Monday, October 12

Special Session 1-A: Prof. Tom Lipo Memorial Session 1
Chair(s): Thomas Jahns, Bulent Sarlioglu

Designing a Magnetic Gear for an Electric Aircraft Drivetrain [#0736]
   Ho Yin (David) Wong¹, Hossein Baninajar¹,², Bertrand Dechant², Jonathan Bird¹,²
   ¹Portland State University, United States; ²FluxMagic, Inc., United States

Methods to Determine the Stator Inter-Turn Short Circuit in an Induction Motor with
Installed Rotor [#0312]
   Dimas Anton Asfani¹, I Made Yulistya Negara¹, I Gusti Ngurah Satriyadi Hernanda¹,
   Daniar Fahmi¹, Eduard Muljadi², Robert M. Nelms²
   ¹Institut Teknologi Sepuluh Nopember, Indonesia; ²Auburn University, United States

Investigation of Asymmetric Consequent-Pole Hybrid Excited Flux Reversal Machines [#0011]
   F.R. Wei, Z.Q. Zhu, X.Y. Sun
   The University of Sheffield, United Kingdom

Design Optimization of Coreless Axial-Flux PM Machines with Litz Wire and
PCB Stator Windings [#1494]
   Murat G. Kesgin, Peng Han, Narges Taran, Damien Lawhorn, Donovin Lewis, Dan M. Ionel
   University of Kentucky, United States

Session 1: Machines for Transportation
Chair(s): Alireza Fatemi, Rajesh Deodhar

Basic Study on Efficiency Improvement of Hybrid Excitation Flux Switching Motor using
Variably Magnetizable Permanent Magnet for Automotive Traction Drives [#0597]
   Keita Otsuka, Takeshi Okada, Tomoya Mifune, Hiroaki Matsumori,
   Takashi Kosaka, Nobuyuki Matsui
   Nagoya Institute of Technology, Japan

A 3D-Airgap Slotless Permanent Magnet Machine for Transportation Applications [#1225]
   Md Sariful Islam¹, Rajib Mikail², Ritvik Chattopadhyay¹, Iqbal Husain¹
   ¹North Carolina State University, United States; ²ABB US Corporate Research Center, United States

Air-Cooled Multi Phase Dual-Winding In-Wheel Motor integrated with
Ultra Small SiC Module [#0024]
   Kan Akatsu¹, Satoshi Tanimoto², Yoshinori Murakami³
   ¹Yokohama National University, Japan; ²Fukushima SiC Applied Engineering Inc., Japan;
   ³Nissan Motor Co., Ltd, Japan

Novel Efficiency-Shifting Radial-Axial Hybrid Interior Permanent Magnet Synchronous
Motor for Electric Vehicle [#0273]
   Hoyun Won, Yang-Ki Hong, Minyeong Choi, Hwan-Sik Yoon, Shuhui Li, Tim Haskew
   The University of Alabama, United States
Investigation of Enhancing Reluctance Torque of a Delta-Type Variable Flux Memory Motor having Large Flux Barrier for EV/HEV Traction

Ren Tsunata, Masatsugu Takemoto, Satoshi Ogasawara, Koji Orikawa
Hokkaido University, Japan

A High-Speed High-Power-Density Non-Heavy Rare-Earth Permanent Magnet Traction Motor

Tsarafidy Raminosoa1, Randy Wiles1, J. Emily Cousineau2, Kevin Bennion2, Jon Wilkins1
1Oak Ridge National Laboratory, United States; 2National Renewable Energy Laboratory, United States

Motor System Integrated Magnetic Multiple Spur Gear and High Speed Motors for Electric Vehicle

Kohei Aiso1, Kan Akatsu2, Yasuaki Aoyama3
1Waseda University, Japan; 2Yokohama National University, Japan; 3Hitachi, Ltd., Japan

Session 2: Power Converter Controls in Wind and PV Systems
Chair(s): Eduard Muljadi, Fei Gao

Modulated Predictive Current Control of NPC Converter-Based PMSG Wind Energy System

Venkata Yaramasu1, Kristiyan Milev1, Apparao Dekka2, Jose Rodriguez3
1Northern Arizona University, United States; 2Lakehead University, Canada; 3Universidad Andres Bello, Chile

Anti-Disturbance Full-Order Sliding Mode Control of PMSG-Based Wind Energy Conversion Systems

Chun Wei1, Jianxing Xu1, Qiang Chen1, Wei Qiao2, Jianwu Zeng3
1Zhejiang University of Technology, China; 2University of Nebraska-Lincoln, United States; 3Minnesota State University-Mankato, United States

Impact of Virtual Synchronous Generator (VSG) on Sub Synchronous Control Interaction (SSCI) in DFIG Systems using Sequence Domain Impedance Method

Mohammad Khatibi, Yu-Fang Jin, Sara Ahmed
University of Texas at San Antonio, United States

LVRT Control based on Partial State-Feedback Linearization for SCIG Wind Turbine Systems

Anh Tan Nguyen, Dong-Choon Lee
Yeungnam University, Korea

Power Optimizer based on Model Predictive Control for a Cascade Multilevel Impedance Source Inverter

Sally Sajadian
Lafayette College, United States

Circulating Current Analysis and Power Mismatch Elimination Strategy for an MMC-Based Photovoltaic System

Xicai Pan, Shangzhi Pan, Jinwu Gong, Xiaoming Zha
Wuhan University, China
Comparative Analysis of Flexible Power Point Tracking Algorithms in Photovoltaic Systems [#1419]
Hossein Dehghani Tafti¹, Georgios Konstantinou¹, Christopher D. Townsend², Glen G. Farivar³, Salvador Ceballos⁴, Josep Pou⁵, John E. Fletcher¹
¹University of New Wales, Australia; ²The University of Western Australia, Australia; ³Nanyang Technological University, Singapore; ⁴Basque Research and Technology Alliance, Spain

Energy Harvesting Comparison and Analysis in 1000V and 1500V Grid-Connected PV Systems [#0593]
Branislav Stevanović¹, Emanuel Serban², Miroslav Vasić¹, Martin Ordonez², Santiago Cóbreces³, Pedro Alou¹
¹Universidad Politécnica de Madrid, Spain; ²The University of British Columbia, Canada; ³Universidad de Alcalá, Spain

Session 3: DC-DC Converters – Switched Capacitors and Datacenter Applications
Chair(s): Wenkang Huang, Gui-Jia Su

Upscaling Supercapacitor assisted Low Dropout Regulator for High-Current and High-Voltage for the 48 V DC Google Rack Architecture [#1570]
Thilanga Ariyarathna¹, Nihal Kularatna², D. Alistair Steyn-Rosse²
¹Waikato Institute of Technology, New Zealand; ²The University of Waikato, New Zealand

An Integrated Programmable Gate Timing Control and Gate Driver Chip for a 48V-to-0.75V Active-Clamp Forward Converter Power Block [#1095]
Dongkwun Kim¹,², Yoshitaka Yamauchi¹, Xiaodong Meng¹, Tianyu Jia¹, Liam McAuliffe¹, Todd Takken¹, Kevin Tien¹, Shurong Tian¹, Yuan Yao¹, Andrew Ferencz¹, Mingoo Seok², Xin Zhang¹
¹IBM T. J. Watson Research Center, United States; ²Columbia University, United States

Series Voltage Compensator for Differential Power Processing [#1403]
Ping Wang, Minjie Chen
Princeton University, United States

A 12 Switch Zero-Inductor Voltage Converter Topology for Next Generation Datacenters [#1086]
Samuel Webb, Yan-Fei Liu
Queen's University, Canada

Merged-Two-Stage Resonant and PWM Soft-Charging of Hybrid-Switched-Capacitor DC-DC Converters [#0551]
Yenan Chen, Jael Baek, Minjie Chen
Princeton University, United States

Reducing $C_{OSS}$ Switching Loss in a GaN-Based Resonant Cockcroft-Walton Converter using Resonant Charge Redistribution [#0380]
Nathan Miles Ellis, Rajeevan Amirtharajah
University of California-Davis, United States

Switched Capacitor Converter with Flexible Voltage Gain and 99.2% Efficiency Utilizing Autotransformer [#1238]
Fnu Satvik, Wensong Yu, Dakai Wang, Siyuan Chen
North Carolina State University, United States
A Novel Hybrid 4:1 Step Down Converter using an Autotransformer with DC Winding Current [#0684]
Cheng Li, Diego Serrano, José A. Cobos
Universidad Politécnica de Madrid, Spain

Session 4: Wide-Bandgap Semiconductors 1
Chair(s): Cong Li, Christina DiMarino

Comparison of Medium-Voltage Oscilloscope Probes for Evaluating Silicon-Carbide Multi-Chip Power Modules [#0816]
Christopher D. New, Andrew N. Lemmon, Brian T. DeBoi, Jared C. Helton, Blake W. Nelson
The University of Alabama, United States

A Physical Investigation of Large-Signal Dynamic Output Capacitance and Energy Loss in GaN-on-Si Power HEMTs at High-Frequency Applications [#0838]
Jia Zhuang¹, Grayson Zulauf¹, Jaume Roig², James D. Plummer¹, Juan Rivas-Davila¹
¹Stanford University, United States; ²ON Semiconductors, Belgium

Characterization and Analysis of Insulated Metal Substrate-Based SiC Power Module for Traction Application [#0296]
Shajjad Chowdhury, Emre Gürpınar, Burak Ozpineci
Oak Ridge National Laboratory, United States

An Intelligent Three-Level Active Gate Driver for Crosstalk Suppression of SiC MOSFET [#0254]
Zhidong Qiu, Hong Li, Yanteng Jiang, Tiancong Shao, Zhichang Yang, Jiaxin Wang, Zhipeng Zhang
Beijing Jiaotong University, China

A 500kW Forced-Air-Cooled Silicon Carbide (SiC) 3-Phase DC/AC Converter with a Power Density of 1.246MW/m³ and Efficiency > 98.5% [#0538]
Yan Li¹, Yonglei Zhang¹, Xibo Yuan², Lei Zhang¹, Fei Ye¹, Zhe Li¹, Yaohua Li¹, Yipu Xu¹, Zijian Wang¹
¹China University of Mining and Technology, China; ²University of Bristol, United Kingdom

Characterizing Threshold Voltage Shifts and Recovery in Schottky Gate and Ohmic Gate GaN HEMTs [#0518]
Jose Ortiz Gonzalez, Burhan Etoz, Olayiwola Alatise
University of Warwick, United Kingdom

Impact of Parasitics and Load Current on the Switching Transient Time and Motor Terminal Overvoltage in SiC-Based Drives [#0963]
Wenzhi Zhou, Mohamed S. Diab, Xibo Yuan
University of Bristol, United Kingdom

3D Commutation-Loop Design Methodology for a Silicon-Carbide Based 15 kW, 380:480 V Matrix Converter with PCB Aluminum Nitride Cooling Inlay [#0726]
Victoria Baker¹, Boran Fan¹, Rolando Burgos¹, Vladimir Blasko², Warren Chen²
¹Virginia Polytechnic Institute and State University, United States; ²Raytheon Technologies Research Center, United States

Performance of Wide-Bandgap Gallium Nitride vs Silicon Carbide Cascode Transistors [#0680]
Yasinn Gunaydin¹, Saeed Jahdi¹, Olayiwola Alatise², Jose Ortiz Gonzalez², Ruizhu Wu², Bernard Stark¹, Mohammad Hedayati¹, Xibo Yuan¹, Phil Mellor¹
¹University of Bristol, United Kingdom; ²University of Warwick, United Kingdom
Session 5: High Speed and Bearingless Machines
Chair(s): Eric Severson, Peng Han

Design of an Ultra-High Speed Bearingless Motor for Significant Rated Power [#1407]
Ashad Farhan, Martin Johnson, Kyle Hanson, Eric L. Severson
University of Wisconsin-Madison, United States

Fully Passively Levitated Self-Bearing Machines with Combined Windings [#0267]
Joachim Van Verdeghem, Bruno Dehez
Université Catholique de Louvain, Belgium

Investigation of Enhancing Output Power Density in Ultra-High-Speed Motors with Concentrated Winding Structure [#0995]
Takayuki Iida1, Masatsugu Takemoto2, Satoshi Ogasawara1, Koji Orikawa1, Ikuya Sato3, Hiroyuki Kokubun1, Akio Toba3, Masao Shuto3
1Hokkaido University, Japan; 2Okayama University, Japan; 3Fuji Electric Co., Ltd., Japan

Towards Electrostatic Levitation of Rotating Machines [#1058]
Michael Mayberry, Daniel C. Ludois, Eric L. Severson
University of Wisconsin-Madison, United States

Investigation of Combined Electro Magnetic Structure of Bearingless Motor and Magnetic Gear [#0637]
Akira Kumashiro1, Akira Chiba1, Wolfgang Gruber2, Wolfgang Amrhein2, Gerald Jungmayr3
1Tokyo Institute of Technology, Japan; 2Johannes Kepler University Linz, Austria; 3Linz Center of Mechatronics GmbH, Austria

Magnetically Geared Conveyor Drive Unit – An Updated Version [#0615]
Simon Staal Nielsen1, Rasmus Koldborg Holm2, Nick Ilsøe Berg, Peter Omand Rasmussen1
1Aalborg University, Denmark; 2Dansk Ingeniørsservice A/S, Denmark

Effects of Axial Flux Magnetic Gear Misalignment [#1502]
Bryton Praslicka1, Matthew Johnson2, Matthew C. Gardner1, Ellen Dangtran1, Hamid A. Toliyat1
1Texas A&M University, United States; 2U.S. Army CCDC, United States

A Dual Stator/Rotor PM and Winding Flux Modulated PM Machine [#0607]
Shaofeng Jia, Shuai Feng, Deliang Liang, Jinjun Liu
Xi'an Jiaotong University, China

Comparison of Reluctance and Surface Permanent Magnet Coaxial Magnetic Gears [#1509]
Shima Hasanpour1, Matthew C. Gardner1, Matthew Johnson2, Hamid A. Toliyat1
1Texas A&M University, United States; 2U.S. Army CCDC, United States

Session 6: Power Converters for Solar Energy
Chair(s): Deepak Divan, Kaushik Basu

Internal Energy Balance of a Modular Multilevel Cascade Converter based on Chopper-Cells with Distributed Energy Resources for Grid-Connected Photovoltaic Systems [#0886]
Bruno E. de O. B. Luna1, Cursino B. Jacobina2, Alexandre C. Oliveira2
1Federal University of Semi-Arid Region, Brazil; 2Federal University of Campina Grande, Brazil
A Fundamental Voltage and Harmonics Elimination Control Strategy for Single-Phase Cascade Off-Grid Photovoltaic-Storage System using Hybrid Modulations [#0119]
Yiyan Lu¹, Zhao Liu¹, Jianshou Kong², Deping Tang³, Jie Yu¹, Jiawei Ji¹
¹Nanjing University of Science and Technology, China; ²Changshu Intelligent Laser Equipment Research Institute, China; ³Hefei Kewell Power System Co., Ltd., China

Optimized Predictive Control of Hybrid Multilevel PV Inverter with Reduced Leakage Current [#0998]
Jayesh Kumar Motwani, Abhinandan Routray, Nimish Kumar Chaudhari, Rajeev Kumar Singh, Ranjit Mahanty
Indian Institute of Technology (BHU) Varanasi, India

Multiport Power Management Method with Partial Power Processing in a MV Solid-State Transformer for PV, Storage, and Fast-Charging EV Integration [#1143]
Liran Zheng, Rajendra Prasad Kandula, Deepak Divan
Georgia Institute of Technology, United States

A Series Interharmonic Filter for Cascaded H-Bridge PV Inverters [#1587]
Yiwei Pan, Ariya Sangwongwanich, Yongheng Yang, Frede Blaabjerg
Aalborg University, Denmark

A Solution for the Full-Bridge Grid-Tie Inverter using Single Virtual Ground Capacitor with UPWM [#0218]
Ruihua Shen, Henry Shu-Hung Chung
City University of Hong Kong, China

A Current-Mode Controller for an HB-NPC Inverter using the Virtual-Ground Trajectory for Power Injection in PV Systems [#0779]
S. Iturriaga-Medina¹, P.R. Martinez-Rodriguez¹, G. Escobar², J.C. Mayo-Maldonado², J.E. Valdez-Resendiz², D. Guillen-Aparicio², O.F. Ruiz-Martinez³
¹Universidad Autonoma de San Luis Potosi, Mexico; ²Tecnologico de Monterrey, Mexico; ³Universidad Panamericana, Mexico

An 11 kV AC, 16 kV DC, 200 kW Direct-to-Line Inverter Building-Block using Series-Connected 10 kV SiC MOSFETs [#1093]
Lakshmi Ravi, Xiang Lin, Dong Dong, Rolando Burgos
Virginia Polytechnic Institute and State University, United States

Session 7: Isolated DC-DC Converters
Chair(s): Shafiq Ahmed Odhano, Yuan Xibo

LLC Converters Power Density Enhancement through Optimized Current Shaping using Multi-Resonant Branches [#0006]
Ali Elrayyah
Hamad Bin Khalifa University, Qatar

Current Balancing and Phase Shedding by Split Capacitor for a Three-Phase LLC Resonant Converter [#1138]
Akiteru Chiba, Yuuki Aoyagi, Kazuto Takagi
Sanken Electric Co., Ltd., Japan
Analysis and Control of Three-Phase Interleaved SCC-LLC Resonant Converter Load Sharing Considering Component Tolerance [#1582]
Bo Sheng, Xiang Zhou, Wenbo Liu, Yang Chen, Yan-Fei Liu, Paresh C. Sen
Queen's University, Canada

An Interchangeable Soft-Switched Voltage Boosting Circuit for a Multi-Mode LLC Step-Up Converter Module in Medium Voltage Applications [#1135]
Mehdi Abbasi¹, Reza Emamalipour¹, Muhammad Ali Masood Cheema², John Lam¹
¹York University, Canada; ²Northern Transformer, Canada

Dual Voltage Flyback Topology Operation with Efficiency Enhancers at Dual Voltage Mains [#0725]
Noam Ezra, Teng Long
University of Cambridge, United Kingdom

The Asymmetrical Half-Bridge Flyback Converter: A Reexamination [#0162]
Giorgio Spiazzi, Simone Buso
University of Padova, Italy

Family of Hybrid DC-DC Converters for Connecting DC Current Bus and DC Voltage Bus [#0674]
Nie Hou, Yun Wei Li
University of Alberta, Canada

Fault Tolerant Isolated Dual Active DC-DC Converter using WBG Devices [#1183]
Amin Ashraf Gandomi¹, Leila Parsa¹, Vahid Dargahi², Keith Corzine¹
¹University of California-Santa Cruz, United States; ²University of Washington-Tacoma, United States

Session 8: Modern Tools for Detecting and Identifying Electrical System Parameters or Attacks
Chair(s): Burak Ozpineci, Osama Mohammed

DC Microgrids under Denial of Service Attacks: Feasibility and Stability Issues [#1567]
Jianzhe Liu¹, Bai Cui², Bo Chen¹, Xiaonian Lu³, Feng Qiu¹, Sudip Mazumder⁴
¹Argonne National Laboratory, United States; ²National Renewable Energy Laboratory, United States; ³Temple University, United States; ⁴University of Illinois at Chicago, United States

Data-Driven Cyberattack Detection for Photovoltaic (PV) Systems through Analyzing Micro-PMU Data [#0734]
Qi Li¹, Fangyu Li¹, Jinan Zhang¹, Jin Ye¹, Wenzhan Song¹, Alan Mantooth²
¹University of Georgia, United States; ²University of Arkansas, United States

Composite Load Model Parameter Identification with Distributed Machine Learning for the Stability Study of Microgrids [#0796]
Javad Khodabakhsh¹, Gerry Moschopoulos¹, Pirathayini Srikanta²
¹Western University, Canada; ²York University, Canada

Detection of False-Data Injection Attacks in Supercapacitor Charging Systems [#0891]
Bowen Liu, Fu Jiang, Heng Li, Hongtiao Liao, Hang Zhang, Xianqi Lu, Jun Peng, Zhiwu Huang
Central South University, China
Expanding Exposure Area of Magnetic Field Generator for Biological Evaluation by using Dual Air-Core Inductor [#0845]
Kazuki Matsubara, Keiji Wada, Yukihisa Suzuki
Tokyo Metropolitan University, Japan

Design Consideration for Power Line Sensors in Power Distribution Systems [#1307]
Xianyong Feng, Robert Hebner, Shannon Strank
The University of Texas at Austin, United States

Design and Implementation of Remote Plasma Sources for Semiconductor Chamber Cleaning [#0352]
T.F. Wu, L.C. Yu, A. Kumari, R.Z. Hung, P.J. Chen
National Tsing-Hua University, Taiwan

A Design Methodology of a Free Positioning None-Overlapping Wireless Charging System for Consumer Electronics with a Limited Parameter Variation [#0155]
Yiming Zhang, Shuxin Chen, Xin Li, Li Zhang, Yi Tang
Nanyang Technological University, Singapore

Session 9: Optimization in Electric Machines
Chair(s): Rukmi Dutta, Giulio De Donato

Multiphysics Optimisation of a Slotless Permanent Magnet Machine with a Composite Winding Layer [#1076]
Suzanne Collins, Philip H. Mellor, Nick Simpson
University of Bristol, United Kingdom

Co-Optimization of an Electric Motor-Drivetrain System for Concentrated Solar Power Heliostats [#1250]
Abdulaziz M. Qwbaiban, Shen Zhang, Thomas G. Habetler
Georgia Institute of Technology, United States

Rotor Surface Optimization of Interior Permanent Magnet Synchronous Motors to Reduce both Rotor Core Loss and Torque Ripples [#0217]
Katsumi Yamazaki¹, Kento Utsunomiya¹, Akihiro Tanaka², Toru Nakada²
¹Chiba Institute of Technology, Japan; ²Nissan Motor Co. Ltd., Japan

Multi-Objective Whale Optimization Algorithm and Optimal Area Product Model based Design of Litz-Wire Gapped High-Frequency Transformer for LLC Resonant Converters [#0263]
Daniyal Ahmed, Li Wang, Zehua Dai
Nanjing University of Aeronautics and Astronautics, China

Electromagnetic and Thermal Analysis of a Line-Start Permanent-Magnet Synchronous Motor [#1440]
Mousalreza Faramarzi Palangar¹, Amin Mahmoudi¹, Solmaz Kahourzade², Wen L. Soong³
¹Flinders University, Australia; ²University of South Australia, Australia; ³University of Adelaide, Australia

Design and Magnetic Field Analysis of a Dual Rotor Axial Flux PM Machine with Steel-Assisted Halbach Magnet Configuration [#1515]
Sodiq Agoro, Iqbal Husain
North Carolina State University, United States
Prediction of Transient Voltage Distribution in Inverter-Fed Stator Winding, Considering Mutual Couplings in Time Domain [#0234]
Shubham Sundeep, Jiabin Wang, Antonio Griffo
The University of Sheffield, United Kingdom

Frequency-Domain based Windings Voltage Distribution Modelling for Converter-Fed Electrical Machines [#0513]
Yi Wei¹, Antonio Griffo¹, Fernando Alvarez-Gonzalez¹, Ravindra Bhide², Subhra Samanta²,
Richard Clark², Arwyn Thomas², Zi-Qiang Zhu¹
¹University of Sheffield, United Kingdom; ²Siemens Gamesa Renewable Energy Limited, United Kingdom

Two-Axis Vector Control of Double Stator Linear and Rotary Permanent Magnet Machine Considering Orthogonally Coupling Effect [#0464]
Lei Xu, Xiaoyong Zhu, Li Zhang, Chao Zhang, Deyang Fan
Jiangsu University, China

Design and Analysis of a Hook Shaped Stator Core with Ring Winding Transverse Flux Machine for Wind Turbine Applications [#1531]
Anik Chowdhury, Yilmaz Sozer
The University of Akron, United States

Session 10: Optimization and Sizing of Energy Storage Systems
Chair(s): Yilmaz Sozer, Xiaofeng Yang

Robustness Evaluation of PV-Battery Sizing Principle under Mission Profile Variations [#0860]
Monika Sandelic, Ariya Sangwongwanich, Frede Blaabjerg
Aalborg University, Denmark

Distributed ESS Capacity Decision for Home Appliances in Smart Home [#1356]
Yeon ju Baik¹, Ye gu Kang²
¹University of Wisconsin-Madison, United States; ²University of Oviedo, Spain

Cost Optimization of Battery and Supercapacitor Hybrid Energy Storage System for Dispatching Solar PV Power [#1553]
Pranoy Kumar Singha Roy, JiangBiao He, Yuan Liao
University of Kentucky, United States

An Online Extremum Seeking Optimization Strategy for Warm-Up of Lithium Batteries [#0896]
Kaifu Guan, Zhiwu Huang, Yongjie Liu, Hongtao Liao, Zhiwei Gao, Yue Wu, Yinhui Le,
Xiaoyong Zhang, Jun Peng
Central South University, China

Reactive Balancing Circuit for Paralleled Battery Modules Employing Dynamic Capacitance Modulation [#0945]
Phuong-Ha La, Sung-Jin Choi
University of Ulisan, Korea

Power Management of Supercapacitors using Auxiliary Bank Switching for Hybrid Energy Storage Systems [#0766]
Yashwanth Dasari, Deepak Ronanki, Sheldon S. Williamson
University of Ontario Institute of Technology, Canada
Cooperative Cell Balancing of Supercapacitors with Adaptive Observers [#0914]
Minghui Guo, Xiaoyong Zhang, Heng Li, Hongtao Liao, Yexin Liao, Zhiqiang Meng, Hang Zhang, Zhiwu Huang
Central South University, China

Analysis of the Inter-Submodule Active Power Disparity Limits in Modular Multilevel Converter-Based Battery Energy Storage Systems [#0186]
Gaowen Liang¹, Hossein Dehghan Tafti², Glen G. Farivar¹, Josep Pou¹, Christopher D. Townsend³, Georgios Konstantinou²
¹Nanyang Technological University, Singapore; ²University of New South Wales, Australia; ³University of Western Australia, Australia

Session 11: DC-DC Converters for Electric Transportation
Chair(s): Li Zhang, Manuel Arias

Variable-Frequency Controlled Interleaved Boost Converter [#1173]
Shamar Christian, Roberto Armin Fantino, Roderick Amir Gomez, Yue Zhao, Juan Carlos Balda
University of Arkansas, United States

A Composite DC-DC Converter using Current-Fed Dual-Half Bridge [#0727]
Nan Lin, Zhe Zhao, Fei Diao, Yue Zhao, Juan Carlos Balda
University of Arkansas, United States

A Bidirectional Non-Isolated DC-DC Converter based on Switched-Capacitor Converters for DC Electric Railways [#0326]
Kazuaki Tesaki, Makoto Hagiwara
Tokyo Institute of Technology, Japan

Split Duty Cycle Coupled Multi-Phase Boost-Buck Converter [#1335]
Ahmed K. Khamis¹, Mohammed Agamy¹, Ramanujam Ramabhadran²
¹University at Albany, SUNY, United States; ²GE Aviation, United States

Auxiliary Power Module – Integrated EV Charger with Extended ZVS Range [#0486]
Gibum Yu, Sewan Choi
Seoul National University of Science and Technology, Korea

Isolated DC/DC Multimode Converter with Energy Storage Integration for Charging Stations [#0337]
Felix Hoffmann, Thiago Pereira, Marco Liserre
Christian-Albrechts-Universität zu Kiel, Germany

High Efficiency Bidirectional DC-DC Converter with Matrix Transformer for Heavy Duty Hybrid Electric Vehicles [#1159]
Shubham Mungekar, Akash Dey, Ghansyamsinh Gohil
The University of Texas at Dallas, United States

Experimental Characterization of a 750-V 100-kW 16-kHz Bidirectional Isolated DC-DC Converter with a Unity-Turns-Ratio Transformer at Different Voltage Ratios [#0073]
Ryo Haneda, Hirofumi Akagi
Tokyo Institute of Technology, Japan
Zero-Voltage-Switching Current-Source Rectifier based EV Charging System using SiC Devices [#0479]
Yang Xu¹, Zheng Wang¹, Pengcheng Liu¹, Yihan Chen¹, Jiangbiao He²
¹Southeast University, China; ²University of Kentucky, United States

Session 12: Wide-Bandgap Semiconductors 2
Chair(s): Xiu Yao, He Li

Mitigation of Motor Overvoltage in SiC-Device-Based Drives using a Soft-Switching Inverter [#1445]
Wenzhi Zhou, Mohamed S. Diab, Xibo Yuan
University of Bristol, United Kingdom

Online Health Monitoring and Aging Prognostics for SiC Power Converters [#0519]
Eddy Aeloiza¹, Arun Kadavelugu¹, Liming Liu¹, Joonas Puukko²
¹ABB Inc., United States; ²ABB Oy, Finland

Hard-Switched Overvoltage Robustness of p-Gate GaN HEMTs at Increasing Temperatures [#1369]
Joseph P. Kozak, Ruizhe Zhang, Jingcun Liu, Qihao Song, Ming Xiao, Yuhao Zhang
Virginia Polytechnic Institute and State University, United States

Influence of Paralleled SiC MOSFET on Turn-Off Gate Voltage Oscillation [#0399]
Ye Zhu¹, Han Li¹, Cheng Luo², Yong Liu¹, Cheng Wan¹, Jie Ma¹
¹Eaton Corp., China; ²Eaton Corp., United States

Trade-Offs between Gate Oxide Protection and Performance in SiC MOSFETs [#0730]
Jose Ortiz Gonzalez, Ruizhu Wu, Olayiwola Alatise
University of Warwick, United Kingdom

Turn on Switching Transient Analysis of SiC MOSFET and Schottky Diode Pair [#0883]
Shamibrota Kishore Roy, Kaushik Basu
Indian Institute of Science-Bangalore, India

Switching Current Imbalance Mitigation for Paralleled SiC MOSFETs using Common-Mode Choke in Gate Loop [#0960]
Jiye Liu, Zedong Zheng
Tsinghua University, China

Current Sharing Analysis of SiC Power Modules in Parallel Operation [#1574]
Yue Zhang, Zhining Zhang, Boxue Hu, Faisal Alsaif, Khalid Alkhalid, Xiao Li, Jin Wang
The Ohio State University, United States

A 1200V/650V/160A SiC+Si IGBT 3-Level T-Type NPC Power Module with Optimized Loop Inductance [#1140]
Asif Imran Emon, Zhao Yuan, Amol Deshpande, Hongwu Peng, Riya Paul, Fang Luo
University of Arkansas, United States
Tuesday, October 13
Special Session 1-B: Prof. Tom Lipo Memorial Session 2
Chair(s): Thomas Jahns, Bulent Sarlioglu

Evaluation of Current Distortion Improvement in an Asymmetrical Six-Phase Induction Motor Drive by using SiC MOSFETs with Reduced Dead Time [#0237]
   Ajay Kumar Morya¹, Alejandro G. Yepes², Jesús Doval-Gandoy², Hamid A. Toliyat¹
   ¹Texas A&M University-College Station, United States; ²University of Vigo, Spain

Overload Performance Prediction of PM and Synchronous Reluctance Machines for Traction Applications [#0449]
   Matteo Carbonieri¹, Wen L. Soong², Amin Mahmoudi³, Solmaz Kahourzade³, Nicola Bianchi¹
   ¹University of Padova, Italy; ²University of Adelaide, Australia, Australia; ³Flinders University, Australia;
   ⁴University of South Australia, Australia

Performance Comparison between SiC Two-Level and Si Three-Level AFE Converters [#0641]
   Marzieh Karami¹, Rangarajan Tallam¹, Kenneth E. Pagenkop², Robert Cuzner³
   ¹Rockwell Automation, United States; ²Cramer Magnetics, United States;
   ³University of Wisconsin-Milwaukee, United States

Poster 1: NVH, Reliability and Machine Diagnostics
Chair(s): Jose Antonino-Daviu, Francisco Paz

Irreversible Demagnetization Fault Prognosis in a Permanent Magnet Type Machines [#0688]
   Zia Ullah, Jin Hur
   Incheon University, Korea

Online Detection of Irreversible Demagnetization Fault with Non-Excited Phase Voltage in Brushless DC Motor Drive System [#0925]
   Doo-Ho Kim, Jun-Hyuk Im, Ullah Zia, Jin Hur
   Incheon National University, Korea

Insulation Design of a High Frequency Electrical Machine for More Electric Aircraft Propulsion [#0043]
   Yalin Wang¹, Xuan Yi², Xiaolong Zhang², Yi Yin¹, Tao Han¹, Kiruba Haran²
   ¹Shanghai Jiao Tong University, China; ²University of Illinois at Urbana-Champaign, United States

Vibration Prediction using the Relative Permeance of IPMSM [#0458]
   Seung-Hyeon Lee¹, In-Jun Yang¹, Won-Ho Kim¹, Ik Sang Jang²
   ¹Gachon University, Korea; ²Hyundai Mobis, Korea

Stray Flux-Based Incipient Stage Bearing Fault Detection for Induction Machines via Noise Cancellation Techniques [#1422]
   Genyi Luo¹, Thomas G. Habeller¹, Jed Hurwitz²
   ¹Georgia Institute of Technology, United States; ²Analog Devices, Inc., United Kingdom

Investigation of Mode 0 Acoustic Noise Reduction of Interior Permanent Magnet Motor with a Principle of Radial Force Sum Flattening [#0446]
   Leping Wang, Ryo Umeoka, Akira Chiba
   Tokyo Institute of Technology, Japan
Winding Condition Monitoring of Inverter-Fed PMSM using High-Frequency Current Injection [#0363]
Zheng Xu, Jianzhong Zhang, Yaqian Zhang, Jin Zhao
Southeast University, China

Wide Speed Range NVH Performance Optimization in Permanent Magnet Synchronous Machines for Automotive Application using Vibration Synthesis [#1534]
Shuvajit Das¹, Anik Chowdhury¹, Zhao Wan², Mojtaba Bahrami Kouhshahi², Alejandro Pina Ortega², Yilmaz Sozer¹
¹The University of Akron, United States; ²Nexteer Automotive, United States

Design of Experiments for Stator Windings Insulation Degradation under High dv/dt and High Switching Frequency [#0642]
Fernando Alvarez-Gonzalez¹, David Hewitt¹, Antonio Griffo¹, Jiabin Wang¹, Mohamed Diab², Xibo Yuan²
¹The University of Sheffield, United Kingdom; ²University of Bristol, United Kingdom

Detection of Early Inter-Turn Stator Faults in Induction Motors via Symmetrical Components – Current vs Stray Flux Analysis [#0299]
Konstantinos N. Gyftakis
University of Edinburgh, United Kingdom

Sensitivity Analysis based NVH Performance Evaluation in Permanent Magnet Synchronous Machines using Lumped Unit Force Response [#1533]
Shuvajit Das¹, Anik Chowdhury¹, Zhao Wan¹, Mojtaba Bahrami Kouhshahi², Alejandro Pina Ortega², Yilmaz Sozer¹
¹The University of Akron, United States; ²Nexteer Automotive, United States

Remote Monitoring and Diagnostics of Blade Health in Commercial MW-Scale Wind Turbines using Electrical Signature Analysis (ESA) [#0425]
Lijun He¹, Mohammad Attia², Liwei Hao¹, Biao Fang¹, Karim Younsi¹, Honggang Wang¹
¹GE Research, United States; ²GE Renewable Energy, United States

Poster 2: EV Charging Infrastructure
Chair(s): Mohammed Alam, Rashmi Prasad

Medium Voltage Contactless Power Transfer for EV Fast Charging [#0790]
Isaac Wong, Suvendu Samanta, Subhashish Bhattacharya
North Carolina State University, United States

Research on 11kW Wireless Charging System for Electric Vehicle based on LCC-SP Topology and Current Doubler [#0149]
Yunhui Wang¹, Meng Xiong¹, Xun Wang¹, Qile Li², Zhao Jiang², Xuezhe Wei¹, Haifeng Dai¹
¹Tongji University, China; ²Ningbo Preh Joyson Automotive Electronics, China

A Sensorless Coil Detection Scheme based on Dead-Time Effect in Dynamic Wireless Power Transfer Systems [#0717]
Utkarsh D. Kavimandan¹, Veda P. Galigekere², Burak Ozpineci², Jason Pries², Omer Onar², Satish M. Mahajan¹
¹Tennessee Technological University, United States; ²Oak Ridge National Laboratory, United States
Vehicle-to-Vehicle Inductive Power Transfer: Design Analysis and Topology Selection [#1047]
Van Thuan Nguyen¹, Van Binh Vu², Vaibhav Uttam Pawaskar¹, Rakesh Krishna Katakam¹, Ghanshyamsinh Gohil¹
¹The University of Texas at Dallas, United States; ²Newcastle University, United Kingdom

Shield Design for 50 kW Three-Phase Wireless Charging System [#1524]
Mostak Mohammad, Jason L. Pries, Omer C. Onar, Veda P. Galigekere, Gui-Jia Su
Oak Ridge National Laboratory, United States

An Automated Component-Based Hardware Design of a Three-Phase Dual-Active Bridge Converter for a Bidirectional On-Board Charger [#0058]
Ryota Kondo¹, Philipp Schülling², Arne Hendrik Wienhausen², Rik W. De Doncker²
¹Mitsubishi Electric Corp., Japan; ²RWTH Aachen University, Germany

An Improved PQ Zeta Converter with Reduced Switch Voltage Stress for Electric Vehicle Battery Charger [#0872]
Radha Kushwaha¹, Bhim Singh¹, Vinod Khadkikar²
¹Indian Institute of Technology Delhi, India; ²Khalifa University-Abu Dhabi, United Arab Emirates

Dynamic Process Analysis of a High-Power Bidirectional DC/DC Converter for Electric Vehicles [#0865]
Liyan Zhu¹, Hua (Kevin) Bai¹, Alan Brown², Matt McAmmond²
¹The University of Tennessee-Knoxville, United States; ²Hella Electronics Corp., United States

Improved Power Quality Charging System based on High Step Down Gain Bridgeless SEPIC APFC for Light Electric Vehicles [#0902]
Jitendra Gupta¹, Radha Kushwaha¹, Bhim Singh¹, Vinod Khadkikar²
¹Indian Institute of Technology Delhi, India; ²Khalifa University, United Arab Emirates

Reducing the Impact of Plug-In Electric Vehicles on Distribution Transformers [#1252]
Akansha Jain, Masoud Karimi-Ghartemani
Mississippi State University, United States

Design and Control of OBC-LDC Integrated Circuit with Variable Turns Ratio for Electric Vehicles [#0100]
Issac Kim, Sunho Lee, Jung-Wook Park
Yonsei University, Korea

High Frequency AC Power Distribution Network for Electric Vehicle Auxiliary Electrical System [#0787]
Qunfang Wu¹, Mengqi Wang¹, Weiyang Zhou¹, Yanghe Liu²
¹University of Michigan-Dearborn, United States; ²Toyota Research Institute North America, United States

Electric Vehicle (EV) Chassis Dynamometer Testing [#0032]
Annette von Jouanne, Jimi Adegbohun, Ryan Collin, Madeline Stephens, Brian Thayil, Caleb Li, Emmanuel Agamlah, Alex Yokochi
Baylor University, United States

Estimation of Peukert Constant of Lithium-Ion Batteries and its Application in Battery Discharging Time Prediction [#0894]
Yadong Gong, Xiaoyong Zhang, Heng Li, Hongtao Liao, Zhiqiang Meng, Yongjie Liu, Zhiwu Huang
Central South University, China
Intercell Transformer Coupled Buck Converter in One-of-Three Rectifier [#1379]
Yuxiang Shi, Jing Xu, Goran Mandic, Sandeep Bala
ABB US Corporate Research Center, United States

A Merged-Two-Stage LEGO-PoL Converter with Coupled Inductors for Vertical Power Delivery [#1224]
Youssef Elasser, Jaeil Baek, Minjie Chen
Princeton University, United States

High Step-Down ZCS Buck Converter with Switched Capacitor [#0115]
Jingjing Qi¹, Xuezhi Wu¹, Yuming Zhao², Jingdou Liu²
¹Beijing Jiaotong University, China; ²Shenzhen Power Supply Co., China

A Quasi Output Voltage Regulation Technique for the Zero Inductor-Voltage Converter [#1550]
Samuel Webb, Yan-Fei Liu
Queen's University, Canada

Loss Model and Output Impedance Analysis of a 48V-to-1V High Current Point-of-Load Converter [#0239]
Alexander Fiore, Qingyun Huang, Alex Q. Huang
The University of Texas-Austin, United States

Comparative Topology and Power Loss Analysis on 48V-to-1V Direct Step-Down Non-Isolated DC-DC Switched-Mode Power Converters [#0567]
Jin Woong Kwak, D. Brian Ma
The University of Texas at Dallas, United States

Pre-Charge, Discharge, and Mini-UPS Circuits in Auxiliary Power Network Architecture for 10 kV SiC-Based Power Electronics Building Blocks [#0924]
Keyao Sun, Jun Wang, Xiang Lin, Rolando Burgos, Dushan Boroyevich
Virginia Polytechnic Institute and State University, United States

Synthesizing a Comprehensive Set of Converter Topologies for a Specified Voltage Gain [#1338]
Ramanuja Panigrahi, Santanu K. Mishra, Avinash Joshi
Indian Institute of Technology Kanpur, India

Low-Ripple High-Voltage DC Generation using a Serially Segmented Multiphase Voltage Multiplier [#0844]
Sanghyeon Park, Juan Rivas-Davila
Stanford University, United States

Modulation Strategy to Minimise RMS and Peak Currents in Dual Active Bridge Converter [#0841]
Dibakar Das, Kaushik Basu
Indian Institute of Science, India
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Chair(s): Huai Wang, Mark J Scott

A Planar PCB based Energy Harvester with Voltage Multiplier [#0591]
Yong Chen, Han Peng, Zhijie Feng, Zhipeng Cheng, Qiaoling Tong, Yong Kang
Huazhong University of Science and Technology, China

Embedded Implementation of Rainflow-Counting for On-Line Predictive Maintenance [#1081]
Carlo Concari, Giada Bettini
University of Parma, Italy

A Ground Clamped Solid-State Circuit Breaker for DC Distribution Systems [#0646]
Tiancan Pang, Muhammad Foyazur Rahman, Madhav D. Manjrekar
University of North Carolina-Charlotte, United States

A Dynamic Efficiency Optimization Method under ZVS Conditions in the Series-Series Type Wireless Power Transfer System [#1441]
Yangbin Jiang, XiPei Yu, Chenxu Zhao, Ruibang Li, Min Wu, Longyang Yu, LaiLi Wang
Xi’an Jiaotong University, China

A Three Stage Architecture for a High Voltage Step-Down Wireless Charging System [#0986]
Apurv Kumar Yadav, Arun Sankar, Alireza Khaligh
University of Maryland, United States

Analysis and Design Considerations of a Compact Transmitter Topology in Low Power Wireless Power Transfer System with Extremely Low Coupling Factor [#1209]
S. Zhang
Power Electronics, United States

Application of SWPDT in the Feedback Control of Wireless EV Charging [#0288]
Hao Chen, Zeqian Cheng, Zhongnan Qian, Jiande Wu, Xiangning He
Zhejiang University, China

Modelling and Analysis of Total Harmonic Distortion in Series-Series Wireless Power Transfer System for 6.78 MHz [#0658]
Lixin Shi, J.C. Rodriguez, Pedro Alou
Universidad Politécnica de Madrid, Spain

Transferring Driving Pulses to Implement Dual-Side Phase-Shift Control of Wireless Power Transfer on Primary Side using Driving Windings [#0117]
Yiming Zhang, Xin Li, Shuxin Chen, Yi Tang
Nanyang Technological University, Singapore

A Study of High Electrical Power and High Efficiency Antenna in 13.56 MHz Wireless Power Transfer [#0330]
Masanori Watanabe, Kan Akatsu
Shibaura Institute of Technology, Japan

Transmitter Coil Design for Multi-Load Wireless Power Transfer Systems [#1513]
Jie Li, Jingjing Sun, Ruiyang Qin, Daniel Costinett
The University of Tennessee, United States
Design and Implementation of Paralleled Inverters with LCLC Resonant Tanks to Generate Plasma for Surface Treatment Applications [#0053]
Tsai-Fu Wu, Anumeha Kumari, Ling-Chia Yu, Kuan-Chung Chen
National Tsing Hua University, Taiwan

Poster 5: Electric Machines Materials, Losses, Thermal, Manufacturing, Modelling Issues
Chair(s): Rajeev Vyas, Edwin Xiaki Sun

A Simplified Efficiency Estimation approach for Converter-Fed Induction Motors [#1200]
John Mushenya, Azeem Khan, Paul Barendse
University of Cape Town, South Africa

Multilayer Bonded Magnets in Surface-Mounted PM Synchronous Machines [#1602]
Mostafa Ahmadi Darmani, Emir Poskovic, Silvio Vaschetto, Fausto Franchini,
Luca Ferraris, Andrea Cavagnino
Politecnico di Torino, Italy

Loss Modeling for Interlocked Magnetic Cores [#0407]
Zbigniew Gmyrek¹, Andrea Cavagnino², Silvio Vaschetto², Gerd Bramerdorfer³
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Modeling of the Temperature Dependence of Soft Magnetic Material [#1091]
Gereon Goldbeck¹, Gerd Bramerdorfer¹, Wolfgang Amrhein¹, Josef Hinterdorfer², Bernhard Weiß
¹Johannes Kepler University Linz, Austria; ²Voestalpine Stahl GmbH, Austria

Off-Line Efficiency Mapping of Induction Motors Operated in Wide Torque-Speed Ranges [#0660]
Ornella Stiscia, Sandro Rubino, Silvio Vaschetto, Andrea Cavagnino, Alberto Tenconi
Politecnico di Torino, Italy

Winding Embedded Liquid Cooling for High Power Density Slotless Motor [#0979]
Ritvik Chattopadhyay¹, Md Sariful Islam¹, Rajib Mikail², Iqbal Husain¹
¹North Carolina State University, United States; ²ABB US Corporate Research Center, United States

Multi-Physics Analysis to Effectively Evaluate Thermal Performance of Liquid-Cooled Electric Machines [#1539]
Abdul Wahab Bandarkar¹, Md Tawhid Bin Tarek¹, Lavanya Vadamodala¹, Yilmaz Sozer¹,
David Colavincenzo², Fernando Venegas², Jeffrey Geither²
¹The University of Akron, United States; ²Bendix Commercial Vehicle Systems, United States

Coupled Electromagnetic and Thermal Optimisation Strategies for Direct-Drive Linear Permanent Magnet Synchronous Motors [#0801]
Soroosh Haji Hosseinejad¹, Thor F. Besier², Andrew J. Taberner², Bryan P. Ruddy²
The University of Auckland, New Zealand

Thermal Modelling of a Permanent Magnet Synchronous Machine through FEM Simulation with Experimental Validation [#0918]
Alejandro L. Rodriguez¹, Patrick Lombard¹, Vincent Leconte¹, Philippe Wendling¹, Irma Villar²
¹Altair Engineering France, France; ²Basque Research and Technology Alliance, Spain
Analysis of Axial Temperature Variation Effect on the Performance of Five-Phase Permanent Magnet Assisted Synchronous Reluctance Motor [©0423]
Md. Khurshedul Islam, Seungdeog Choi
Mississippi State University, United States

Physically Meaningful Linear Electric Machine Frequency Analysis and Modeling Technique without a Constant Speed Assumption [©0070]
Austin E.N. Gaspar
University of Wisconsin-Madison, United States

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Chair(s): Udochukwu Akuru, Lijian Wu

Eddy Current Loss Reduction in 3D-Printed Axial Flux Motor using 3D-Printed SMC Core [©0441]
Hyun-Jo Pyo¹, Jae Won Jeong², Jihun Yu², Dong-Woo Nam¹, Seo-Hee Yang¹, Won-Ho Kim¹
¹Gachon University, Korea; ²Korea Institute of Material Science, Korea

Basic Characteristics of an Axial-Gap Type Magnetic Resonant Coupling Machine with Different Numbers of Poles [©0454]
Kazuto Sakai, Takanobu Akiyama
Toyo University, Japan

A Robust Position Control System based on Load Force Observer for RotLin Machine [©0897]
Lang Bu, Yasutaka Fujimoto
Yokohama National University, Japan

A Motor Design based on Wireless Magnetic Resonance Coupling Technology [©0907]
Besong John Ebot, Yasutaka Fujimoto
Yokohama National University, Japan

Design and Testing of a High Force Density Linear Electromagnetic Actuator [©0174]
Zhengmeng Liu, Jiabin Wang
The University of Sheffield, United Kingdom

Design and Analysis of a Vernier Motor Considering Series Compensation [©0871]
Abdur Rehman, Byungtaek Kim, Young Hoon Joo
Kunsan National University, Korea

Comparative Analysis of Outer-Rotor Flux-Modulated Permanent Magnet Generator Topologies [©1109]
John Mushenya, Azeem Khan
University of Cape Town, South Africa

Analysis and Optimization of Radial Flux Modular Stator Permanent Magnet Synchronous Machines [©0498]
Werner Jara¹, Gerd Bramerdorfer², Carlos Madariaga¹, Javier Riedemann¹, Juan Tapia³,
Gordan Segon⁴, Werner Koppelstätter⁴, Siegfried Silber⁴
¹Pontificia Universidad Catolica, Chile; ²Johannes Kepler University Linz, Austria;
³University of Concepcion, Chile; ⁴Linz Center of Mechatronics, Austria
Analysis of a Five-Phase PM Vernier Machine Topology with Two-Slot Pitch Winding [#0956]
Shaohong Zhu, Tom Cox, Zeyuan Xu, Chris Gerada
University of Nottingham, United Kingdom

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**Chair(s):** Grant Pitel, Luca Solero

**A Wide Range Output Voltage Gain Operation with Mode Transition of Single Input Dual Output LLC Converter [#0467]**
Yuki Kinoshita, Hitoshi Haga
Nagaoka University of Technology, Japan

**ZVS Analysis of Half Bridge LLC-DCX Converter Considering the Influence of Resonant Parameters and Loads [#1495]**
Guoliang Deng, Yao Sun, Guo Xu, Xiaoying Chen, Shiming Xie, Shutian Yan, Mei Su, Yuefeng Liao
Central South University, China

**LLC Resonant Converter with Reconfigurable Voltage Rectifier for Wide Input Voltage Applications [#1038]**
Fahad Alaql, Issa Batarseh
University of Central Florida, United States

**Review and Comparison of Resonant DC-DC Converters for Wide-Output Voltage Range Applications [#1046]**
Fahad Alaql, Issa Batarseh
University of Central Florida, United States

**Multiple-Output LLC Resonant Converter with Magnetic Control [#0512]**
Yuqi Wei¹, Quanming Luo², Dereje Woldegiorgis¹, Alan Mantooth¹
¹University of Arkansas, United States; ²Chongqing University, China

**Comparison of a Dual Active Bridge and CLLC Converter for On-Board Vehicle Chargers using GaN and Time Domain Modeling Method [#0110]**
Konstantin Siebke, Regine Mallwitz
Technische Universität Braunschweig, Germany

**Efficiency Optimization of Dual Active Bridge DC-DC Converter with Triple Phase-Shift Control [#0693]**
Garry Jean-Pierre¹, Necmi Altin², Ahmad El Shafei¹, Adel Nasiri¹
¹University of Wisconsin-Milwaukee, United States; ²Gazi University, Turkey

**An Optimized Scheme for Current Stress Reduction with Zero-Voltage Switching in Dual-Active-Bridge Converters under Varying Input Voltage [#0935]**
Haoyu Zhang, Motoki Akihiro, Tomoyuki Mannen, Takanori Isobe
University of Tsukuba, Japan

**Hardware Design of SiC-Based Four-Port DAB Converter for Fast Charging Station [#1478]**
M. di Benedetto¹, A. Lidozzi¹, L. Solero¹, F. Crescimbini¹, S. Bifaretti²
¹Roma Tre University, Italy; ²Tor Vergata University, Italy
Integrated Planar Transformer Design of 3-kW Auxiliary Power Module for Electric Vehicles [#0825]
Ramadhan Muhammad¹, Sangjin Kim¹, Chaeyoung Suk¹, Sewan Choi¹, Byeongyu Yu², Sanghun Park²
¹Seoul National University of Science and Technology, Korea; ²LG Electronics, Korea

Design and Optimization of a High Power Density Low Voltage DC-DC Converter for Electric Vehicles [#1501]
Yang Chen, Wenbo Liu, Andrew Yurek, Xiang Zhou, Bo Sheng, Yan-Fei Liu
Queen's University, Canada

Modulation Strategy for a Multilevel DC-DC Converter Interfacing EV Battery and Propulsion Inverter during Regenerative Mode [#0746]
Vinay Rathore¹, Kaushik Rajashekara¹, Parthasarathy Nayak²
¹University of Houston, United States; ²Emerson Commercial and Residential Solutions, United States

A Novel Topology for an Extendable Isolated DC-DC Multi-Port Power Converter with a Multipurpose Hybrid Energy Storage System [#0524]
Sina Vahid, Ayman El-Refaie
Marquette University, United States

A Family of High Frequency Isolated Impedance Source DC-DC Converters for Distributed Power Generation Systems [#0104]
Zeeshan Aleem, Hyoung-Kyu Yang, Jung-Wook Park
Yonsei University, Korea

High Frequency Active-Clamped Zero-Current Switching Current-Fed Push-Pull Converter for Micro-Converter Applications [#0791]
Qunfang Wu¹, Mengqi Wang¹, Weiyang Zhou¹, Can Huang², Guanliang Liu¹, Xiaoming Wang³
¹University of Michigan-Dearborn, United States; ²Lawrence Livermore National Laboratory, United States; ³Somion Global LLC, United States

Poster 8: Converters for AC and DC Microgrids
Chair(s): Ali Marzoughi, Qiang Wei

A 4kV/100A SiC MOSFETs-Based Solid State DC Circuit Breaker with Low Stray Inductances and Powered by a Load-Independent Wireless Power Transfer System [#1232]
Zhonghao Dongye¹, Yao Wang¹, Hua Zhang¹, Sheng Zheng², Xiaonan Lu³, Fei Lu¹
¹Drexel University, United States; ²Oak Ridge National Laboratory, United States; ³Temple University, United States

A Distributed approach for Secondary and Tertiary Layer Control in DC Microgrids [#1305]
Ashray Manur, Maitreyee Marathe, Giri Venkataramanan
University of Wisconsin-Madison, United States

Current Derivative Assisted Protection Coordination System for Faster Fault Isolation in a Radial DC Microgrid [#1392]
Md Rifat Kaisar Rachi, Mehnaz Akhter Khan, Iqbal Husain
North Carolina State University, United States

A Dynamic Diffusion Algorithm for Distributed Secondary Control of DC Microgrids [#0804]
Dawei Liao¹, Fei Gao¹, Yutong Zhao¹, Daniel Rogers²
¹Shanghai Jiao Tong University, China; ²University of Oxford, United Kingdom
**A New approach for Hybrid AC-DC Circuit Fault Analysis** [#1146]  
Mohammad Mehdi Rezvani, Shahab Mehrooeeen  
Louisiana State University, United States

**Modular Hybrid DC Circuit Breaker for Medium-Voltage DC System** [#0850]  
Dong-Uk Kim, Sungmin Kim  
Hanyang University, Korea

**A Rule based EMS for Fast Charging Station with CHIL Implementation** [#0744]  
Dhruv Kler, Asal Zabetian Hosseini, Sony Varghese, Chu Sun, Geza Joos  
McGill University, Canada

**Impedance Estimator for Multi-Source DC Microgrids with Islanding Detection Capabilities** [#1048]  
Cristian Blanco, Pablo Garcia, Andres Suarez, Irene Pelaez  
University of Oviedo, Spain

**An Emulation Platform for Mimicking Unbalanced Loads and Sources** [#0125]  
A.S. Vijay, Suryanarayana Doola, Mukul C. Chandorkar  
Indian Institute of Technology-Bombay, India

**An Improved Distributed Secondary Control Scheme for Islanded AC Microgrids** [#0805]  
Jiahao Yu, Fei Gao, Shanshan Wei, Junzhong Xu, Dawei Liao, Yutong Zhao  
Shanghai Jiaotong University, China

**Distributed Averaging Optimization-Based Technique for Microgrid Secondary Control** [#0818]  
Fahad Alshammari, Ayman El-Refaie  
Marquette University, United States

**Poster 9: Electric Machines (IPMSM and Synchronous Reluctance)**  
Chair(s): Takashi Kosaka, Ignacio Galiano

**Induction Motor Performance Prediction using Static FEA: Method Description and Comparison with Time-Domain Approach** [#0762]  
Matteo Carbonieri¹, Lino Di Leonardo², Marco Tursini², Marco Villani², Mircea Popescu³  
¹University of Padova, Italy; ²University of L'Aquila, Italy; ³Motor Design Ltd., United Kingdom

**Influence of Airgap Length on Performance of High Power PM-Assisted Syn-Rel Machines** [#1361]  
Tianjie Zou¹, David Gerada¹, Adam Walker¹, Gaurang Vakil¹, Salvatore La Rocca¹, Antonino La Rocca¹, Krzysztof Paciura², Richard Barden², Emil Ernest², Shaohong Zhu², Naiya Qayyum², Alastair McQueen¹, Anuvad Bardalai¹, R.M. Ram Kumar¹, Alessandra Marfoni¹, Chris Gerada¹  
¹University of Nottingham, United Kingdom; ²Cummins Corporate R&T, United Kingdom

**Improvement in Torque Density by Ferrofluid Injection into Interior Permanent Magnet Synchronous Motor** [#0463]  
In-Jun Yang¹, Seung-Hyeon Lee¹, Dong-Ho Kim², Kwang-Soo Kim³, Ik Sang Jang⁴, Won-Ho Kim¹  
¹Gachon University, Korea; ²Hanyang University, Korea; ³Halla University, Korea; ⁴Hyundai Mobis, Korea

**Design of High-Speed Wet-Type Permanent Magnet Synchronous Motor Considering Oil Frictional Loss** [#0613]  
Wenbo Jin, Hong Guo, Jinquan Xu  
Beihang University, China
Experimental Test on Dual Three-Phase Synchronous Reluctance Motor [#1194]
Jun-Kyu Park¹, Chaelim Jeong², Alberto Bellini³, Claudio Bianchini⁴, Nicola Bianchi²
¹Korea Electrotechnology Research Institute, Korea; ²University of Padova, Italy;
³University of Bologna, Italy; ⁴University of Modena and Reggio Emilia, Italy

The Study on Improving Reluctance Torque and Preventing Irreversible Demagnetization by Modified the Shape of Conventional Ferrite Flux-Concentrated Motor [#0882]
Min-Jae Jeong¹, Hyun-Jo Pyo¹, Dong-Woo Nam¹, Seo-Hee Yang¹, KangBeen Lee², Won-Ho Kim¹
¹Gachon University, Korea; ²Hyundai Kia Namyang Institute, Korea

Design Optimization of a Novel Axial Flux Ferrite Magnet Assisted Synchronous Reluctance Motor [#1538]
Md Tawhid Bin Tarek, Yilmaz Sozer
The University of Akron, United States

Magneto-Structural Combined Dimensional and Topology Optimization of Interior Permanent Magnet Synchronous Machine Rotors [#1279]
Feng Guo, Ian P. Brown
Illinois Institute of Technology, United States

Detection Technique for Manufacturing Imperfection of Rare-Earth Magnets on IPMSM [#0403]
Deok-Jae Kwon, Jun-Hyuk Im, Mudassir Raza Siddiqi, Jin Hur
Incheon National University, Korea

Finite Element-Based Multi-Objective Design Optimization of IPM Considering Saturation Effects for Constant Power Region of Operation [#0966]
Qingqing Ma, Ayman El-Refaie
Marquette University, United States

A Unified Model for Field Weakening Operation of Synchronous AC Machines [#1171]
Dheeraj Bobba, Bulent Sarlioglu
University of Wisconsin-Madison, United States

Simple Robust Rotor 5 MW Synchronous Reluctance Generator [#0761]
Jandré Dippenaar, Maarten J. Kamper
Stellenbosch University, South Africa

Parameter Measurements and Modeling of a Novel Hybrid Variable Flux Machine with Series Rare-Earth and AlNiCo Magnets [#0417]
Rajendra Thike, Pragasen Pillay
Concordia University, Canada

Hybrid Excitation Method for Higher Pole Number Grid-Tie Synchronous Generators [#1184]
Dillan K. Ockhuis, Maarten J. Kamper, Andrew T. Loubser
Stellenbosch University, South Africa
Poster 10: Transportation Electrification and Battery Management Systems
Chair(s): Hassan Hossam Hassan Eldeeb, Rafael Pena Alzola

Position Sensorless PMSM Drive for Solar PV-Battery Light Electric Vehicle with Regenerative Braking Capability [#0147]
Sreejith R., Bhim Singh
Indian Institute of Technology Delhi, India

A Comparative Study of Technologies for Wayside Energy Storage in DC Rail Transportation Systems [#0091]
Oindrilla Dutta, Ahmed Mohamed
City College of New York, United States

Short Current Protection Circuit for Automotive Motor Inverters Application based on GaN Transistors [#0905]
Jacob Parnes, David Shapiro, Gleb Vetakh, Yuri Gitelmakher, Gregory Bunin
VisIC Technologies, Israel

Speed Planning for Autonomous Driving in Dynamic Urban Driving Scenarios [#0773]
Mingqiang Wang¹, Zhenpo Wang¹, Lei Zhang¹, D.G. Dorrell²
¹Beijing Institute of Technology, China; ²University of Witwatersrand, South Africa

Active Voltage Balancing of Integrated Modular Drive with Series DC-Link Capacitors [#0540]
Fan Wu¹, Ayman M. El-Refai², Thomas M. Jahns²
¹Marquette University, United States; ²University of Wisconsin-Madison, United States

Four-Port Modular Multilevel AC/AC Converter in Continuous Co-Phase Traction Power Supply Application [#1287]
Mingrui Li¹, Xiaqian Li¹, Yunzhi Lin², Yingdong Wei¹, Chao Lu¹, Zhiyuan Shen¹,
Ziming Li¹, Zengqin Li³
¹Tsinghua University, China; ²China Railway Electrification Engineering Group, China;
³China Railway Electric Industry Co., Ltd, China

Stray Inductance-Based Current Sensing Considering Temperature-Dependent DCR Effect [#1110]
Sang Min Kim, Taesuk Kwon
Hyundai Mobis, Korea

Zero-Sequence Current Control in a Back to Back Inverter with Pump Back Test Configuration [#0235]
Yuzhi Zhang¹, Zhongjie Wang², Yu Du¹
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¹Chiba University, Japan; ²Omron Corp., Japan

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¹Federal University of Campina Grande, Brazil; ²Federal Rural University of Pernambuco, Brazil

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¹Aalborg University, Denmark; ²SINTEF Energy Research Institute, Norway

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¹Temple University, United States; ²Oregon State University, United States

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¹Halla Mechatronics, United States; ²North Carolina State University, United States

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¹University of Wisconsin-Madison, United States; ²University of Minnesota, United States

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Md Sariful Islam¹, Rajib Mikail², Iqbal Husain¹
¹North Carolina State University, United States; ²ABB US Corporate Research Center, United States

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¹University of New South Wales, Australia; ²CSIRO, Australia

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¹Virginia Polytechnic Institute and State University, United States; ²Siemens Corporate Research, Germany

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¹Qatar University, Qatar; ²University of Malaya, Malaysia

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¹The University of British Columbia, Canada; ²King Abdullah University of Science and Technology, Saudi Arabia; ³Yonsei University, Korea

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¹Oregon State University, United States; ²Ecomerit Technologies, LLC, United States

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¹Chungnam National University, Korea; ²California State University-Fresno, United States

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¹Graduate University of Advanced Technology, Iran; ²Western University, Canada
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University of North Carolina-Charlotte, United States

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École de Technologie Supérieure, Canada

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Yunting Liu¹, Leon M. Tolbert¹, Fred Wang¹, Fang Z. Peng²
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  Zhiyong Xia, Jaber A. Abu Qahouq
  University of Alabama, United States

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  \textsuperscript{1}East Carolina University, United States; \textsuperscript{2}Oak Ridge National Laboratory, United States; \textsuperscript{3}The University of Tennessee, United States

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  \textsuperscript{1}The University of Alabama, United States; \textsuperscript{2}Mississippi State University, United States; \textsuperscript{3}University of Central Florida, United States

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  \textsuperscript{1}The University of Tennessee-Knoxville, United States; \textsuperscript{2}Oak Ridge National Laboratory, United States

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  Temple University, United States

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  \textsuperscript{1}North Carolina State University, United States; \textsuperscript{2}EATON, United States
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**Chair(s): Andrea Cavagnino, Alireza Fatemi**

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John Noon\(^1\), He Song\(^1\), Bo Wen\(^1\), Igor Cvetkovic\(^1\), Srdjan Srdic\(^2\), Gernot Pammer\(^2\), Rolando Burgos\(^1\)
\(^1\)Virginia Polytechnic Institute and State University, United States; \(^2\)EGSTON Power Electronics GmbH, Austria

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An Li, Dong Jiang, Xiangwen Sun, Zicheng Liu
Huazhong University of Science and Technology, China

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Michael Rios, Giri Venkataramanan
University of Wisconsin-Madison, United States

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Zhiwei Zhang
The Ohio State University, United States

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Dong-Ho Kim\(^1\), Kwang Soo Kim\(^2\), Ju Lee\(^1\), In-Jun Yang\(^3\), Si-Woo Song\(^3\), Won-Ho Kim\(^3\)
\(^1\)Hanyang University, Korea; \(^2\)Halla University, Korea; \(^3\)Gachon University, Korea

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Haisen Zhao\(^1\), Xinglan Guo\(^1\), Xin Dai\(^2\), Hassan H. Eldeeb\(^3\), Yang Zhan\(^1\), Guorui Xu\(^1\), Osama Mohammed\(^3\)
\(^1\)North China Electric Power University, China; \(^2\)Inner Mongolian Baotou Donghua Thermal Power Plant, China; \(^3\)Florida International University, United States

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Taohid Latif\(^1\), Mohamed Zubair M. Jaffar\(^2\), Iqbal Husain\(^1\)
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Habib Castro-Coronado, Jose Antonino-Daviu, Alfredo Quijano-Lopez, Vicente Fuster-Roig, Pedro Llovera-Segovia
Universitat Politècnica de València, Spain

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Mousalreza Faramarzi Palangar\(^1\), Amin Mahmoudi\(^1\), Solmaz Kahourzade\(^2\), Wen L. Soong\(^3\)
\(^1\)Flinders University, Australia; \(^2\)University of South Australia, Australia; \(^3\)University of Adelaide, Australia

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Ying Xie, Zexin Ma, Yuwen Xu, William Cai, Zhaoyang Ning, Shengming Hu
Harbin University of Science and Technology, China
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Emmanuel Agamloh¹, Silvio Vaschetto², Andrea Cavagnino², Annette von Jouanne¹, Alexandre Yokochi¹
¹Baylor University, United States; ²Politecnico di Torino, Italy

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Sumeet Singh, Pragasen Pillay
Concordia University, Canada

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Mohammad Noor Bin Shaheed, Yilmaz Sozer, Sifat Chowdhury, J. Alex De Abreu-Garcia
The University of Akron, United States

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Yang Peng, Yue Wang, Yonghui Liu, Hang Liu
Xī'ān Jiàotòng Universit y, China

Reactive Power Modulation Strategy of a Single-Stage Buck-Boost-Type Inverter [#0303]
Ken King Man Siu, Carl Ngai Man Ho
University of Manitoba, Canada

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University of Modena and Reggio Emilia, Italy

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Yonsei University, Korea

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University of Cape Town, South Africa
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Auburn University, United States

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Anshul Varshney, Utkarsh Sharma, Bhim Singh
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Immad Shams1, Prashant Shrivastava1, Kok Soon Tey1, Saad Mekhilef1,2
1University of Malaya, Malaysia; 2Swinburne University of Technology, Australia

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Xiao Li, Jianyu Pan, Ziwei Ke, Rui Liu, Junchong Fan, Yue Zhang, Boxue Hu,
Risha Na, Longya Xu, Jin Wang
The Ohio State University, United States

Three-Phase AC-DC-AC Converter with Shared Legs and Floating H-Bridges [#1277]
Alan S. Felinto, Cursino B. Jacobina
Federal University of Campina Grande, Brazil

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Dehong Zhou1, Zhongyi Quan2, Yunwei (Ryan) Li2
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Amanda P. Monteiro1, Cursino B. Jacobina1, Filipe A.C. Bahia2, Reuben P.R. Sousa1
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Rodrigo P. de Lacerda1, Cursino B. Jacobina1, Edgard L.L. Fabricio2, Alan Santana Felinto1
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Full Power Range Seamless Control of Three-Phase Unidirectional Vienna Rectifier including Partial DCM/CCM Operation with Low Harmonic Current Distortion even under Highly Distorted Grid [#1278]
Massimiliano Biason1, Roberto Petrella1, Sandro Calligaro2, Mattia Morandin3, Marco Zordan3
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A Novel Voltage Balancing Strategy for Four-Level Hybrid-Clamped Converters under Selective Harmonic Elimination PWM [0453]
Mingzhe Wu¹, Hao Tian¹, Yun Wei Li¹, Kui Wang²
¹University of Alberta, Canada; ²Tsinghua University, China

The Active Gate Driver for Switching Loss Reduction of Inverter [0434]
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Korea Electronics Technology Institute, Korea

A Novel Hybrid Modulation for Photovoltaic Three-Level T-Type Inverter to Simultaneously Eliminate Neutral-Point Voltage Ripple and Interact with Maximum Power Point Tracking Process [0635]
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National Sun Yat-Sen University, Taiwan

Optimal Selection of the Voltage Modulation Strategy for an Open Winding Multilevel Inverter [1525]
A. Testa¹, S. Foti¹, S. De Caro¹, L.D. Tornello², G. Scelba², G. Scarcella²
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Chair(s): Dongbo Zhao, Pedro Rodriguez

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Ageda Guerra¹, Roberto Garcia Rochín, Patrick W. Cross²
¹John Deere, Mexico; ²John Deere, United States

A Fixed-Frequency Synchronous Boost Converter based on Adaptive On-Time Control with a New Reverse Phase Ripple Injection Compensation [0201]
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Samsung Electronics, Korea

Optimal Design of Control Strategy for Full-Bridge LLC Converter [0187]
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Shanghai Jiao Tong University, China

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Kyle J. Goodrick¹, Gab-Su Seo², Satyaki Mukherjee¹, Jinia Roy², Rahul Mallik³, Branko Majmunovic¹, Soham Dutta³, Dragam Maksimovic¹, Brian Johnson³
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Xing Wei¹, Zhan Shen², Yuyuan Ye³, Jingwen Leng¹, Zhike Xu¹, Long Jin¹
¹Southeast University, China; ²Aalborg University, Denmark; ³State Grid Jiangsu Electric Power Co., Ltd., China
A Dual-Objective Modulated Model Predictive Control Scheme for the Point-of-Load Inverter in DC Microgrid with Dichotomy Algorithm [#0573]
Jinsong He¹, Xin Zhang²
¹Nanyang Technological University, Singapore; ²Zhejiang University, China

Optimization of a SiC MOSFET Behavioural Circuit Model by using a Multi-Objective Genetic Algorithm [#0640]
Gaetano Bazzano¹, Alessandra Raffo¹, Santi Agatino Rizzo², Nunzio Salerno², Giovanni Susinna², PierPaolo Veneziano¹
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Yong-Su Noh, Dongmyoung Joo, Byong Jo Hyon, Joon Sung Park, Jin-Hong Kim, Jun-Hyuk Choi
Korea Electronics Technology Institute, Korea

Passivity-Based Parameter Design of Passive Power Filter for the Grid-Current-Controlled VSC [#0122]
Jiancheng Zhao, Chuan Xie, Kai Li
University of Electronic Science and Technology of China, China

Novel Modulation Strategy to Eliminate Device Overvoltage Stress and Enable True ZVS Operation in the Soft-Switching Solid-State Transformer [#1111]
Mickael J. Mauger, Prasad Kandula, Deepak Divan
Georgia Institute of Technology, United States

Three-Phase Unified Power Quality Conditioner based on H-Bridge and High-Frequency Link [#1609]
Maxsuel F. Cunha, Cursino B. Jacobina, Alan S. Felinto
Federal University of Campina Grande, Brazil

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Michael Starke¹, Pankaj Bhowmik, Steven Campbell, Madhu Chinthavali, Bailu Xiao, Radha Sree Krishna Moorthy, Benjamin Dean, Jongchan Choi
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Decoupling Capacitor Design for Multi-Inverter based Grid Emulator System [#0758]
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The University of Tennessee-Knoxville, United States

Chair(s): Mahesh Swamy, Jul-Ki Seok

Kang Liu¹, Zicheng Liu¹, Dong Jiang¹, Qiyuan Wang¹, Zhongxiang He²
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A Dual Modular Multilevel Converter with High-Frequency Circulating Current Injection for MV Open-End Stator Winding Machine Drives [#0526]
Mohamed S. Diab1, Xibo Yuan1, Barry W. Williams2
1University of Bristol, United Kingdom; 2University of Strathclyde, United Kingdom

Magnetic Resolver using Hall-Effect Sensors [#0628]
Ye Gu Kang, Diego F. Laborda, Daniel Fernández, David Reigosa, Fernando Briz
University of Oviedo, Spain

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Concordia University, Canada

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University of Cambridge, United Kingdom

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Peter Killeen, Daniel C. Ludois
University of Wisconsin-Madison, United States

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University of Wisconsin-Madison, United States

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Prerit Pramod
Nexteer Automotive Corp., United States

Evaluation of Sensorless Techniques for Surface Permanent-Magnet Integrated Motor Drive using Current-Source Inverter [#1262]
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University of Wisconsin-Madison, United States

A Novel Model based Development of a Motor Emulator for Rapid Testing of Electric Drives [#1418]
Visweshwar Chandrasekaran1, Benjamin Sykora1, Sanchit Mishra2, Ned Mohan2
1Trane Technologies, United States; 2University of Minnesota, United States

High-Frequency Evaluation of Two-Level Voltage-Source and Current-Source Inverters with Different Output Cables [#1615]
Hang Dai, Renato A. Torres, Woongkul Lee, Thomas M. Jahns, Bulent Sarlioglu
University of Wisconsin-Madison, United States

Symmetric DQ Control of Saturated Salient AC Machines – Utilizing Targeted Time Constant Virtual Resistance and Complex Vector Flux-Linkage Regulation [#1196]
Caleb W. Secrest, Dwarakanath V. Simili, Yochan Son
BorgWarner Inc., United States
Input-Output Feedback Linearization Control of a Linear Induction Motor Taking into Consideration its Dynamic End-Effects and Iron Losses [#0617]
Angelo Accetta¹, Maurizio Cirrincione², Filippo D’Ippolito², Marcello Pucci¹, Antonino Sferlazza³
¹National Research Council of Italy, Italy; ²University of the South Pacific, Fiji; ³University of Palermo, Italy

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Joohyun Lee, Jiwon Yoo, Seung-Ki Sul
Seoul National University, Korea

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Mehmet Emin Akdogan, Sara Ahmed
The University of Texas at San Antonio, United States

An Intelligent Fuzzy Control Approach for a Back-Pressure Autonomous Industrial Microgrid [#0564]
Rahmat Khezri¹, Amin Mahmoudi¹, Sajjad Golshannavaz²
¹Flinders University, Australia; ²Urmia University, Iran

Distributed Control and Dynamic Optimization of a Microgrid [#0410]
Jameel Ahmad¹, Muhammad Aqil Aslam², Muhammad Tahir², Sudip K. Mazumder³
¹University of Management and Technology-Lahore, Pakistan; ²University of Engineering and Technology-Lahore, Pakistan; ³University of Illinois-Chicago, United States

Influence of PLL Parameters on Small-Signal Stability of Microgrids with Synchronous Generators [#1162]
Diana Patricia Morán-Río¹, Javier Roldán-Pérez¹, Milan Prodanovic¹, Aurelio García-Cerrada²
¹IMDEA Energy Institute, Spain; ²Comillas Pontifical University, Spain

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North Carolina State University, United States

Control of a Grid-Tied Multiport Inverter for a Microgrid with Renewable Energy Sources [#0742]
Dianzhi Yu, Xia Du, Jianwu Zeng, Zhaoxia Yang
Minnesota State University-Mankato, United States

A Modular Generic Microgrid Controller Adaptive to Different Compositions [#0222]
Chu Sun¹, Syed Qaseem Ali², Geza Joos¹, Francois Bouffard¹
¹McGill University, Canada; ²Opal-RT Technologies Inc., Canada

A Real-Time De-Risked Emulation based Testing Platform for AC Microgrids [#0124]
A.S. Vijay, Suryanarayana Doola, Mukul C. Chandorkar
Indian Institute of Technology-Bombay, India
Analysis of AC-DC-AC Converter with Shared Legs under Unbalanced Conditions [#1284]
Alan S. Felinto, Cursino B. Jacobina
Federal University of Campina Grande, Brazil

Asymmetric Voltage Sag Compensation Capability of Dual Voltage Source Inverter [#1021]
Jefferson R.P. de Assis¹, Darlan A. Fernandes¹, Fabiano F. Costa², P.C. Ribeiro¹, Rogério G. de Almeida¹
¹Federal University of Paraíba, Brazil; ²Federal University of Bahia, Brazil

Series Arc Fault Detection and Localization in DC Distribution based on Master Controller [#0131]
Vu Le¹, Xiu Yao¹, Chad Miller², Tsao-Bang Hung²
¹State University of New York at Buffalo, United States; ²Wright Patterson Air Force Base, United States

An Ultra-Fast and Non-Invasive Short Circuit Protection Strategy for a WBG Power Electronics Converter with Multiple Half-Bridge Legs [#1334]
Chondon Roy, Namwon Kim, Hossein Niakan, Ali Parsa Sirat, Babak Parkhideh
University of North Carolina at Charlotte, United States

Open-Circuit Fault Reconfiguration of Multi-Phase Interleaved DC-DC Converter [#1454]
Abbas Hassan, Ali Bazzi
American University of Beirut, Lebanon

Analytical Modelling and Resilient Operation Design for Capacitor Voltage Ascent in MMC Distributed Control System with Communication Interruption [#0849]
Shunfeng Yang¹, Haiyu Wang¹, Haiyu Chen², Wensheng Song²
¹Southwest Jiaotong University, China; ²Xī’ān Jiaotong University, China

A New Procedure for Switched Mode Power Supplies Development by using Virtual Tests [#0200]
Jack Hu, Srinivas Gude
Delta Electronics, Inc., Taiwan

A Novel In Situ IGBT and FWD Junction Temperature Estimation Technique for IGBT Module based on On-State Voltage Drop Measurement [#0393]
Yanyong Yang, Pinjia Zhang
Tsinghua University, China

Diagnosis of Power Device Failures using Discrete Fourier Transform for DC-AC Flying Capacitor Multilevel Converters [#0306]
Ruqiang Zheng¹, Xin Yin¹, Sai Tang¹, Chao Zhang¹, Daming Wang¹, Jun Wang¹, Z. John Shen², Zishun Peng¹
¹Hunan University, China; ²Illinois Institute of Technology, United States

Measure Theory-Based approach for Remaining Useful Lifetime Prediction in Power Converters [#1136]
Amin Rahnama Sadat, Harish Sarma Krishnamoorthy
University of Houston, United States
Energy-Based Stabilizing Controllers for DC-DC Converters Feeding Constant Power Loads [#0300]
C.A. Villarreal-Hernandez¹, J. Loranca-Coutino¹, O.F. Ruiz-Martinez², J.C. Mayo-Maldonado¹,
J.E. Valdez-Resendiz¹, J.C. Rosas-Caro², G. Escobar¹, Daniel Guillen¹
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Poster 24: Converter Control and Modeling 1
Chair(s): Jin Tan, Hanchao Liu

A GaN-Based CRM Totem-Pole PFC Converter with Fast Dynamic Response and Noise Immunity for a Multi-Receiver WPT System [#0765]
Jingjing Sun, Jie Li, Daniel J. Costinett, Leon M. Tolbert
The University of Tennessee-Knoxville, United States

Operation of a Three-Phase Standalone Inverter with Online Parameter Update by Instantaneous Charge Transfer Estimation [#1245]
Vikram Roy Chowdhury, Jonathan W. Kimball
Missouri University of Science and Technology, United States

PWM and PFM Hybrid Modulation Scheme for Dual-Input LLC Resonant Converter [#0755]
Xi Chen, Issa Batarseh
University of Central Florida, United States

Transient Mitigation in Mode Transitions for Composite DC-DC Converters [#1428]
Aritra Ghosh, Vivek Sankaranarayanan, Robert W. Erickson
University of Colorado-Boulder, United States

Predictive Zero-Sequence Control of Parallel Three-Phase Active Rectifiers [#0292]
Luca Tarisciotti¹, Claudio Burgos², Cristian Garcia³, Jose Rodriguez¹
¹Universidad Andres Bello, Chile; ²University of Nottingham, United Kingdom; ³Universidad de Talca, Chile

A Novel Control Method for a Primary Triple Bridges Dual Active Bridge DC-DC Converter with Minimum RMS Current Optimization [#0795]
Deliang Chen¹, Junjun Deng¹, Wenbo Wang¹, Zhenpo Wang¹, Shuo Wang¹, David G. Dorrell²
¹Beijing Institute of Technology, China; ²University of Witwatersrand, South Africa

Analytical Control System Synthesis for Dual-Loop Cascaded Stationary Frame Voltage Regulators [#1506]
H. Siraj¹, B.P. McGrath¹, I.U. Nutkani¹, Y. Liao², X. Wang²
¹RMIT University, Australia; ²Aalborg University, Denmark

A Novel SVPWM Method for NPC Three-Level Interleaved H-Bridge Inverter [#0387]
Weichao Li, Jinyang Han, Liang Zhou, Chen Deng, Ming Yan
National Key Laboratory for Vessel Integrated Power System Technology, China

Adaptive Sliding Mode Control based on a Hyperbolic Tangent Function for DC-to-DC Buck-Boost Power Converter [#1063]
Universidad Tecnológica de la Mixteca, Mexico
Input Shaping Control of Paralleled DC-DC Converters [#0626]
Shishir Patel, Wayne Weaver
Michigan Technological University, United States

Operation and Control of Converters having Integrated Capacitor Blocked Transistor Cells [#0430]
Jianghui Yu, Rolando Burgos
Virginia Polytechnic Institute and State University, United States

A CCM based Average Current Control Technique for Chopper Integrated Single-Phase ANPC Inverter to Minimize Voltage Ripple [#1342]
Jagath Vallabhai Missula, Ravindranath Adda, Praveen Tripathy
Indian Institute of Technology Guwahati, India

Poster 25: Control of Electric Drives
Chair(s): Luca Zarri, Behrooz Mirafzal

A Constant Current based Interior Permanent Magnet (IPM) Synchronous Motor Drive Control Strategy [#0316]
Yunpeng Si, Yifu Liu, Chunhui Liu, Zhengda Zhang, Mengzhi Wang, Qin Lei
Arizona State University, United States

Overmodulation Strategy for Inverters with a Single DC-Link Current Sensor [#0353]
Bumun Jung, Taeyeon Lee, Kwanghee Nam
POSTECH, Korea

Reduction of Voltage Harmonics in an Open-End Winding Induction Motor Driven by a Dual-Inverter with Floating-Capacitor in the Low-Speed Region [#0445]
Akihito Mizukoshi, Hitoshi Haga
Nagaoka University of Technology, Japan

Low-Speed Operation of a Motor Drive System using Dual Inverters to Reduce Input Current Harmonics [#0468]
Ren Okumura, Hitoshi Haga
Nagaoka University of Technology, Japan

Growing Neural Gas-Based Maximum Torque per Ampere (MTPA) Technique for SynRM s [#0483]
Angelo Accetta¹, Maurizio Cirrincione², Maria Carmela Di Piazza³, Giuseppe La Tona¹,
Massimiliano Luna¹, Marcello Pucci¹
¹National Research Council of Italy, Italy; ²University of South Pacific, Fiji

Adaptive PI Parameter of Flux-Weakening Controller based on Voltage Feedback for Model Predictive Control of SPMSM [#0496]
Yongchang Zhang¹, Jialin Jin¹, Hao Jiang¹, Dong Jiang²
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Model Predictive Saturation Controller-Based Direct Torque Control of Permanent-Magnet Synchronous Machines [#0523]
Matthew Penne¹, Wei Qiao¹, Liyan Qu¹, Lizhi Qu¹, Jiyao Wang², Silong Li²
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Development of SiC-Based Motor Drive using Typhoon HIL 402 as System-Level Controller [#0669]
Ryan Collin, Madeline Stephens, Annette von Jouanne
Baylor University, United States

An Improved Virtual Signal Injection Control of MTPA for an IPMSM [#0780]
Hao Jiang, Yongchang Zhang, Haitao Yang
North China University of Technology, China

Model Predictive Flux Control based on Synchronous Pulse-Width Modulation [#0906]
Haitao Yang1, Peng Huang1, Yongchang Zhang1, Jianguo Zhu2
1North China University of Technology, China; 2The University of Sydney, Australia

Generalized Optimal SVPWM for the Switched-Capacitor Voltage Boost Converter [#1088]
Shukai Wang, Ameer Janabi, Bingsen Wang
Michigan State University, United States

Precise Rotor Speed Measurement Method with Sinusoidal Coded Gearwheel Encoder for Spindle Motor Drive [#1331]
Jaehong Kim1, Muhammad Usama1, Kwanghee Nam2
1Chosun University, Korea; 2POSTECH, Korea

Motor Bearing Current Characterization in SiC-Based Variable Frequency Drive Applications [#0033]
Annette von Jouanne, Ryan Collin, Madeline Stephens, Yu Miao, Brian Thayil, Caleb Li, Emmanuel Agamloh, Alex Yokochi
Baylor University, United States

Energy Efficiency Performance Evaluation of Direct Torque and Flux Control in Induction Machines Driven by Adjustable Speed Drives [#0078]
Kevin Lee, Jimmy Qi
Eaton Corp., United States

A Unique Way to Address Component Breakdown Guidelines Set in UL 61800-5-1 for Variable Frequency Drives [#0130]
Mahesh Swamy1, Nathan Seipel2
1IEEE, United States; 2Yaskawa America, Inc., United States

A V/Hz based Maximum Torque per Volt Control in Flux-Weakening Region for Interior Permanent Magnet Synchronous Motors [#0165]
Zhihao Song1, Wenxi Yao1, Kevin Lee2
1Zhejiang University, China; 2Eaton Corp., United States

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Chair(s): Lina He, Yaosuo Xue

An Intelligent Overcurrent Protection Algorithm of Distribution Systems with Inverter based Distributed Energy Resources [#1210]
Lina He1, Shuaiang Rong1, Chengwei Liu2
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Group-Based Control for Domestic Electric Water Heaters using Quantum-Inspired Evolutionary Algorithm [#0132]
Sheng Xiang¹, Liuchen Chang¹, Bo Cao¹, Yigang He²
¹University of New Brunswick, Canada; ²Hefei University of Technology, China

Two-Stage Optimal Sizing of Standalone Hybrid Electricity Systems with Time-of-Use Incentive Demand Response [#0569]
Rahmat Khezri¹, Amin Mahmoudi¹, Mohammed H. Haque²
¹Flinders University, Australia; ²University of South Australia, Australia

Autonomous Control Strategy for Reliable OLTC Operation under PV Power Fluctuation with Effective Voltage Regulation [#0090]
Ali Elrayyah, Nand Kishor Singh
Hamad Bin Khalifa University, Qatar

Virtual Synchronous Generator with Limited Current – Impact on System Transient Stability and its Mitigation [#1218]
Yiwei Ma¹, Fred Wang¹,², Leon M. Tolbert¹,²
¹The University of Tennessee, United States; ²Oak Ridge National Laboratory, United States

Simple Tuning Method of Virtual Synchronous Generators Reactive Control [#0690]
Fabio Mandrile, Enrico Carpaneto, Eric Armando, Radu Bojoi
Politecnico di Torino, Italy

A New Method to Improve the Transient Performance of Virtual Synchronous Generator with the Extended Virtual Impedance [#0236]
Zhengmao Yang, Shuai Lu
Chongqing University, China

Analysis of Output Impedance Constraints for Grid-Connected Virtual Synchronous Generators Considering Large-Disturbance Stability [#1434]
Mingxuan Li, Yue Wang, Sirui Shu, Yonghui Liu, Yang Peng
Xi’an Jiaotong University, China

VSS-DNSE Adaptive Control Algorithm for Enhancing Performance of PV-Grid Interfaced System [#0577]
Kripa Tiwari, Seema Kewat, Bhim Singh, Gaurav Modi
Indian Institute of Technology-Delhi, India

On Stability of Hybrid Power Ramp Rate Control for High Photovoltaic Penetrated Grid [#1280]
Silvanus D'Silva¹, Ahmad Khan¹,², Muhammad Farooq¹,², Mohammad B. Shadmand¹,², Haitham Abu-Rub³
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Poster 27: Wide-Bandgap Semiconductors
Chair(s): Cong Li, Francesco Iannuzzo

An Adaptive Driving Signals Delay Control for Voltage Balancing of Series-Connected SiC MOSFETs [#0146]
Min Zhao, Hua Lin, Tao Wang
Huazhong University of Science and Technology, China
An Active Clamping Control Method for DC Solid State Circuit Breaker based on Cascaded SiC JFETs [#0256]
Hong Duan¹, Wei Wang¹, Dong He², Zhikang Shuai¹, Xue Yang¹, Z. John Shen³
¹Hunan University, China; ²Hunan University of Technology, China; ³Illinois Institute of Technology, United States

A Step-by-Step Modelling approach for SiC MOSFETs Half-Bridge Modules Considering Temperature Characteristics [#0477]
Peng Yang, Wenlong Ming, Jun Liang
Cardiff University, United Kingdom

Analytical Modeling of SiC MOSFETs Short-Circuit Behavior Considering Parasitic Parameters [#0170]
Pengfei Xiang, Ruixiang Hao, Xiaojie You, Siwei Liu, Honglin Jiao, Fang Li
Beijing Jiaotong University, China

Analysis and Gate Driver Design Considerations of 10 kV SiC MOSFETs under Flashover Fault Due to Insulation Failure [#1055]
Xingxuan Huang¹, Shiqi Ji¹, Dingrui Li¹, Cheng Nie¹, Leon M. Tolbert¹,², Fred Wang¹,², William Giewont³
¹The University of Tennessee-Knoxville, United States; ²Oak Ridge National Laboratory, United States; ³EPC Power, United States

In-Circuit Shoot-through-Based Characterization of SiC MOSFET TSEP Curves for Junction Temperature Estimation [#0373]
Alessandro Soldati, Roberto Menozzi, Carlo Concari
University of Parma, Italy

A GaN and Si Hybrid Solution for 48V-12V Automotive DC-DC Application [#0731]
Lei Kou, Juncheng Lu
GaN Systems Inc., Canada

Current Distribution Monitoring of Paralleled GaN HEMTs [#1400]
Hossein Niakan, Ali Parsa Sirat, Babak Parkhideh
University of North Carolina at Charlotte, United States

Body Diode Reverse Recovery Effects on SiC MOSFET Half-Bridge Converters [#0652]
Mario Pulvirenti¹, Angelo G. Sciacca¹, Luciano Salvo¹, Massimo Nania¹, Giacomo Scelba², Giuseppe Scarcella²
¹STMicroelectronics, Italy; ²University of Catania, Italy

Turn-On Performance Comparison of SiC Single-Driver Module (SDM) and Multi-Driver Module (MDM) [#0341]
Pengkun Liu¹, Ruiyang Yu¹, Alex Q. Huang¹, Johan Strydom², Stephanie W. Butler²
¹The University of Texas-Austin, United States; ²Texas Instruments Inc., United States

Poster 28: Converter Control and Modeling 2
Chair(s): Liang Du, Zhiqiang (Jack) Wang

Observers for Discrete-Time Current Control of Converters Equipped with an LCL Filter [#0636]
F.M. Mahafugur Rahman¹, Jarno Kukkola¹, Ville Pirsto¹, Mikko Routimo¹,², Marko Hinkkanen¹
¹Aalto University, Finland; ²ABB Drives, Finland
Control Strategies Generation Mechanism for LLC Resonant Converter [#0514]
Yuqi Wei¹, Quanming Luo², Dereje Woldegiorgis³, Alan Mantooth¹
¹University of Arkansas, United States; ²Chongqing University, China

Soft-Switching Auxiliary Current Control for Faster Load Transient Response of Buck Converter [#0394]
Dongwook Kim¹, Myeongjae Hong², Jongun Baek¹, Jisu Lee¹, Joonho Shin¹, Jong-Won Shin¹
¹Chung-Ang University, Korea; ²Samsung, Korea

H-Bridge MMCs with Symmetrical Half-Bridge Submodules [#0198]
Jingyang Fang¹, Zhongxi Li¹, Stefan M. Goetz¹, Shunfeng Yang², Haiyu Wang²
¹Duke University, United States; ²Southwest Jiaotong University, China

Modular Multilevel Converter Device-Level Loss Balancing Control for Better Lifetime [#0278]
Huan Qiu, Jinyu Wang, Yi Tang
Nanyang Technological University, Singapore

Finite Control Set – Model Predictive Control Applied to Dual-Converter-Based Rectifiers [#0771]
Victor F.M.B. Melo, Ruan C.V. dos Santos, Gleice M. da Silva Rodrigues, Nady Rocha, Edison R.C. da Silva
Federal University of Paraíba, Brazil

A Simplified Modulated Model Predictive Control for Direct Matrix Converter [#0400]
Xifei Liu, Xin Yin, Zhong Zeng, Sai Tang, Jun Wang
Hunan University, China

Computational Cost Efficient Model of Losses for Multi-Port Active-Bridge Converters [#0836]
Soleiman Galeshi, David Frey, Yves Lembeye
Université Grenoble Alpes, CNRS, France

A Constant Current Digital Control Method for Primary-Side Regulation Active-Clamp Flyback Converter [#0181]
Chong Wang, Xiang Zhang, Daying Sun, Wenhua Gu
Nanjing University of Science and Technology, China

Development of a Two-Level VSC based DC Impedance Measurement Unit [#0535]
Le Kong¹, Nattapat Praisuwanna¹, Liang Qiao¹, Fred Wang¹,²
¹The University of Tennessee-Knoxville, United States; ²Oak Ridge National Laboratory; United States

DC Link Voltage Balancing of the Active Front-End for the Extreme Fast Charging Stations [#0999]
Amirhossein Moeini, Sai Hemanth Kankanala, Jonathan W. Kimball
Missouri University of Science and Technology, United States

Small Signal Modeling of Switched Tank Converter with Partial Power Voltage Regulation [#0188]
Zisen Liu, Yundong Ma, Fuchun Zhang, Huijun Lu
Nanjing University of Aeronautics and Astronautics, China

Capacitor Voltage Round-Robin Transmission Modes with Voltage-Ripple-Filtering Capability for an MMC Distributed Control System [#0822]
Shunfeng Yang, Shun Liu, Hang Su, Wensheng Song, Bo Zhan
Southwest Jiaotong University, China
Optimisation and Design Performance of a Small-Scale DC Vernier Reluctance Machine for Direct-Drive Wind Generator Drives [0176]
Udochukwu B. Akuru1, Maarten J. Kamper1, Mkhululi Mabhula2
1Tshwane University of Technology, South Africa; 2Stellenbosch University, South Africa

Analysis of Double-Output CLL Resonant Converter for All-Electric UAV Applications [0372]
Erdem Asa1, Kerim Colak2, Omer C. Onar1, Dariusz Czarkowski3, Burak Ozpineci1
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1McMaster University, Canada; 2Rockwell Automation Canada, Canada

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1The University of Akron, United States; 2Bendix Commercial Vehicle Systems, United States

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1North China University of Technology, China; 2Huazhong University of Science and Technology, China

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1Hitachi, Ltd., Japan; 2Okayama University, Japan; 3Hokkaido University, Japan

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Rockwell Automation, United States
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¹Hitachi, Ltd., Japan; ²Hitachi Power Semiconductor Device, Ltd., Japan

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Zhituo Ni¹, Mehdi Narimani¹, Navid Reza Zargari²
¹McMaster University, Canada; ²Rockwell Automation Canada, Canada

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¹Aalto University, Finland; ²KTH Royal Institute of Technology, Sweden

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¹Seoul National University, Korea; ²Garrett Motion, Korea

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¹Aalborg University, Denmark; ²SINTEF, Norway

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¹The University of Tennessee, United States; ²Oak Ridge National Laboratory, United States

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¹Okayama University, Japan; ²Tohoku University, Japan
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Huazhong University of Science and Technology, China

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Jiaxin Teng1, Lizhi Qu2, Dariusz Czarkowski1
1New York University, United States; 2Toshiba International Corp., United States

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1Prince Mohammad Bin Fahd University, Saudi Arabia; 2University of Central Florida, United States

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1Chongqing University, China; 2University of Arkansas, United States

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University of Arkansas, United States

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1Tsinghua University, China; 2Electric Power Research Institute China Southern Power Grid, China; 3China Railway Electrification Engineering Group Co., Ltd., China
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Andrés Rón¹, Andrés Tarrasó¹, Álvaro Luna¹, Pedro Rodríguez²
¹Universitat Politècnica de Catalunya, Spain; ²Universidad Loyola Andalucía, Spain

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Jiaoxin Jia¹, Xiangwu Yan¹, Benshuang Qin¹, Abubakar Siddique², Bo Zhang¹
¹North China Electric Power University, China; ²Khwaja Fareed University of Engineering & Information Technology, Pakistan

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¹Middle East Technical University, Turkey; ²Aselsan Inc., Turkey

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The University of Texas at Dallas, United States

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¹Politecnico di Torino, Italy; ²Prima Electro S.p.a., Italy

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Truong-Duy Duong¹, Minh-Khai Nguyen², Young-Cheol Lim¹, Joon-Ho Choi¹,
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¹Chonnam National University, Korea; ²Wayne State University, United States; ³Queensland University of Technology, Australia

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North Carolina State University, United States

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¹Okayama University, Japan; ²Tohoku University, Japan

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¹University of Oviedo, Spain; ²Instituto de Telecomunicações, Portugal; ³Coimbra Polytechnic-ISEC, Portugal; ⁴University of Coimbra, Portugal; ⁵Port Said University, Egypt

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Virginia Polytechnic Institute and State University, United States

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Xuan Guo¹, Li Ran¹, Peter Tavner²
¹University of Warwick, United Kingdom; ²Durham University, United Kingdom

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Christoph H. van der Broeck, Rik W. De Doncker
RWTH Aachen University, Germany

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Timothy A. Polom¹, Robert D. Lorenz²
¹Silicon Austria Labs, Austria; ²University of Wisconsin-Madison, United States

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Muhammad H. Alvi¹, Minhao Sheng², Robert D. Lorenz², Thomas M. Jahns²
¹General Motor Research and Development, United States; ²University of Wisconsin-Madison, United States

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Indian Institute of Technology Kanpur, India

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Yonsei University, Korea

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¹Nanjing University of Science and Technology, China; ²Changshu Intelligent Laser Equipment Research Institute, China; ³Jiangsu Nicetown Electric Power Automation Co., China
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Saginaw Valley State University, United States

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1Oak Ridge National Laboratory, United States; 2North Dakota State University, United States; 3University of Dayton, United States

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1University of L’Aquila, Italy; 2DigiPower srl, Italy

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Xiangtan University, China

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Jianpeng Wang¹, Meng Xu¹, Jin Zhang¹, Laili Wang¹, Yongmei Gan¹, Tomoyuki Yamazaki²
¹Xi’an Jiaotong University, China; ²Fuji Electric Co., Ltd., Japan

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Ariya Sangwongwanich¹, Francesco Iannuzzo¹, Rui Wu², Morten Hygum², Frede Blaabjerg¹
¹Aalborg University, Denmark; ²Vestas Wind Systems A/S, Denmark

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Georgia Institute of Technology, United States

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Tianqi Zhang¹, Edward Shelton², Luke Shillaber¹, Patrick Palmer³
¹University of Cambridge, United Kingdom; ²Cambridge Design Partnership, United Kingdom;
³Simon Fraser University, Canada

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University of Texas-Austin, United States

A Passive Integration Unit for Current-Feed Single-Switch Resonant Converter [#0247]
Cheng Deng¹,², Jiang Bo¹, Andrés Escobar-Mejía³
¹Xiangtan University, China; ²Hunan Province Cooperative Innovation Center for Wind Power Equipment and Energy Conversion, China; ³Universidad Tecnológica de Pereira, Colombia

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¹Aalborg University, Denmark; ²National University of Ireland-Galway, Ireland;
³Illinois Tool Works Ground Support Equipment, Denmark

Design of Insulation System in High-Frequency Auxiliary Power Supply for Medium Voltage Applications [#0756]
Ning Yan¹, Qin Chen², Dong Dong¹, Rolando Burgos¹
¹Virginia Polytechnic Institute and State University, United States; ²Applied Materials, United States

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Hengzhao Yang
New Mexico Institute of Mining and Technology, United States
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Jun Zhang¹, Xiong Du², Heng-Ming Tai³
¹Hohai University, China; ²Chongqing University, China; ³University of Tulsa, United States

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Runyu Wang, Xinggang Fan, Dawei Li, Ronghai Qu
Huazhong University of Science and Technology, China

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Han Cui¹, Lingxiao Xue², Khai Ngo³
¹The University of Tennessee, United States; ²Oak Ridge National Laboratory, United States; ³Virginia Polytechnic Institute and State University, United States

High-Precision Simulation for Structure and Efficiency Optimization of High-Power High-Frequency Transformer [#0821]
Zheyuan Yi¹, Kai Sun¹, Shilei Lu¹, Guoen Cao², Yongdong Li¹, Jung-Ik Ha³
¹Tsinghua University, China; ²Chinese Academy of Sciences, China; ³Seoul National University, Korea

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Rounak Siddaiah, William J. Koebel, Robert M. Cuzner
University of Wisconsin-Milwaukee, United States

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Ashik Amin, Seungdeog Choi
Mississippi State University, United States

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Mohammad Arifur Rahman, Yilmaz Sozer, J. Alexis De Abreu-Garcia
The University of Akron, United States

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University of Wisconsin-Madison, United States

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University of Wisconsin-Madison, United States

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Hideaki Funaki1, Atsushi Mishima1, Masahito Shoyama1, Yuichi Noge1, Tomonori Kimura2, Takahiro Yamada2, Gamal M. Dousoky3
1Kyushu University, Japan; 2MIRISE Technologies Corp., Japan; 3Minia University, Egypt

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Bo Zhan, WenSheng Song, Jinhui Chen, Shunfeng Yang, Shun Liu
Southwest Jiaotong University, China

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Sante Pugliese, Yongdae Kwon, Marco Liserre
Christian-Albrechts-Universität Kiel, Germany

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Maged Ibrahim, Fabrice Bernier, Jean-Michel Lamarre
National Research Council of Canada, Canada

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Fan Wu, Ayman M. El-Refaie
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Guillaume Colinet1, William Lamberts1, Francois Baudart2, Bruno Dehez1
Université Catholique de Louvain, Belgium

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Yuzuki Tsuchiya1, Kan Akatsu2
1Shibaura Institute of Technology, Japan; 2Yokohama National University, Japan

Comparative Analysis of PWM Power Losses in IPM Machines with Different Modulation Schemes using Wide-Bandgap-Based Inverters [#0605]
Le Chang1, Woongkul Lee1, Thomas M. Jahns1, Jihyun Kim2
1University of Wisconsin-Madison, United States; 2General Motors Global Propulsion Systems, United States
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Maged Ibrahim¹, Jaydeep Bhalala², Pragasen Pillay²
¹National Research Council, Canada; ²Concordia University, Canada

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Dominic North, Nick Simpson, Phil Mellor
University of Bristol, United Kingdom

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Xiangjian Meng, Feng Gao, Tao Xu
Shandong University, China

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Olufemi I. Olayiwola, Paul S. Barendse
University of Cape Town, South Africa

Accelerated Aging Method and Lifetime Evaluation of Aluminum Electrolytic Capacitors for Power Electronic Application [#1003]
Sagar B. Narale, Amit Verma, Sandeep Anand
Indian Institute of Technology Kanpur, India

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Hongwu Peng¹, Zhao Yuan¹, Dereje Lemma Woldegiorgis¹, Asif Imran Emon¹, Balaji Narayanasamy¹, Yusi Liu², Fang Luo¹, Alan Mantooth¹, Haider Ghazi Mhiesan¹
¹University of Arkansas, United States; ²On Semiconductor, United States

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Rahmat Khezri¹, Amin Mahmoudi¹, Hirohisa Aki²
¹Flinders University, Australia; ²University of Tsukuba, Japan

A Cost-Effective Standalone E-Bike Charging Station Powered by Hybrid Wind and Solar Power System including Second-Life BESS [#0708]
Cong-Long Nguyen¹, Ettore Colicchio², Paolo Primiani², Louis Viglione², Kamal Al-Haddad¹, Lyne Woodward¹
¹École de Technologie Supérieure, Canada; ²Alizeti Ubimobil Inc., Canada

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Carlos Villarreal-Hernandez¹, Javier Loranca-Coutino¹, Omar F. Ruiz-Martinez², Jonathan C. Mayo-Maldonado², Jesus E. Valdez-Resendiz¹, Julio C. Rosas-Caro², Gerardo Escobar-Valderrama¹, Carolina Del-Valle-Soto²
¹Tecnologico de Monterrey, Mexico; ²Universidad Panamericana, Mexico
Yao Lu, Weirong Liu, Yue Wu, Jiahao Huang, Hongtao Liao, Yongjie Liu, Jun Peng, Zhiwu Huang
Central South University, China

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Thiago Pereira¹, Klaus Krischan², Annette Muetze², Marco Liserre¹
¹Christian-Albrechts-Universität zu Kiel, Germany; ²Graz University of Technology, Austria

High-Frequency Quasi-Z-Source Inverter Concept for Short-Circuit Capable GaN-HEMT-Based Converters [#1585]
Taichi Nakayama, Tomoyuki Mannen, Akira Nakajima, Takanori Isobe
University of Tsukuba, Japan

Efficiency, Cost and Volume Comparison of Si-IGBT based T-NPC and 2-Level SiC-MOSFET based Topology with DV/DT Filter for High Speed Drives [#0982]
Jelena Loncarski¹, Vito Giuseppe Monopoli¹, Riccardo Leuzzi², Pericle Zanchetta³, Francesco Cupertino¹
¹Politecnico di Bari, Italy; ²University of Nottingham, United Kingdom

New Cascaded Converter Topologies for Transformerless Galvanic Active Isolation [#0005]
Clint Halsted, Madhav Manjrekar
University of North Carolina at Charlotte, United States

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National Renewable Energy Laboratory, United States
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Pin Ying Wang¹, Ping Kun Chiu¹, Sheng Teng Li¹, Ching Jan Chen¹, Chih Chao Hsu²
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Ping Kun Chiu¹, Pin Ying Wang¹, Sheng Teng Li¹, Ching Jan Chen¹, Yi Ting Chen²
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University of California-Davis, United States

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Arizona State University, United States

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Andrea Cavagnino³, Emmanuel Agamloh⁴
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¹Graz University of Technology, Austria; ²Siemens Healthcare GmbH, Germany

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¹University of Nottingham, United Kingdom; ²University of Newcastle, United Kingdom

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North China University of Technology, China

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Hunan University, China

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¹The Hong Kong Polytechnic University, Hong Kong; ²Federation University Australia, Australia

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¹Nanyang Technological University, Singapore; ²University of New South Wales, Australia

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¹Federal University of Campina Grande, Brazil; ²Federal Institute of Paraíba, Brazil

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Ahmed Ismail M. Ali¹,², Mahmoud A. Abdallah², Takaharu Takeshita¹
¹Nagoya Institute of Technology, Japan; ²South Valley University, Egypt

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Jaehong Lee¹, Junghyeon Roh¹, Seung-Hwan Lee¹, Sungmin Kim², Myung-Yong Kim³
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¹Hitachi, Ltd., Japan; ²Hitachi Automotive Systems, Ltd., Japan

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¹Technical University of Rosenheim, Germany; ²Technical University of Munich, Germany

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Oak Ridge National Laboratory, United States

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Davide Minaglia¹, Luca Rovere², Andrea Formentini², Riccardo Leuzzi³, Sabino Pipolo², Mario Marchesoni⁴, Pericle Zanchetta²
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National Research Council of Canada, Canada

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Yang Xiao¹, Zi-Qiang Zhu¹, Jin-Tao Chen², Di Wu², Li-Ming Gong²
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Hitachi, Ltd, Japan

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1Beijing Institute of Technology, China; 2University of Padova, Italy; 3Johannes Kepler University Linz, Austria; 4Southeast University, China

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Deyang Fan, Li Quan, Xiaoyong Zhu, Peng Han, Zixuan Xiang
1Jiangsu University, China; 2University of Kentucky, United States

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1Queen Mary University of London, United Kingdom; 2Northumbria University Newcastle, United Kingdom

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1Michigan State University, United States; 2Ford Motors, United States; 3Florida State University, United States

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1The University of Tennessee, United States; 2Oak Ridge National Laboratory, United States

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Sungjae Ohn¹, Ripun Phukan¹, Dong Dong¹, Rolando Burgos¹, Dushan Boroyevich¹,
Mondal Gopal², Sebastian Nielebock²
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Zitao Liao¹, Derek Chou¹, Kelly Fernandez¹, Yong-Long Syu², Robert C.N. Pilawa-Podgurski¹
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Indian Institute of Science, India

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Kazuma Sumiya¹, Yuji Naito¹, Jin Xu², Noboru Shimosato², Yukihiro Sato¹
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Jean T. Cardoso¹, Cursino B. Jacobina¹, Maxsuel F. Cunha¹, Antonio de P.D. Queiroz²,
Samuel C.S. Júnior¹
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Guanguan Zhang¹, Hui Wang², Chenghui Zhang¹
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Yangyang Meng¹, Zipeng Liang¹, Sideng Hu¹, Zhenyu Ma², Xiangning He¹
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Ahmed A. Elserougi¹, Otavio Bertozzi², Ahmed M. Massoud³, Shehab Ahmed²
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Chao Wu¹, Ion Boldea², Dao Zhou¹, Lucian Tutelea², Frede Blaabjerg¹
¹Aalborg University, Denmark; ²Politechnica University of Timisoara, Romania

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Victor Felipe M.B. Melo²
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Italo A. Cavalcanti de Oliveira¹, Cursino Brandão Jacobina¹,
Emerson de Lacerda Soares¹, Nady Rocha²
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Rasoul Akbari, Afshin Izadian
Purdue School of Engineering and Technology, United States

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Western University, Canada

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Eric Armando, Aldo Boglietti, Salvatore Musumeci, Sandro Rubino, Enrico Carpaneto, Daniele Martinello
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Stefan Leitner, Thomas Kulterer, Hannes Gruebler, Annette Muetze
Graz University of Technology, Austria

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University of Sheffield, United Kingdom

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Southeast University, China

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Roberto Rosso¹, Xiongfei Wang², Marco Liserre³, Xiaonan Lu⁴, Soenke Engelken¹
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A Grid-Forming Multi-Port Converter using Unified Virtual Oscillator Control [#0981]
M.A. Awal, Md Rashed Hassan Bipu, Siyuan Chen, Mehnaz Khan, Wensong Yu, Iqbal Husain
North Carolina State University, United States

A Pre-Synchronization Strategy for Grid-Forming Virtual Oscillator Controlled Inverters [#1306]
Minghui Lu¹, Soham Dutta², Victor Purba², Sairaj Dhople², Brian Johnson¹
¹University of Washington, United States; ²University of Minnesota, United States

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Jiacheng Li¹, John E. Fletcher¹, D.G. Holmes², B.P. McGrath²
¹University of New South Wales, Australia; ²RMIT, Australia

PLL-Less Active and Reactive Power Controller for Grid-Following Inverter [#1309]
Ahmad Khan¹,², Mitchell Easley¹, Mohsen Hosseinzadeh-Ahmar¹,², Mohammad B. Shadmand¹,², Haitham Abu-Rub³, Poria Fajri⁴
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Aalborg University, Denmark
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Shan He, Dao Zhou, Xiongfei Wang, Frede Blaabjerg
Aalborg University, Denmark

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Switched Capacitor MMC Submodule Voltage Balancing with Reduced Number of Voltage Sensors [#0240]
Robson Bauwelz Gonzatti1,2, Qichen Yang2, Hamed Pourgharibshahi2, Fang Peng2
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A Simple Carrier-Based Implementation for a General 3-Level Inverter using Nearest Three Space Vector PWM Approach [#0828]
Aditya Dholakia1, Sayan Paul1, Shailesh Ghotgalkar2, Kaushik Basu1
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Jianfei Chen1, Jianyu Pan2, Caisheng Wang1, Jian Li2
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Simplified Model Predictive Control of Multilevel Converters with Internal Identical Structure [#0314]
Dehong Zhou1, Zhongyi Quan2, Yunwei (Ryan) Li3
1University of Electronic Science and Technology of China, China; 2University of Alberta, Canada

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Arizona State University, United States

Steady-State Analysis of the Switched-Capacitor Modular Multilevel Converter with $\Gamma$-Matrix Modulation [#0807]
Qichen Yang1, Robson Bauwelz Gonzatti1,2, Hamed Pourgharibshahi1, Fang Peng1
1Florida State University, United States; 2Federal University of Itajuba, Brazil

A Bidirectional Modular Multilevel Resonant DC-DC Converter for Medium Voltage Power Conversion [#0473]
Wentao Cui, Shuai Shao, Jianjia Zhang, Yuchen Li, Junming Zhang
Zhejiang University, China

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Da Jiao, Qingyun Huang, Alex Q. Huang
The University of Texas at Austin, United States

Three-Phase Multilevel Flying Capacitor Rectifier with Reduced Switch Count [#0720]
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Federal University of Campina Grande, Brazil
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Xin Sui1, Shan He1, Jinhao Meng2, Remus Teodorescu1, Daniel-Ioan Stroe1
1Aalborg University, Denmark; 2Sichuan University, China

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Irene Peláez1, Ramy Georgious1, Sarah Saeed1, Pablo García1, Igor Cantero2
1University of Oviedo, Spain; 2CEGASA Energía, Spain

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Wuhan University, China, China

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Julio C. Yela, Abdulraouf Benshatti, Thomas Link, S.M. Rakiul Islam, Sung-Yeul Park
University of Connecticut, United States

Digital Multi-Loop Control of an LLC Resonant Converter for Electric Vehicle DC Fast Charging [#1562]
Davide Cittanti, Matteo Gregorio, Eric Armando, Radu Bojoi
Politecnico di Torino, Italy

Active Equalization of Series/Parallel Li-Ion Battery Modules including No-Load Conditions [#1041]
Miguel Crespo1, Ramy Georgious2, Pablo García2, Geber Villa2
1Ceagas Energía, S.L.U., Spain; 2University of Oviedo, Spain

Multi-Objective Optimization of Triple Port Converter for Photovoltaic and Energy Storage Integration [#1105]
Sneha Thakur, Ghanshyamsinh Gohil, Poras T. Balsara
The University of Texas at Dallas, United States

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Yinhui Le, Fu Jiang, Jun Peng
Central South University, China

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The University of Sheffield, United Kingdom
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Pablo Castro Palavicino, Woongkul Lee, Bulent Sarlioglu
University of Wisconsin-Madison, United States

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Rockwell Automation, United States

A Novel Method of Monitoring and Locating Stator Winding Insulation Ageing for Inverter-Fed Machine based on Switching Harmonics [#0349]
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Tsinghua University, China

Triaxial Smart Sensor based on the Advanced Analysis of Stray Flux and Currents for the Reliable Fault Detection in Induction Motors [#0233]
Israel Zamudio-Ramirez1,2, Roque A. Osornio-Rios1, Jose Antonino-Daviu2
1Universidad Autonoma de Querétaro, Mexico; 2Universitat Politècnica de València, Spain

Bispectrum Analysis of Stray Flux Signals for the Robust Detection of Winding Asymmetries in Wound Rotor Induction Motors [#0604]
Miguel E. Iglesias-Martínez1, Pedro Fernández de Córdoba2, Jose Alfonso Antonino-Daviu2, J. Alberto Conejero2
1Universidad de Pinar del Río, Cuba; 2Universitat Politècnica de València, Spain

Flux-Based Detection and Classification of Induction Motor Eccentricity, Rotor Cage, and Load Defects [#0251]
Jaehoon Shin, Yonghyun Park, Sang Bin Lee
Korea University, Korea

Fault Tolerance Analysis of a Ironless PM Machine for Energy Storage [#0939]
Claudio Bianchini1, Ambra Torreggiani1, Danilo David2, Matteo Davoli2, Alberto Bellini3
1University of Modena and Reggio Emilia, Italy; 2Raw Power srl, Italy; 3University of Bologna, Italy

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Yuchen He1, Yuan Li1, Qichen Yang1, Robson Bauwelz Gonzatti1,2, Allan Taylor3, Fangzheng Peng1
1Florida State University, United States; 2Federal University of Itajuba, Brazil; 3Kettering University, United States

Virtual Impedance-Based Grid Synchronization for Converters Connected through Long Cables [#0241]
Robson Bauwelz Gonzatti1,2, Bokang Zhou2, Yuchen He2, Allan R. Taylor3, Fang Peng2
1Federal University of Itajuba, Brazil; 2Florida State University, United States; 3Kettering University, United States
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Missouri University of Science and Technology, United States

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Universidade Federal da Paraiba, Brazil

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Yu-Chen Liu¹, Chen Chen², Yu-Chen Chung¹, Meng-Chi Tsai¹, Kim Ann Katherine³
¹National Ilan University, Taiwan; ²National Taiwan University of Science and Technology, Taiwan;
³National Taiwan University, Taiwan

Reduction of Vital Sensors in RSyM based Solar Water Pumping System [#0397]
Hina Parveen, Utkarsh Sharma, Bhim Singh
Indian Institute of Technology-Delhi, India

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Huangjie Gong¹, Evan S. Jones¹, Rosemary E. Alden¹, Andrew G. Frye¹, Donald Colliver², Dan M. Ionel¹
¹Tennessee Valley Authority, United States; ²University of Kentucky, United States

Hierarchical Control of Heterogeneous Inverter Air-Conditionings for
Primary Frequency Regulation [#0004]
Tingyu Jiang¹, Ping Ju¹, Wenjie Ruan¹, Yang Yang², Jian Zhao², Fu Shen²
¹Hohai University, China; ²State Grid Taizhou Power Supply Co., China;
³State Grid Nanjing Power Supply Co., China

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Daifei Zhang¹, Mattia Guacci¹, Michael Haider¹, Dominik Bortis¹, Johann W. Kolar¹, Jordi Everts²
¹ETH Zürich, Switzerland; ²Prodrive Technologies, Netherlands

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Jun-ichi Itoh, Satoshi Nakamura, Shunsuke Takuma, Hiroki Watanabe
Nagaoka University of Technology, Japan

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Erick I. Pool-Mazun¹, Jose Juan Sandoval¹, Prasad Enjeti¹, Ira J. Pitel²
¹Texas A&M University, United States; ²Magna-Power Electronics Inc., United States

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Nuilers Surasak, Hideaki Fujita
Tokyo Institute of Technology, Japan
A Three-Phase Isolated Rectifier using Current Unfolding and Active Damping Methods [#1168]
Ha Pham N.¹, Tomoyuki Mannen², Keiji Wada³
¹University of Technology-Sydney, Australia; ²University of Tsukuba, Japan; ³Tokyo Metropolitan University, Japan

A Single Stage 1.65kW AC-DC LLC Converter with Power Factor Correction (PFC) for On-Board Charger (OBC) Application [#1565]
Wenbo Liu, Andrew Yurek, Bo Sheng, Yang Chen, Yan-Fei Liu, Paresh C. Sen
Queen's University, Canada

Electrolytic Capacitor-Less Quasi-Single-Stage AC/DC Converter with Controllable Rectifier Circuits [#0879]
Zhennan Wang¹, Shengwen Fan¹, Zhenyu Shan², Xiaofeng Ding²
¹North China University of Technology, China; ²Beihang University, China

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Minki Kim, Jungwon Choi
University of Minnesota, United States

Multilevel Single-Phase Four-Leg AC-DC-AC Converter [#1204]
Phelipe L.S. Rodrigues, Cursino B. Jacobina, Antônio M.N. Lima
Federal University of Campina Grande, Brazil

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Indian Institute of Technology-Bombay, India

Distributed Average Observation in Inverter Dominated Dynamic Microgrids [#1208]
Yuhua Du¹, Xiaonan Lu¹, Bo Chen², Jianzhe Liu³, Xiongfei Wang³, Frede Blaabjerg³
¹Temple University, United States; ²Argonne National Laboratory, United States; ³Aalborg University, Denmark

Toward Distributed Control for Reconfigurable Robust Microgrids [#0226]
Xia Miao¹, Marija Ilić¹, Christopher Smith², Matthew Overlin², Ryan Wiechens²
¹Massachusetts Institute of Technology, United States; ²MIT Lincoln Laboratory, United States

Controller Design and Implementation of a Medium Voltage (13.8 kV) Modular Multi-Level Converter for Asynchronous Microgrids [#1254]
Dingrui Li¹, Xingxuan Huang¹, Shiqi Ji¹, Cheng Nie¹, Fred Wang¹, Leon M. Tolbert¹,²
¹The University of Tennessee, United States; ²Oak Ridge National Laboratory, United States

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Kaushik Gajula, Xiuping Yao, Luis Herrera
University at Buffalo, United States
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Nie Hou, Yun Wei Li, Li Ding
University of Alberta, Canada

Distributed Control and Power Management of Islanded DC Nanogrids with Applications to Rural Electrification [#0953]
Ali Arsalan¹, Jameel Ahmad², Muhammad Tahir³, Sudip K. Mazumder⁴
¹Khwaja Fareed University of Engineering and Information Technology, Pakistan; ²University of Management and Technology Lahore, Pakistan; ³University of Engineering and Technology Lahore, Pakistan; ⁴University of Illinois at Chicago, United States

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Javad Khodabakhsh, Gerry Moschopoulos
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Okan Boler, Omer Gundogmus, Yilmaz Sozer
The University of Akron, United States

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Xiaoyong Sun, Zi-Qiang Zhu, Fangrui Wei
The University of Sheffield, United Kingdom

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Candra Adi Wiguna¹, Yifei Cai¹, Atsuya Ohashi², Jihad Furfani³, Junichi Asama², Akira Chiba¹
¹Tokyo Institute of Technology, Japan; ²Shizuoka University, Japan; ³Bandung Institute of Technology, Indonesia

Design and Performance Analysis of Switched Reluctance Motor with Inner Holes to Reduce Radial Force [#0619]
Grace Firsta Lukman, Xuan Son Nguyen, Kwang-Il Jeong, Jin-Woo Ahn
Kyungsung University, Korea

Reduction Method of Torque Ripple, DC Current Ripple, and Radial Force Ripple with Control Flexibility of Five-Phase SRM [#0621]
Takahiro Kumagai, Jun-Ichi Itoh, Keisuke Kusaka
Nagaoka University of Technology, Japan

Design of a Novel Integrated Switched Reluctance Motor-Compressor [#1104]
Ahmed Hembel, Hao Ding, Leyue Zhang, Bulent Sarlioglu
University of Wisconsin-Madison, United States
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Chair(s): Igor Cvetkovic, Jingxin Wang

CIMMCC and MSTOGI based Solar PV System for Improvement in Power Quality under Grid Voltage Variation [#0461]
Abhishek Ranjan, Seema Kewat, Bhim Singh, Rohini Sharma
Indian Institute of Technology-Delhi, India

Power Oscillation Control of Grid-feeding Converter Considering Next Generation Grid Code during Asymmetrical Faults [#0257]
Yu Feng¹, Zhikang Shuai¹, Jun Ge¹, Huimin Zhao¹, Z. John Shen²
¹Hunan University, China; ²Illinois Institute of Technology, United States

Solar Photovoltaic Array Fed Unified Power Quality Conditioner System Enabling Alleviation of Asymmetrical Voltage Sag [#0436]
Sanjenbam Chandrakala Devi¹, Bhim Singh¹, Priyank Shah⁷, Sachin Devassy³, Hina Parveen¹
¹Indian Institute of Technology-Delhi, India; ²The University of Warwick Coventry, United Kingdom; ³CSIR-Central Electronics Engineering Research Institute, India

Resonance Suppression based on Predictive Control of Grid-following Inverters with LCL Filter in Weak Grid Condition [#1368]
Muhammed Farooq Umar¹,², Ahmad Khan¹,², Mitchell Easley¹, Silvanus D'silva¹, Brevann Nun¹, Mohammad B. Shadmand¹,²
¹Kansas State University, United States; ²University of Illinois at Chicago, United States

A Novel Phase-Locked Loop based Four-Leg Converter Control for Unbalanced Load Compensation under Distorted and Unbalanced Grid Condition [#0172]
Shilei Jiao, Krishna Raj R., Kaushik Rajashekara
University of Houston, United States

Development of a Hybrid Cascaded Converter based STATCOM with Reduced Switching Losses [#0258]
Yu-Chen Su, Po-Tai Cheng
National Tsing Hua University, Taiwan

State-Feedback-Based Low-Frequency Active Damping of VSC Operating in Weak-Grid Conditions [#0984]
Federico Cecati¹, Rongwu Zhu¹, Marco Liserre¹, Xiongfei Wang²
¹Christian-Albrechts-Universität Kiel, Germany; ²Aalborg University, Denmark

Universal Active Power Filter based on AC-DC-AC Converter with Six Controlled Switches for Single-Phase Systems [#1202]
Phelipe L.S. Rodrigues, Cursino B. Jacobina, Antônio M.N. Lima
Federal University of Campina Grande, Brazil
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Chair(s): Santanu Mishra, Giorgio Spiazzi

Improvement of DC Nanogrid Energy Performance with a New Multi-Port Converter [#0989]
Ramtin Rasoulinezhad, Adel Abosnina, Gerry Moschopoulos
Western University, Canada

A High Gain DC-DC Topology based on Two-Winding Coupled Inductors Featuring Continuous Input Current [#1350]
Mohsen Mahmoudi¹, Ali Ajami¹, Ebrahim Babaei², Nima Abdolmaleki³, Caisheng Wang³
¹Azarbaijan Shahid Madani University, Iran; ²University of Tabriz, Iran; ³Wayne State University, United States

A Novel Single-Switch High Step-Up DC-DC Converter with Low Voltage Stress on Active Components [#0767]
Pedram Chavoshipour Heris¹, Zahra Saadatizadeh¹, Frede Blaabjerg²
¹University of Tabriz, Iran; ²Aalborg University, Denmark

New CRM Topology for Zero Voltage Switching in Quadratic High Gain Boost Converter [#1025]
Nikhil Korada, Raja Ayyanan
Arizona State University, United States

Low Side Switch based Regenerative Snubber Circuit for Flyback Converter [#0396]
Saumya Bohra¹, Arnab Sarkar¹, Sandeep Anand¹,²
¹Indian Institute of Technology-Kanpur, India; ²Indian Institute of Technology-Bombay, India

Minimum Current-Ripple Point Tracking for Renewable Energy Applications [#0229]
C.A. Villarreal-Hernandez¹, J. Loranca-Coutino¹, O.F. Ruiz-Martinez², J.C. Mayo-Maldonado¹,
J.E. Valdez-Resendiz¹, J.C. Rosas-Caro², Daniel Guillen¹
¹Tecnologico de Monterrey, Mexico; ²Universidad Panamericana, Mexico

A Novel Boost Converter Topology with Non-Pulsating Input and Output Current [#0694]
Enrique Garza-Arias¹, Julio C. Rosas-Caro², Jesus E. Valdez-Resendiz¹,
Jonathan C. Mayo-Maldonado¹, Gerardo Escobar-Valderrama¹, Javier Loranca-Coutino¹,
Carlos Villarreal-Hernandez¹, Leonardo J. Valdivia²
¹Tecnologico de Monterrey, Mexico; ²Universidad Panamericana, Mexico

A High Efficiency and High Power SiC DC-DC Converter based on Interleaved-Boost and Full-Bridge LLC Integration for PV Applications [#0889]
Shilei Lu¹, Kai Sun¹, Guo-en Cao², Zheyuan Yi¹, Hanyu Liu¹, Yongdong Li¹
¹Tsinghua University, China; ²Chinese Academy of Sciences, China

Analysis of an LCL-Isolated Modular Multilevel DC-DC Converter [#1118]
Mahmoud Mehrabankhomartash, Xiangyu Han, Maryam Saeedifard, Deepak Divan
Georgia Institute of Technology, United States
Modular Smart Transformer Topology for the Interconnection of Multiple Isolated AC and DC Grids [#0354]
  Johannes Kuprat, Markus Andresen, Vivek Raveendran, Marco Liserre
  Kiel University, Germany

An Active Damping Control Strategy for a Multi-Cell AC-DC Solid State Transformer [#1288]
  Vishnu Mahadeva Iyer¹, Srinivas Gulur², Subhashish Bhattacharya²
  ¹GE Global Research, United States; ²North Carolina State University, United States

Coordinated Power Control Strategy of Modified Electrical Energy Router [#0255]
  Zixun Pan¹, Xiaofeng Yang¹, Zejie Li¹, Haibo Tao¹, Yanbin Zhang¹, Trillion Q. Zheng¹, Pavel Kobrle²
  ¹Beijing Jiaotong University, China; ²Czech Technical University, Czech Republic

A Hybrid Voltage Regulator with Arcless Tap Change and Stepless Voltage Regulation Functions [#0743]
  Yafeng Wang, Tiefu Zhao
  University of North Carolina-Charlotte, United States

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  Qingyun Huang, Sanjay Rajendran, Soumik Sen, Zhicheng Guo, Liqi Zhang, Alex Q. Huang
  The University of Texas at Austin, United States

A Control Method of Hybrid Transformer Enabled Harmonic Isolator for Sensitive Clustered Harmonic Loads [#1387]
  Yos Prabowo¹, Vishnu Mahadeva Iyer², Subhashish Bhattacharya¹, Eddy Aeloiza³
  ¹North Carolina State University, United States; ²GE Global Research, United States; ³ABB Inc., United States

High Power DC-DC Converter based on Parallel Hybrid Converter [#1447]
  Mohd Shadab Ansari¹, Ibhan Chand Rath¹, Siba Kumar Patro², Anshuman Shukla¹
  ¹Indian Institute of Technology Bombay, India; ²Visvesvaraya National Institute of Technology, India

A Control Technique to Eliminate dc Harmonics in Series-Connected Hybrid VSCs for HVDC Applications [#1446]
  Siba Kumar Patro¹, Anshuman Shukla²
  ¹Visvesvaraya National Institute of Technology, India; ²Indian Institute of Technology Bombay, India

Virtual Friction for Oscillation Damping and Inertia Sharing from Multi-Terminal VSC-HVDC Grids [#1057]
  Alberto Rodríguez-Cabero¹, Javier Roldán-Pérez¹, Milan Prodanovic¹, Jon Are Suul², Salvatore D’arco²
  ¹IMDEA Energy Institute, Spain; ²SINTEF Energy Research, Norway
Thursday, October 15

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Chair(s): Antonio J. Marques Cardoso, Thomas Wolbank

Fault-Tolerant Control of Five-Phase Open-End Induction motor Drive with a Floating Capacitor [#0357]
Xiangwen Sun, Zicheng Liu, Dong Jiang, An Li
Huazhong University of Science and Technology, China

Time-Frequency Domain based Diagnostics of Stator Faults in Motors Drives via Dispersal Magnetic Field [#0813]
Hassan H. Eldeeb¹, Haisen Zhao¹,², Osama A. Mohammed¹
¹Florida International University, United States; ²North China Electric Power University, China

Universal SVPWM Fault-Tolerant Control of a New Five-Phase Flux-Intensifying Fault-Tolerant Interior-Permanent-Magnet Motor [#0196]
Li Zhang, Xiaiyong Zhu, Deyang Fan
Jiangsu University, China

Fully Integrated Fault-Tolerance for PMSMs in Aviation Applications [#0712]
Alastair P. Thurlbeck, Yue Cao
Oregon State University, United States

Analysis and Evaluation of Active/Hybrid/Passive DV/DT-Filter Concepts for Next Generation SiC-Based Variable Speed Drive Inverter Systems [#1145]
M. Haider¹, M. Guacci¹, D. Bortis¹, J.W. Kolar¹, Y. Ono²
¹ETH Zürich, Switzerland; ²Nabtesco R&D Center, Japan

Automatic Generation of Gate Driving Vectors for Digital Gate Drivers to Satisfy EMI Regulations [#1226]
Ryuzo Morikawa, Toru Sai, Katsuhiro Hata, Makoto Takamiya
The University of Tokyo, Japan

A Novel Multi-Physical Coupled Model of Press-Pack IGBT in Steady Conducting State Considering Fretting Wear [#1310]
Cao Zhan¹, Lingyu Zhu¹, Jiangang Dai¹, Ting Hou²
¹Xi’an Jiaotong University, China; ²State Key Laboratory of HVDC Transmission Technology, China

SiC based Interleaved VSI Fed Transverse Flux Machine Drive for High Efficiency, Low EMI Noise and High Power Density Applications [#1581]
Salman K. Harasis, Md Ehsanul Haque, Anik Chowdhury, Yilmaz Sozer
The University of Akron, United States

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Chair(s): Sheng Zheng, Alinaghi Marzoughi

Design and Optimization of a Highly Integrated Modular Filter Building Block for Three-Level Grid Tied Converters [#0997]
Ripun Phukan¹, Sungjoe Ohn¹, Dong Dong¹, Rolando Burgos¹, Gopal Mondal², Sebastian Nielebock²
¹Virginia Polytechnic Institute and State University, United States; ²Siemens Corporate Research, Germany
A Parallel Control Strategy for Power Mismatch Elimination of Photovoltaic Grid-Connected Cascaded H-Bridge Multilevel Inverter [#0093]
Xicai Pan, Shangzhi Pan, Jinwu Gong, Xiaoming Zha
Wuhan University, China

Single-Phase Cascaded Multilevel Rectifier using Totem-Pole Bridgeless Cells [#0721]
Ailton do Egito Dutra, Montê Alves Vitorino, Alan Santana Felinto, Maurício Beltrão de Rossiter Corrêa
Federal University of Campina Grande, Brazil

A New Reduced Switch-Count Configuration for Regenerative Cascaded H-Bridge Converter [#0079]
Sarah Badawi¹, Mehdi Narimani¹, Zhongyuan Cheng², Navid Reza Zargari²
¹McMaster University, Canada; ²Rockwell Automation Canada, Canada

Current Harmonic Reduction in DC-Link Capacitors of a Regenerative Cascaded H-Bridge Converter [#0692]
Shaoyi Yuan, Mehdi Narimani
McMaster University, Canada

A New Model-Based Fault Detection and Localization Scheme for Cascaded H-Bridge Multilevel Converter [#1584]
Naga Brahmendra Yadav Gorla, Sandeep Kolluri, Merlin Chai, Sanjib Kumar Panda
National University of Singapore, Singapore

Session 39: Grid Interactive Converter Control
Chair(s): Gab-Su Seo, Xiongfei Wang

CCS-MPC with Long Predictive Horizon for Grid-Connected Current Source Converter [#0242]
Cheng Xue, Li Ding, Yunwei (Ryan) Li
University of Alberta, Canada

Decoupled Active and Reactive Power Control without PLL Requirement for Differential Buck Converter [#1304]
Ahmad Khan¹,², Mohsen Hosseinzadehtaher¹,², Mitchell Easley¹, Mohammad B. Shadmand¹,², Haitham Abu-Rub³
¹Kansas State University, United States; ²University of Illinois at Chicago, United States; ³Texas A&M University at Qatar, Qatar

Control Technique for High-Frequency Soft-Switching Three-Phase Inverter under Grid Fault Condition [#1281]
Gibong Son, Zhengrong Huang, Qiang Li, Fred C. Lee
Virginia Polytechnic Institute and State University, United States

Virtual Admittance PLL Structure for Grid Forming Power Converters in Microgrids [#0994]
Andres Tarraso¹, Jose Ignacio Candela¹, Ngoc Bao Lai², Gregory N. Baltas², Pedro Rodriguez²
¹Universitat Politecnica de Catalunya, Spain; ²Universidad Loyola Andalucia, Spain
**A Single Feedback Current Control Design Technique for LCL Grid-Connected Inverters based on Pole Allocation in the Frequency Domain [#0709]**

Uziel Santos de Araújo¹, João Raphael Souza Martins², André Pires Nóbrega Tahim¹, Darlan Alexandria Fernandes³, José Renes Pinheiro¹, Fabiano Fragoso Costa¹  
¹Federal University of Bahia, Brazil; ²Federal University of Campina Grande, Brazil; ³Federal University of Paraíba, Brazil

**Synchronverter-Based Control of Multi-Port Autonomous Reconfigurable Solar Plants (MARS) [#1240]**

Phani R.V. Marthi¹, Suman Debnath¹, Mariesa L. Crow²  
¹Oak Ridge National Laboratory, United States; ²Missouri University of Science and Technology, United States

**Adaptive-Passive Virtual Inertia Control based on Energy Balance between a Synchronous Generator and a Three-Phase Inverter [#1222]**

Sara Yazdani, Mehdi Ferdowsi, Pourya Shamsi  
Missouri University of Science and Technology, United States

**Dynamic Discontinuous PWM for Grid-Tied Inverter Applications [#0675]**

Zeljko Jankovic¹, Puneeth Murthy¹, Lixiang Wei¹, Adel Nasiri²  
¹Rockwell Automation, United States; ²University of Wisconsin-Milwaukee, United States

**Optimal Design of Grid Interactive Inverters based on Harmonic State Space Modeling [#1289]**

Dongsen Sun, Xiaonan Lu, Liang Du  
Temple University, United States

**Session 40: Tools and Techniques for the Optimization and Protection of Power Electronic Systems**

Chair(s): Brandon Grainger, Shajjad Chowdhury

**Electronic Design Automation (EDA) Tools and Considerations for Electro-Thermo-Mechanical Co-Design of High Voltage Power Modules [#1243]**

Tristan M. Evans, Shilpi Mukherjee, Yarui Peng, H. Alan Mantooth  
University of Arkansas, United States

**High-Frequency Transformer Design with High-Voltage Insulation for Modular Power Conversion from Medium-Voltage AC to 400-V DC [#1187]**

Zheqing Li, Yi-Hsun Hsieh, Qiang Li, Fred C. Lee, Mohamed H. Ahmed  
Virginia Polytechnic Institute and State University, United States

**Relative Entropy based Lithium-Ion Battery Pack Short Circuit Detection for Electric Vehicle [#0549]**

Zhenyu Sun¹, Zhenpo Wang¹, Peng Liu¹, Zhaosheng Zhang¹, Shuo Wang¹, David G. Dorrell²  
¹Beijing Institute of Technology, China; ²University of Witwatersrand, South Africa

**Q-Learning-Based Smart Selective Harmonic Current Mitigation-PWM (S²HCM-PWM) for Grid-Connected Converters [#0992]**

Amirhossein Moeini¹, Morteza Dabbaghjamanesh², Jonathan W. Kimball¹  
¹Missouri University of Science and Technology, United States; ²The University of Texas at Dallas, United States
High Frequency Signal Injection Method for Online Condition Monitoring of Electric Machines [#1576]
Okan Boler, Senol Sancar, Yilmaz Sozer, J. Alexis De Abreu-Garcia
The University of Akron, United States

A Frequency-Domain Method for Stray Parameters Extraction in Arbitrary Section of Laminated Busbars [#1605]
Mingyang Wang, Guofeng Wu, Sideng Hu, Xiangning He
Zhejiang University, China

A Synchronous Distributed Control and Communication Network for SiC-Based Scalable Impedance Measurement Unit [#1134]
Yu Rong¹, Jun Wang¹, Zhiyu Shen², Sizhan Zhou¹, Bo Wen¹, Rolando Burgos¹, Dushan Boroyevich¹
¹Virginia Polytechnic Institute and State University, United States; ²Delta Electronics (America) LTD., United States

Partial Discharge Signal Propagation in Three-Phase Gas-Insulated Switchgear: CIGRE Recommendations-Based Analysis [#0559]
Ahmad Darwish¹, Shady S. Refaat², Haitham Abu-Rub², Hamid A. Toliyat¹
¹Texas A&M University-College Station, United States; ²Texas A&M University-Doha, Qatar

Session 41: Predictive and Sensorless Control of Electric Drives
Chair(s): David Diaz Reigosa, Francisco Paz

Saliency-Based Speed Sensorless Control of Single-Inverter Dual Induction Machines using Reduced Amount of Current Sensors [#0580]
Eduardo Rodriguez Montero¹, Markus Vogelsberger², Martin Bazant³, Thomas Wolbank¹
¹Vienna University of Technology, Austria; ²Bombardier Transportation Austria GmbH, Austria; ³Bombardier Transportation Switzerland Ltd., Switzerland

Improved Sensorless Control Method for Permanent Magnet Synchronous Machines Considering Resistance Asymmetry and Temperature Variation [#0476]
Tianyi Liu¹, Ziqiang Zhu¹, Zhanyuan Wu², David Stone¹, Martin Foster¹
¹University of Sheffield, United Kingdom; ²Siemens Gamesa Renewable Energy, United Kingdom

Sensorless Control of Wound Rotor Synchronous Motors based on Rotor High-Frequency Signal Injection [#0339]
David Reigosa, Ye Gu Kang, María Martínez, Daniel Fernández, J.M. Guerrero, Fernando Briz
University of Oviedo, Spain

Realization of Signal-Injection Sensorless Control of SMPMSM by Modification of Current Trajectory [#1595]
Yoon-Ro Lee, Yong-Cheol Kwon, Seung-Ki Sul
Seoul National University, Korea

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Michigan State University, United States

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Xing Wang¹, Yongchang Zhang¹, Haitao Yang¹, Boyue Zhang¹, Jose Rodriguez²
¹North China University of Technology, China; ²Universidad Andres Bello, Chile

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Paolo Gherardo Carlet¹, Andrea Favato¹, Saverio Bolognani², Florian Dörfler²
¹University of Padova, Italy; ²ETH Zürich, Switzerland

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¹Utah State University, United States; ²North Carolina State University, United States;
³Toyota Research Institute North America, United States

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¹Ford Motor Co., United States; ²The Ohio State University, United States

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Bo Zhang¹, Richard B. Carlson¹, Veda P. Galigekere², Omer C. Onar², Jason L. Pries²
¹Idaho National Laboratory, United States; ²Oak Ridge National Laboratory, United States
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\textsuperscript{1}Utah State University, United States; \textsuperscript{2}Idaho National Laboratory, United States

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Indian Institute of Technology Guwahati, India

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\textsuperscript{1}Indian Institute of Technology Kanpur, India; \textsuperscript{2}GE Global Research, United States

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\textsuperscript{1}Federal University of Campina Grande, Brazil; \textsuperscript{2}Federal University of Paraiba, Brazil

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\textsuperscript{1}Hokkaido University, Japan; \textsuperscript{2}Okayama University, Japan

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Anindya Ray, Kaushik Rjashekara
University of Houston, United States
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Shah Zaman¹, Yan Zhang¹, Liu Jinhun¹, Li Xinying¹, Nauman Ali Larik², Zhang Jinshui¹
¹Xi’an Jiaotong University, China; ²South China University of Technology, China

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Dong Xie, Xinglai Ge
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¹Aalborg University, Denmark; ²Schneider Electric Power Drives Gmbh, Austria

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Sandia National Laboratories, United States

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Patrick T. Lewis¹, Brandon M. Grainger²
¹Hepburn and Sons, LLC, United States; ²University of Pittsburgh, United States

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Vahe Seferian¹, Ali Bazzi¹, Hazem Hajj¹
¹American University of Beirut, Lebanon; ²University of Connecticut, United States

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¹Nanyang Technological University, Singapore; ²Zhejiang University, China
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Huazhong University of Science and Technology, China  

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¹Lakehead University, Canada; ²National Institute of Technology Karnataka, India; ³Khalifa University, United Arab Emirates  

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Angelo Accetta¹, Maurizio Cirrincione², Filippo D'Ippolito³, Marcello Pucci¹, Antonino Sferlazza³  
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Anantaram Varatharajjan, Gianmario Pellegrino, Eric Armando  
Politecnico di Torino, Italy  

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Akm Arafat¹, Md. Khurshedul Islam², Kazi Nishat Tasnim², Seungdeog Choi²  
¹Commins Inc., United States; ²Mississippi State University, United States  

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Seoul National University, Korea  

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¹The University of Tennessee, United States; ²ABB Corporate Research, United States

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Adrien Voldoire¹, Jean-Luc Schanen¹, Jean-Paul Ferrieux¹, Benoit Sarrazin¹, Cyrille Gautier², Marwan Ali²
¹University Grenoble Alpes, France; ²Safran Tech, France

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Yong-Yao Shen, Meng-Jiang Tsai, Jiuyang Zhou, Po-Tai Cheng
National Tsing-Hua University, Taiwan

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University of Bologna, Italy

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Mojtaba Forouzesh, Bo Sheng, Yang Chen, Yan-Fei Liu
Queen's University, Canada

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Yue Liu, Hongfei Wu, Yu Tai, Jun Zou, Yihang Jia
Nanjing University of Aeronautics and Astronautics, China

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Hao Wen¹, Dong Jiao¹, Jih-Sheng Laï¹, Johan Strydom², Lanhua Zhang²
¹Virginia Polytechnic Institute and State University, United States; ²Texas Instruments Inc., United States

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The University of Texas-Dallas, United States

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   Sreyam Sinha¹, Yuetao Hou¹, Di Ni¹, Qing Ji², Arun Persaud², Peter Seidl²,
   Thomas Schenkel², Amit Lal¹, Khurram K. Afridi¹
   ¹Cornell University, United States; ²Lawrence Berkeley National Laboratory, United States

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   Yuetao Hou¹, Sreyam Sinha¹, Di Ni¹, Qing Ji², Arun Persaud², Peter Seidl²,
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   ¹Cornell University, United States; ²Lawrence Berkeley National Laboratory, United States

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   Yu Yao, Harish S. Krishnamoorthy
   University of Houston, United States

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   Hwa-Pyeong Park¹, Mina Kim², Jongbok Baek¹, Moses Kang¹, Jee-Hoon Jung²
   ¹Korea Institute of Energy Research, Korea; ²Ulsan National Institute of Science and Technology, Korea

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   Kodai Matsuura¹, Masataka Ishihara¹, Akihiro Konishi¹, Kazuhiro Umetani², Eiji Hiraki¹
   ¹Okayama University, Japan; ²Tohoku University, Japan

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   Ruiyang Qin, Jie Li, Daniel Costinett
   The University of Tennessee-Knoxville, United States

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   Jiayang Wu, Albert T.L. Lee, Siew-Chong Tan, S.Y. (Ron) Hui
   The University of Hong Kong, Hong Kong

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Xi'an Jiaotong University, China

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¹Nanyang Technological University, Singapore; ²Southwest Jiaotong University, China; ³Xinjiang University, China

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Weiyang Zhou¹, Mengqi Wang¹, Qunfang Wu¹, Guanliang Liu¹, Wencong Su¹, Can Huang²
¹University of Michigan-Dearborn, United States; ²Lawrence Livermore National Laboratory, United States

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Zeqian Cheng, Hao Chen, Zhongnan Qian, Jiande Wu, Xiangning He
Zhejiang University, China

Subhajyoti Mukherjee, Veda P. Galigekere, Omer Onar, Burak Ozpineci, Jason Pries, Rong Zeng, Gui-Jia Su
Oak Ridge National Laboratory, United States

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Tarak Saha¹, Subhajyoti Mukherjee², Veda Prakash Galigekere², Omer C. Onar²
¹Utah State University, United States; ²Oak Ridge National Laboratory, United States

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University of Wisconsin-Madison, United States

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¹The University of Akron, United States; ²Bendix Commercial Vehicle Systems, United States
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The University of Akron, United States

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Guang-Jin Li¹, Xiao-Bin Liang², Zi-Qiang Zhu¹, Javier Ojeda³, Mohamed Gabsi³
¹The University of Sheffield, United Kingdom; ²State Grid Sichuan Electric Power Institute, China;
³École Normale Supérieure Paris-Saclay, France

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Omer Gundogmus¹, Md Ehsanul Haque¹, Lavanya Vadomodala¹, Abdul Wahab Bandarkar¹,
Anik Chowdhury¹, Yilmaz Sozer¹, Fernando Venegas², David Colavincenzo²
¹The University of Akron, United States; ²Bendix Commercial Vehicle Systems, United States

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Jun-Hyuk Im, Woo-Jong Kim, Jin Hur
Incheon National University, Korea

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Peng Han¹, Greg Heins², Dean Patterson², Mark Thiele², Dan M. Ionel¹
¹University of Kentucky, United States; ²Regal Beloit Corp., Australia

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Peng Han¹, Greg Heins², Dean Patterson², Mark Thiele², Dan M. Ionel¹
¹University of Kentucky, United States; ²Regal Beloit Corp., Australia

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Zhongbao Wei, Hongwen He, Jian Hu
Beijing Institute of Technology, China

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Mattin Lucu¹, Markel Azkue¹, Haritz Camblong², Egoitz Martinez-Laserna¹
¹Ikerlan Technology Research Centre, Spain; ²University of the Basque Country, Spain

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Haolu Liu, Junhua Wang, Qisheng Liu, Shiqi Liu, Jia Tang
Wuhan University, China

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Prashant Shrivastava, Tey Kok Soon, Mohd Yamani Idna Idris, Saad Mekhilef
University Malaya, Malaysia
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Xinrong Huang¹, Anirudh Budnar Acharya¹, Jinhao Meng², Xin Sui¹,
Daniel-Ioan Stroe¹, Remus Teodorescu¹
¹Aalborg University, Denmark; ²Sichuan University, China

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Kevin Davis¹, John G. Hayes²
¹Cork Institute of Technology, Ireland; ²University College Cork, Ireland

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Xinrong Huang¹, Yuanyuan Li², Jinhao Meng³, Xin Sui¹, Remus Teodorescu¹, Daniel-Ioan Stroe¹
¹Aalborg University, Denmark; ²University of Electronic Science and Technology, China;
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Sanchit Mishra, T. Sreekanth, Ned Mohan
University of Minnesota, United States

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Florian Krismer, Varsha N. Behrunani, Pascal S. Niklaus, Johann W. Kolar
ETH Zürich, Switzerland

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Joon-Hee Lee, Seung-Ki Sul
Seoul National University, Korea

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Hitesh Kumar, Santanu K. Mishra, Mandeep Singh Rana
Indian Institute of Technology Kanpur, India
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North Carolina State University, United States

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Mohd Shadab Ansari, Anshuman Shukla, Himanshu J. Bahirat
Indian Institute of Technology Bombay, India

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Technical University of Munich, Germany

A Level-Increased MMC Topology and Modulation Strategy in DC Distribution Grids [#0625]
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North China Electric Power University, China

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Texas A&M University, United States

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Hongxiang Chen, Sai Tang, Zhong Zeng, Jun Wang
Hunan University, China

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Yufei Li¹,², Fei Diao², Yue Zhao²
¹Northwestern Polytechnical University-Xi’an, China; ²University of Arkansas, United States
A Five-Level Flying-DC-Source Multilevel Inverter with Self-Regulated Voltages and Boosting Capability [#0420]
Antonio Venancio de M. Filho¹, André Elias L. da Costa¹, Edison Roberto C. da Silva¹,²,
Cursino Brandão Jacobina¹, Nady Rocha²
¹Federal University of Campina Grande, Brazil; ²Federal University of Paraíba, Brazil

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Marc S. Petit¹, Hao Zeng², Bulent Sarlioglu²
¹Miller Electric Manufacturing, LLC, United States; ²University of Wisconsin-Madison, United States

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Okan Boles, Omer Gundogmus, Abdul Wahab Bandarkar, Yilmaz Sozer
The University of Akron, United States

Deadbeat Control for AC Drive Systems with Optimal Dynamic Performance [#1116]
Wei Tian¹, Qifan Yang¹, Xinyue Li¹,², Xiaonan Gao¹, Xiao Chen¹, Ralph Kennel¹
¹Technical University of Munich, Germany; ²Bosch Rexroth AG, Germany

Design of a SiC-Based Switched CCM/TCM Inverter for High-Speed Machine Drive with Low PWM-Induced Current Ripple [#0610]
Yunlei Jiang, Yanfeng Shen, Luke Shillaber, Teng Long
University of Cambridge, United Kingdom

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Fayez F.M. El-Sousy¹, Mahmoud M. Amin², Ghada A. Abdel Aziz³, Ahmed Al-Durra⁴, Osama A. Mohammed⁵
¹Prince Sattam bin Abdulaziz University, Saudi Arabia; ²Manhattan College, United States;
³Electronics Research Institute, Egypt; ⁴Khalifa University, United Arab Emirates;
⁵Florida International University, United States

Shaofeng Jia, Binke Li, Xiaozhuang Dong, Deliang Liang, Jinjun Liu
Xi'an Jiaotong University, China

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Masaki Nagataki¹, Keiichiro Kondo¹, Osamu Yamazaki², Kazuaki Yuki², Yosuke Nakazawa²
¹Waseda University, Japan; ²Toshiba Infrastructure Systems and Solutions Corp., Japan

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¹Soochow University, China; ²Bristol University, United Kingdom

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Vladimir Blasko¹, Mahmoud El Chamie¹, Boran Fan², Rolando Burgos²
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North China University of Technology, China
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Faizah Zahin¹, Alireza Abasian², S. Ali Khajehoddin¹

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Md Safayatullah, Issa Batarseh

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Jing Guo, Hua Han, Guo Xu, Zhiqiang Cai, Hui Wang, Yao Sun, Mei Su

Central South University, China

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Muhammad Faisal Fiaz¹, Sandro Calligaro¹, Roberto Petrella²

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Anup Anurag¹, Nithin Kolli¹, Sayan Acharya², Subhashish Bhattacharya¹,

Todd R. Weatherford³, Andrew Parker³

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The University of Texas at Austin, United States

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University of Maryland, United States
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Georgia Institute of Technology, United States

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University of Sheffield, United Kingdom

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Luocheng Yan¹, Ziqiang Zhu¹, Ji Qi¹, Yuan Ren², Chengwei Gan², Simon Brockway², Chris Hilton²
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Diego F. Laborda¹, David Díaz Reigosa¹, Daniel Fernández¹, Kensuke Sasaki², Takashi Kato², Fernando Briz¹
¹University of Oviedo, Spain; ²Nissan Motor Co. Ltd., Japan

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¹Christian-Albrechts-Universität Kiel, Germany; ²Aalborg University, Denmark
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¹Huazhong University of Science and Technology, China; ²United Imaging Healthcare Co., China

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¹Nanyang Technological University, Singapore; ²Zhejiang University, China

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  ¹Florida State University, United States; ²Raytheon Technologies Research Center, United States

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  ¹Shahid Beheshti University, Iran; ²King Mongkut’s University of Technology North Bangkok, Thailand;
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¹Gesinne S.L., Spain; ²University of Oviedo, Spain; ³Cegasa Energía, S.L.U., Spain

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Roghayeh Gavagsaz-Ghoachani¹, Matheepot Phattanasak², Jean-Philippe Martin³, Serge Pierfederici³
¹Shahid Beheshti University, Iran; ²King Mongkut’s University of Technology North Bangkok, Thailand;
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L. Bigarelli¹, M. di Benedetto¹, A. Lidozzi¹, L. Solero¹, P.J. Grbović²
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Utkal Ranjan Muduli¹,², Abdul R. Beig², Khaled Al Jaafari², Jamal Y. Alsawalhi², Ranjan Kumar Behera¹
¹Indian Institute of Technology Patna, India; ²Khalifa University, United Arab Emirates
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¹The Ohio State University, United States; ²Safran Group, United States

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¹Ohio State University, United States; ²Ford Motor Co., United States

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³University of Newcastle, United Kingdom; ⁴University of Pavia, Italy

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University of Wisconsin-Milwaukee, United States