jung-Ik Ha
Seoul National University, Korea

[P2-065] Estimation of SynRM Flux Saturation Model at Standstill Using Artificial Neural Network
Yun-Jae Lee, Min-Seong Lee, and Young-Doo Yoon
Hanyang University, Korea

[P2-066] Fast Dynamic Field-Oriented Control Using Direct Large Voltage Vector and Hysteresis Switch
Hasan Ali Gamal Al-kaf and Kyo-Beum Lee
Ajou University, Korea

[P2-067] Improved Deadbeat-Predictive Torque Control Space Vector Modulation Method with Open-End Winding Interior Permanent Magnet Synchronous Motor
Tae-Yong Yoon, Hyung-Woo Lee, and Kyo-Beum Lee
Ajou University, Korea

[P2-068] Neutral-Point Voltage Regulation of Three-Level Neutral-Point Clamped Converter for LVDC Power Distribution Application
Mina Kim[1], Hwa-Pyeong Park[2], Seung-Yeol Oh[1], Daeseak Cha[1], Byoung-Sun Ko[1], and Jung-Sik Choi[1]
[1]Korea Electronics Technology Institute, Korea, [2]Kumoh National Institute of Technology, Korea

[P2-069] Current Limiter Circuit to Suppress Inrush Load Current for LVDC Distribution System
Chano Jeon[1], Wonsik Jeong[2], Kyungwook Heo[2], Mina Kim[3], and Jeehoon Jung[2]
[1]Hyundai Motors, Korea, [2]Ulsan National Institute of Science and Technology, Korea, [3]Korea Electronics Technology Institute, Korea

[P2-070] Operating Test Circuit for Valves in MMC based HVDC Power Conversion System
Chi-Hwan Bae, Hak-Soo Kim, and Eui-Cheol Nho
Pukyong National University, Korea

[P2-071] Design and Verification of Active Balancing Circuit for Battery Management System based on a Bidirectional Converter
Chang-Hua Lin and Yu-Lin Lee
National Taiwan University of Science and Technology, Taiwan

[P2-072] A Single-Stage Differential Boost Inverter with Modified SPWM Control for BESS Applications
Hwa-Dong Liu[1], Chang-Hua Lin[2], and Yu-Lin Lee [2]
[1]National Taiwan Normal University, Taiwan, [2]National Taiwan University of Science and Technology, Taiwan

[P2-073] Online Impedance based Hardware-in-the-Loop Testbed for Battery Management Systems
Sung-Yeul Park[1], Sean Youngblood[1], Thomas Link[1], Anthony Ingrassia[1], Arijit Bose[2], and Ian Heino[2]
[1]University of Connecticut, USA, [2]University of Rhode Island, USA

[P2-074] Capacity Estimation based on the Aging Characteristics Analysis of Liquid Metal Batteries
Qionglin Shi, Haomiao Li, Kangli Wang, and Kai Jiang
Huazhong University of Science and Technology, China

[P2-075] Clustering Optimization Method for Liquid Metal Battery Screening Requirements
E Zhang, Kangli Wang, and Kai Jiang
Huazhong University of Science and Technology, China

[P2-076] A Characteristic of the Thermal Runaway with Defects from Manufacturing Process of the Lithium-ion Batteries
Deokhun Kang, Young Woo Son, Pyeong-Yeon Lee, Insu Back, and Jonghoon Kim
Chungnam National University, Korea

[P2-077] Development and Demonstration of Bidirectional Battery Charger for E-Mobility Charging Station
Hyunjun Choi[1], Sun-pil Kim[2], Jung-hoon Ahn[1], Dong-Hwan Park[1], and Sung-geun Song[1]
[1]Korea Electronics Technology Institute, Korea, [2]GNEPS Co., Ltd., Korea

[P2-078] Integrating Centralized and Decentralized Battery Management Systems Using Smart Cell Technology for Enhanced Battery Safety
M. Faiz, Miyoung Lee, Eunjin Kang, Hyeungjun Choi, and K. Jonghoon
Chungnam National University, Korea

[P2-079] Smith Predictor-based Cross-Coupling Correction for Voltage Source Converters Under Mixed Reference Frames
Qilin Peng[1], Jiajun Yang[2], Sandro Guenter[2], Giampaolo Buticchi[1], Nadia M. L. Tan[1,3], and Patrick Wheeler[4]
[1]University of Nottingham Ningbo China, China, [2]Nottingham Ningbo China Beacons of Excellence Research and Innovation Institute, China, [3]Universiti Tenaga Nasional, Malaysia, [4]University of Nottingham, UK

[P2-080] Impedance Identification Signal Excitation for Series-End Winding Motor System
Hongyan Qu, Boyang Li, Min Zhou, Dong Jiang, and Wei Sun
Huazhong University of Science and Technology, China

[P2-081] Analysis of Opportunities and Restrictions of a 3-Level Active Neutral Point Clamped Traction Inverter for 800V Battery Electric Vehicles
J. Häring[1], M. Hepp[2], W. Wondrak[2], and M.-M. Bakran[1]
[1]University of Bayreuth, Germany, [2]Mercedes-Benz AG, Germany

[P2-082] A Single-/Three-phase Compatible V2G Bidirectional on-Board Charger with Reconfigurable Structure
Yiu Pang Chan, Qingchun Li, Bhoopal Ponnuvelu, and River Tin-Ho Li
Hong Kong Applied Science and Technology Research Institute Company Limited, Hong Kong

[P2-083] Proposal and Validation of a Series Hybrid System Using a DC-Input Direct Electric-Power Converter D-EPC
Hiroki Matsuno, Hiromu Akiyama, Kantaro Yoshimoto, and Tomoki Yokoyama
Tokyo Denki University, Japan

[P2-084] High Frequency Link Ripple Power Compensation Strategies for 1- ϕ Bidirectional AC-DC Matrix Converters
Subhranil Barman, Shiladri Chakraborty, and Kishore Chatterjee
Indian Institute of Technology Bombay, India

[P2-085] Pulse Width Modulation Method for Reliability Improvement of DC-link Capacitors and Power Devices of NPC Inverter
Jae-Heon Choi and Ui-Min Choi
Seoul National University of Science and Technology, Korea

[P2-086] Influence of Different PWM Methods on Thermal Loadings of Power Devices and DC-link Capacitors of Single-Phase Five-Level T-type NPC Inverter
Taerim Ryu and Ui-Min Choi
Seoul National University of Science and Technology, Korea

[P2-087] Cyclic Temperature and Humidity Profile for Mixed Flowing Gas Tests of Power Semiconductor Modules
J. Rautio[1], T. J. Kärkkäinen[1], J. Jäppinen[1], K. Korpinen[1], M. Niemelä[1], P. Silventoinen[1], J. Leppänen[2], and J. Ingman[2]
[1]LUT University, Finland, [2]ABB Oy, Finland

[P2-088] Virtual Junction Temperature Estimation During Dynamic Power Cycling Tests
Kevin Muñoz Barón, Kanuj Sharma, and Ingmar Kallfass
University of Stuttgart, Germany

[P2-089] Utilizing Electroluminescence of Silicon IGBTs for Junction Temperature Sensing
Lukas A. Ruppert, Bjarne Wirsen, Sven Kalker, and Rik W. De Doncker
RWTH Aachen University, Germany

[P2-090] A Fault Diagnosis Method in BLDC Motor Drive Systems Using Moving Average Filter for Back Electromotive Force Signal Processing
Sung-Won Lee[1], Jun-Hyuk Im[2], Doo-Ho Kim[3], and Jin Hur[1]
[1]Incheon National University, Korea, [2]Daegu Mechatronics & Materials Institute, Korea, [3]Realtimewave Co., Ltd., Korea

[P2-091] Solid-State Circuit Breaker with Avalanche Robustness Using Series-Connection of SiC Diodes
Taro Takamori[1], Keiji Wada[1], Wataru Saito[2], and Shin-ichi Nishizawa[2]
[1]Tokyo Metropolitan University, Japan, [2]Kyushu University, Japan

[P2-092] High dv/dt Testing of Coil Winding Insulation Systems for Wide-Bandgap Applications
Vivien C. Grau, Laurids Schmitz and Rik W. De Doncker
RWTH Aachen University, Germany

[P2-093] Implementation and Validation of a Long-Term Measurement System for Single Event Burnout at High Altitude
C. Beckemeier[1], L. Fauth[1], and J. Friebe[2]
[1]Leibniz University, Germany, [2]University of Kassel, Germany

[P2-094] Universal Short-Circuit and Open-Circuit Fault Detection for an Inverter
B. Brown and Z. Zhang
Clemson University, USA

[P2-095] Quantitative Comparison of the Empirical Lifetime Models for Power Electronic Devices in EV Fast Charging Application
Faezeh Kardan, Aditya Shekhar, and Pavol Bauer
Delft University of Technology, The Netherlands

[P2-096] Terminal Voltage Analysis According to Filter Types of Motor Drive System with Long Cables
Xuanxi Liu, Yu Han, Shanshan Wang, Hanyoung Bu, Dohong Lee, and Younghoon Cho
Konkuk University, Korea

[P2-097] Design and Simulation Analysis of Intercell Transformer based on Five-level T-type Inverter
Yu Han, Shanshan Wang, Xuanxi Liu, Hanyoung Bu, Dongmin Choi, and Younghoon Cho
Konkuk University, Korea

[P2-098] Broad Learning based Fault Detection and Diagnosis Method for Three-Phase Six Switch Converter
Marif Daula Siddique, Mrutyunjaya Sahani, and Sanjib Kumar Panda
National University of Singapore, Singapore

[P2-099] Optimal Number of Turns Design of IPT for Maximum Power Efficiency base on Reinforcement Learning with DQN
Jin H. Jang, Min S. Jeong, Jun H. Heo, and Eun S. Lee
Hanyang University, Korea

[P2-100] Prediction Procedure of Parasitic Parameters Considering Laminated Bus Bar Geometries based on Machine Learning
Ryosuke Shigetomi and Keiji Wada
Tokyo Metropolitan University, Korea

[P2-101] SVM-based Series Arc Detection Algorithm for Photovoltaic System
Jae-Beom Ahn, Seung-Jae Jeong, and Hong-Je Ryoo
Chung-Ang University, Korea

[P2-102] Open-Circuit Fault Diagnosis based on Deep Learning for Four-Level Active Neutral-Point Clamped Inverters
Dyan Puspita Apsari, Jiwon Jung, and Dong-Choon Lee
Yeungnam University, Korea

[WALQA-A] Week-After Live Q&A I

Online **June 8 (Thu.), 2023 / 9:00PM~10:20PM**

9:10PM [WALQA-A-1] A High Speed Short-Circuit Protection Circuit with Current Limitation and Soft Turn-Off for High Power IGBTs

Guangyao Zhang[1], Lu Shu[1], Junming Zhang[1], Shuai Shao[1], and Jinkun Ke[2]

[1]Zhejiang University, China, [2]Global Energy Interconnection Research Institute Co., Ltd., China

9:20PM [WALQA-A-2] A Load Adaptive Intelligent IGBT Gate Drive

Guangyao Zhang, B. Junming Zhang, Shuai Shao, and Wanyuan Qu

Zhejiang University, China

9:30PM [WALQA- A-3] A Hybrid Current and Voltage-Source Gate Driver for Series-Connected SiC MOSFETs

Tobias Nieckula Ubostad, Daniel Alexander Philipps, and Dimosthenis Peftitsis

Norwegian University of Science and Technology, Norway

9:50PM [WALQA- A-4] Evaluating Fluid based Transient Calorimetric Method for Measurement of the Ferrite Core Losses

Jacob Reynvaan, Milan Pajnić, and Johann Krenn

Silicon Austria Labs GmbH, Austria

9:40PM [WALQA- A-5] A Sigma Converter for High-Voltage Bus Converter: Modeling and Control

Peng Wang, Yundong Ma, Pengfei Wang, Di Wang, and Yongji Tong

Nanjing University of Aeronautics and Astronautics, China

10:00PM [WALQA-A-6] Network CM EMI Reduction Using Sinusoidal Frequency Modulated Carrier Wave Indexing

Dinh Le and Seungdeog Choi

Mississippi State University, USA

10:10PM [WALQA-A-7] Comparison of Modeling Approaches for LLC Resonant Converter based on Extended Describing Function

Goutam Ghosh, Soumitro Vyapari, and Viju Nair. R

Indian Institute of Technology Tirupati, India

[WALQA-B] Week-After Live Q&A II

Online **June 8 (Thu.), 2023 / 9:00PM~10:30PM**

09:10PM [WALQA-B-1] Motor Emulator for Permanent Magnet Synchronous Machine based on SiC Power Converter

Xiaotian Yang[1], Wenxin Huang[1], Jingkui Shi[2], and Li Xiang[2]

[1]Nanjing University of Aeronautics and Astronautics, China, [2]Zinsight Technology, China

9:20PM [WALQA-B-2] Balancing Voltage Algorithm for a Medium Voltage Cascaded H-Bridge STATCOM in Zero-current Mode

G. Tresca[1], S. Granata[1], G. Postiglione[2], C. Finotti[2], and P. Zanchetta[1,3]

[1]University of Pavia, Italy, [2]Nidec, Italy, [3]University of Nottingham, UK

9:30PM [WALQA-B-3] An Improved PWM Method of Zero-Sequence Circulating Current Control in Parallel Inverters

Yu. Li[1], Jianbo Gao[1], Zhenbin Zhang[2], Qiwu Wang[1], Zhongqing Jia[1], and Xintao Li[3]

[1]Qilu University of Technology, China, [2]Shandong University, China, [3]SK Servo Technology Co., Ltd., China

9:40PM [WALQA-B-4] A Single-Stage Buck/Boost Three-Phase DC-AC Power Converter with Sine-PWM Method and Non-Pulsating AC Waveforms

Daisy Delgado-Zaragoza and Mahima Gupta

Portland State University, USA

9:50PM [WALQA-B-5] An Integrated Arm and Integrated Three-Phase Module DC-AC Modular Converter with Minimal Energy Storage Requirements

Wiwin Lew and Mahima Gupta

Portland State University, USA

10:00PM [WALQA-B-6] Enhanced Inverter Current Control Method for Variable Frequency Drive System with Small Film DC-Link Capacitor

Rongfeng Deng[1,2], Jiaqiang Yang[1,2], Wanben Huang[1,2], Zhebin Yang[1,2], Tangtang Gu[3], and Senqing Zhuo[3]

[1]Zhejiang University, China, [2]Zhejiang Provincial Laboratory of Electrical Machine Systems, China, [3]Aux Electric Co., Ltd., China

10:10PM [WALQA-B-7] A Speed-Adaptive Sliding-Mode Observer with Extended State Variable for Speed-Sensorless Induction Motor Drives

Xinghao Xia, Bo Wang and Dianguo Xu

Harbin Institute of Technology, China

10:20PM [WALQA-B-8] Computationally-efficient Modelling of Wave Energy Conversion Systems via Pseudo Steady-State PMSM Model

X. Zhang[1], J. Apsley[1], and M. Iacchetti[1,2]
[1]The University of Manchester, UK, [2]Politecnico di Milano, Italy

[WALQA-C] Week-After Live Q&A III

Online June 8 (Thu.), 2023 / 9:00PM~10:30PM

9:10PM [WALQA-C-1] Imbalance Control with Stratified Voltage of Modularized CC-to-CV Converter for Auto and Seamless Module Switching

Jie Cai[1,2,3], Zhijian Fang[1,2,3], Yuangeng Xia[1,2,3], and Xiaoxian Song[1,2,3]
[1]China University of Geosciences, China, [2]Hubei Key Laboratory of Advanced Control and Intelligent Automation for Complex Systems, China, [3]Ministry of Education, China

9:20PM [WALQA-C-2] An Arduino - based Power Management Controller with Cloud - based Monitoring Scheme for Wind Turbine Generator Tied to Utility AC Grid

Angelo Beltran Jr.[1,2], George Darwin Arguelles[1], Gerald Franz Maliwanag[1], Carl Faustine Nabong[1], and Erlaine Pacantara[1]
[1]Adamson University, Philippines, [2]National Research Council of the Philippines, Philippines

9:30PM [WALQA-C-3] Continuous Co-Phase Traction Power Supply System based on Delta-Connected Cascaded H-Bridge Converter

Wenchang Zhang, Kai Li, Zhibo Zhang, Jiawei Guo, and Chenchen Wang
Beijing Jiaotong University, China

9:40PM [WALQA-C-4] A High-Frequency Transformer Design with Leakage Integration for Auxiliary Power Supply in Railway Application

Zheqing Li, Feng Jin, Chunyang Zhao, Eric Hsieh, and Qiang Li
Virginia Polytechnic and State University, USA

9:50PM [WALQA-C-5] LCC Compensation of Signal Channel for Simultaneous Wireless Power and Data Transfer Systems

Maode Zhou and Minfan Fu
ShanghaiTech University, China

10:00PM [WALQA-C-6] Small-signal Impedance Model of an Inductive Power Transfer System Using LCC-LCC Compensation

Chaoqun Qi, Guangce Zheng, Xinlin Wang, Xiaoxuan Ji, and Minfan Fu
ShanghaiTech University, China

10:10PM [WALQA-C-7] Finite-Control-Set Model Predictive Control for Inductive Power Transfer Charging EV Systems with Constant Voltage Load

Zeinab Karami[1], Jiayu Zhou[1], Giuseppe Guidi[2], and Jon Are Suul[1,2]
[1]Norwegian University of Science and Technology, Norway, [2]SINTEF Energy Research, Norway

10:20PM [WALQA-C-8] A Study on Molecular Dynamics of High Voltage Pulsed Electrolysis

Matías Albornoz[1], Marco Rivera[1,2], Patrick Wheeler[2], and Pericle Zanchetta[2]
[1]Universidad de Talca, Chile, [2]University of Nottingham, UK