PROGRAM LISTING

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) Wong[1], Hossein Baninajar[1,2], Bertrand Dechant[2], Jonathan Bird[1,2]
[1]Portland State University, United States; [2]FluxMagic, Inc., United States

Methods to Determine the Stator Inter-Turn Short Circuit in an Induction Motor with Installed Rotor [#0312]
Dimas Anton Asfani[1], I Made Yulistya Negara[1], I Gusti Ngurah Satriyadi Hernanda[1], Daniar Fahmi[1], Eduard Muljadi[2], Robert M. Nelms[2]
[1]Institut Teknologi Sepuluh Nopember, Indonesia; [2]Auburn 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 Islam[1], Rajib Mikail[2], Ritvik Chattopadhyay[1], Iqbal Husain[1]
[1]North Carolina State University, United States; [2]ABB US Corporate Research Center, United States

Air-Cooled Multi Phase Dual-Winding In-Wheel Motor integrated with Ultra Small SiC Module [#0024]
Kan Akatsu[1], Satoshi Tanimoto[2], Yoshinori Murakami[3]
[1]Yokohama National University, Japan; [2]Fukushima SiC Applied Engineering Inc., Japan; [3]Nissan 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 [#0390]

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 [#0759]

Tsarafidy Raminosoa[1], Randy Wiles[1], J. Emily Cousineau[2], Kevin Bennion[2], Jon Wilkins[1]
[1]Oak Ridge National Laboratory, United States; [2]National Renewable Energy Laboratory, United States

Motor System Integrated Magnetic Multiple Spur Gear and High Speed Motors for Electric Vehicle [#0388]

Kohei Aiso[1], Kan Akatsu[2], Yasuaki Aoyama[3]
[1]Waseda University, Japan; [2]Yokohama National University, Japan; [3]Hitachi, 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 [#1324]

Venkata Yaramasu[1], Kristiyan Milev[1], Apparao Dekka[2], Jose Rodriguez[3]
[1]Northern Arizona University, United States; [2]Lakehead University, Canada; [3]Universidad Andres Bello, Chile

Anti-Disturbance Full-Order Sliding Mode Control of PMSG-Based Wind Energy Conversion Systems [#0137]

Chun Wei[1], Jianxing Xu[1], Qiang Chen[1], Wei Qiao[2], Jianwu Zeng[3]
[1]Zhejiang University of Technology, China; [2]University of Nebraska-Lincoln, United States; [3]Minnesota 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 [#1571]

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 [#1389]

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

Power Optimizer based on Model Predictive Control for a Cascade Multilevel Impedance Source Inverter [#1463]

Sally Sajadian
Lafayette College, United States

Circulating Current Analysis and Power Mismatch Elimination Strategy for an MMC-Based Photovoltaic System [#0094]

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 Tafti[1], Georgios Konstantinou[1], Christopher D. Townsend[2], Glen G. Farivar[3], Salvador Ceballos[4], Josep Pou[5], John E. Fletcher[1]

[1]University of New Wales, Australia; [2]The University of Western Australia, Australia; [3]Nanyang Technological University, Singapore; [4]Basque Research and Technology Alliance, Spain

Energy Harvesting Comparison and Analysis in 1000V and 1500V Grid-Connected PV Systems [#0593]

Branislav Stevanović[1], Emanuel Serban[2], Miroslav Vasić[1], Martin Ordonez[2], Santiago Cóbreces[3], Pedro Alou[1]

[1]Universidad Politécnica de Madrid, Spain; [2]The University of British Columbia, Canada; [3]Universidad 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 Ariyarathna[1], Nihal Kularatna[2], D. Alistair Steyn-Rosse[2]

[1]Waikato Institute of Technology, New Zealand; [2]The 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 Kim[1,2], Yoshitaka Yamauchi[1], Xiaodong Meng[1], Tianyu Jia[1], Liam McAuliffe[1], Todd Takken[1], Kevin Tien[1], Shurong Tian[1], Yuan Yao[1], Andrew Ferencz[1], Mingoo Seok[2], Xin Zhang[1]

[1]IBM T. J. Watson Research Center, United States; [2]Columbia 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, Jaeil 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 Zhuang[1], Grayson Zulauf[1], Jaume Roig[2], James D. Plummer[1], Juan Rivas-Davila[1]
[1]Stanford University, United States; [2]ON Semiconductors, Belgium

Characterization and Analysis of Insulated Metal Substrate-Based SiC Power Module for Traction Application [#0296]

Shajjad Chowdhury, Emre Gurpinar, 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, Yanfeng 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/m^3 and Efficiency >98.5% [#0538]

Yan Li[1], Yonglei Zhang[1], Xibo Yuan[2], Lei Zhang[1], Fei Ye[1], Zhe Li[1], Yaohua Li[1], Yipu Xu[1], Zijian Wang[1]
[1]China University of Mining and Technology, China; [2]University 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 Baker[1], Boran Fan[1], Rolando Burgos[1], Vladimir Blasko[2], Warren Chen[2]
[1]Virginia Polytechnic Institute and State University, United States; [2]Raytheon Technologies Research Center, United States

Performance of Wide-Bandgap Gallium Nitride vs Silicon Carbide Cascode Transistors [#0680]

Yasin Gunaydin[1], Saeed Jahdi[1], Olayiwola Alatise[2], Jose Ortiz Gonzalez[2], Ruizhu Wu[2], Bernard Stark[1], Mohammad Hedayati[1], Xibo Yuan[1], Phil Mellor[1]
[1]University of Bristol, United Kingdom; [2]University 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 Iida[1], Masatsugu Takemoto[2], Satoshi Ogasawara[1], Koji Orikawa[1], Ikuya Sato[3], Hiroyuki Kokubun[3], Akio Toba[3], Masao Shuto[3]
[1]Hokkaido University, Japan; [2]Okayama University, Japan; [3]Fuji 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 Kumashiro[1], Akira Chiba[1], Wolfgang Gruber[2], Wolfgang Amrhein[2], Gerald Jungmayr[3]
[1]Tokyo Institute of Technology, Japan; [2]Johannes Kepler University Linz, Austria; [3]Linz Center of Mechatronics GmbH, Austria

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

Effects of Axial Flux Magnetic Gear Misalignment [#1502]
Bryton Praslicka[1], Matthew Johnson[2], Matthew C. Gardner[1], Ellen Dangtran[1], Hamid A. Toliyat[1]
[1]Texas A&M University, United States; [2]U.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 Hasanpour[1], Matthew C. Gardner[1], Matthew Johnson[2], Hamid A. Toliyat[1]
[1]Texas A&M University, United States; [2]U.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. Luna[1], Cursino B. Jacobina[2], Alexandre C. Oliveira[2]
[1]Federal University of Semi-Arid Region, Brazil; [2]Federal 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 Lu[1], Zhao Liu[1], Jianshou Kong[2], Deping Tang[3], Jie Yu[1], Jiawei Ji[1]
[1]Nanjing University of Science and Technology, China; [2]Changshu Intelligent Laser Equipment Research Institute, China; [3]Hefei 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-Medina[1], P.R. Martinez-Rodriguez[1], G. Escobar[2], J.C. Mayo-Maldonado[2], J.E. Valdez-Resendiz[2], D. Guillen-Aparicio[2], O.F. Ruiz-Martinez[3]
[1]Universidad Autonoma de San Luis Potosi, Mexico; [2]Tecnologico de Monterrey, Mexico; [3]Universidad 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 Abbasi[1], Reza Emamalipour[1], Muhammad Ali Masood Cheema[2], John Lam[1]
[1]York University, Canada; [2]Northern 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 Gandomi[1], Leila Parsa[1], Vahid Dargahi[2], Keith Corzine[1]
[1]University of California-Santa Cruz, United States; [2]University 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 Liu[1], Bai Cui[2], Bo Chen[1], Xiaonan Lu[3], Feng Qiu[1], Sudip Mazumder[4]
[1]Argonne National Laboratory, United States; [2]National Renewable Energy Laboratory, United States; [3]Temple University, United States; [4]University of Illinois at Chicago, United States

Data-Driven Cyberattack Detection for Photovoltaic (PV) Systems through Analyzing Micro-PMU Data [#0734]
Qi Li[1], Fangyu Li[1], Jinan Zhang[1], Jin Ye[1], Wenzhan Song[1], Alan Mantooth[2]
[1]University of Georgia, United States; [2]University of Arkansas, United States

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

Detection of False-Data Injection Attacks in Supercapacitor Charging Systems [#0891]
Bowen Liu, Fu Jiang, Heng Li, Hongtao 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 Yamazaki[1], Kento Utsunomiya[1], Akihiro Tanaka[2], Toru Nakada[2]
[1]*Chiba Institute of Technology, Japan;* [2]*Nissan 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 Palangar[1], Amin Mahmoudi[1], Solmaz Kahourzade[2], Wen L. Soong[3]
[1]*Flinders University, Australia;* [2]*University of South Austria, Australia;* [3]*University 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 Wei[1], Antonio Griffo[1], Fernando Alvarez-Gonzalez[1], Ravindra Bhide[2], Subhra Samanta[2], Richard Clark[2], Arwyn Thomas[2], Zi-Qiang Zhu[1]
[1]University of Sheffield, United Kingdom; [2]Siemens 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 Baik[1], Ye gu Kang[2]
[1]University of Wisconsin-Madison, United States; [2]University 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 Ulsan, 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 Liang[1], Hossein Dehghan Tafti[2], Glen G. Farivar[1], Josep Pou[1], Christopher D. Townsend[3], Georgios Konstantinou[2]
[1]Nanyang Technological University, Singapore; [2]University of New South Wales, Australia; [3]University 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. Khamis[1], Mohammed Agamy[1], Ramanujam Ramabhadran[2]
[1]University at Albany, SUNY, United States; [2]GE 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 Xu[1], Zheng Wang[1], Pengcheng Liu[1], Yihan Chen[1], Jiangbiao He[2]
[1]Southeast University, China; [2]University 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 Aeloiza[1], Arun Kadavelugu[1], Liming Liu[1], Joonas Puukko[2]
[1]ABB Inc., United States; [2]ABB 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 Zhu[1], Han Li[1], Cheng Luo[2], Yong Liu[1], Cheng Wan[1], Jie Ma[1]
[1]Eaton Corp., China; [2]Eaton 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 Morya[1], Alejandro G. Yepes[2], Jesús Doval-Gandoy[2], Hamid A. Toliyat[1]
[1]Texas A&M University-College Station, United States; [2]University of Vigo, Spain

Overload Performance Prediction of PM and Synchronous Reluctance Machines for Traction Applications [#0449]

Matteo Carbonieri[1], Wen L. Soong[2], Amin Mahmoudi[3], Solmaz Kahourzade[3], Nicola Bianchi[1]
[1]University of Padova, Italy; [2]University of Adelaide, Australia, Australia; [3]Flinders University, Australia; [4]University of South Australia, Australia

Performance Comparison between SiC Two-Level and Si Three-Level AFE Converters [#0641]

Marzieh Karami[1], Rangarajan Tallam[1], Kenneth E. Pagenkopf[2], Robert Cuzner[3]
[1]Rockwell Automation, United States; [2]Cramer Magnetics, United States; [3]University 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 Wang[1], Xuan Yi[2], Xiaolong Zhang[2], Yi Yin[1], Tao Han[1], Kiruba Haran[2]
[1]Shanghai Jiao Tong University, China; [2]University of Illinois at Urbana-Champaign, United States

Vibration Prediction using the Relative Permeance of IPMSM [#0458]

Seung-Hyeon Lee[1], In-Jun Yang[1], Won-Ho Kim[1], Ik Sang Jang[2]
[1]Gachon University, Korea; [2]Hyundai Mobis, Korea

Stray Flux-Based Incipient Stage Bearing Fault Detection for Induction Machines via Noise Cancellation Techniques [#1422]

Genyi Luo[1], Thomas G. Habetler[1], Jed Hurwitz[2]
[1]Georgia Institute of Technology, United States; [2]Analog 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 Das[1], Anik Chowdhury[1], Zhao Wan[2], Mojtaba Bahrami Kouhshahi[2], Alejandro Pina Ortega[2], Yilmaz Sozer[1]
[1]The University of Akron, United States; [2]Nexteer Automotive, United States

Design of Experiments for Stator Windings Insulation Degradation under High dv/dt and High Switching Frequency [#0642]

Fernando Alvarez-Gonzalez[1], David Hewitt[1], Antonio Griffo[1], Jiabin Wang[1], Mohamed Diab[2], Xibo Yuan[2]
[1]The University of Sheffield, United Kingdom; [2]University 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 Das[1], Anik Chowdhury[1], Zhao Wan[1], Mojtaba Bahrami Kouhshahi[2], Alejandro Pina Ortega[2], Yilmaz Sozer[1]
[1]The University of Akron, United States; [2]Nexteer Automotive, United States

Remote Monitoring and Diagnostics of Blade Health in Commercial MW-Scale Wind Turbines using Electrical Signature Analysis (ESA) [#0425]

Lijun He[1], Mohammad Attia[2], Liwei Hao[1], Biao Fang[1], Karim Younsi[1], Honggang Wang[1]
[1]GE Research, United States; [2]GE 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 Wang[1], Meng Xiong[1], Xun Wang[1], Qile Li[2], Zhao Jiang[2], Xuezhe Wei[1], Haifeng Dai[1]
[1]Tongji University, China; [2]Ningbo Preh Joyson Automotive Electronics, China

A Sensorless Coil Detection Scheme based on Dead-Time Effect in Dynamic Wireless Power Transfer Systems [#0717]

Utkarsh D. Kavimandan[1], Veda P. Galigekere[2], Burak Ozpineci[2], Jason Pries[2], Omer Onar[2], Satish M. Mahajan[1]
[1]Tennessee Technological University, United States; [2]Oak Ridge National Laboratory, United States

Vehicle-to-Vehicle Inductive Power Transfer: Design Analysis and Topology Selection [#1047]

Van Thuan Nguyen[1], Van Binh Vu[2], Vaibhav Uttam Pawaskar[1], Rakesh Krishna Katakam[1], Ghanshyamsinh Gohil[1]
[1]The University of Texas at Dallas, United States; [2]Newcastle 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 Kondo[1], Philipp Schülting[2], Arne Hendrik Wienhausen[2], Rik W. De Doncker[2]
[1]Mitsubishi Electric Corp., Japan; [2]RWTH Aachen University, Germany

An Improved PQ Zeta Converter with Reduced Switch Voltage Stress for Electric Vehicle Battery Charger [#0872]

Radha Kushwaha[1], Bhim Singh[1], Vinod Khadkikar[2]
[1]Indian Institute of Technology Delhi, India; [2]Khalifa University-Abu Dhabi, United Arab Emirates

Dynamic Process Analysis of a High-Power Bidirectional DC/DC Converter for Electric Vehicles [#0865]

Liyan Zhu[1], Hua (Kevin) Bai[1], Alan Brown[2], Matt McAmmond[2]
[1]The University of Tennessee-Knoxville, United States; [2]Hella Electronics Corp., United States

Improved Power Quality Charging System based on High Step Down Gain Bridgeless SEPIC APFC for Light Electric Vehicles [#0902]

Jitendra Gupta[1], Radha Kushwaha[1], Bhim Singh[1], Vinod Khadkikar[2]
[1]Indian Institute of Technology Delhi, India; [2]Khalifa 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 Wu[1], Mengqi Wang[1], Weiyang Zhou[1], Yanghe Liu[2]
[1]University of Michigan-Dearborn, United States; [2]Toyota 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 Agamloh, 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

Poster 3: DC-DC Converters 1
Chair(s): Manuel Arias, Hidemine Obara

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 Qi[1], Xuezhi Wu[1], Yuming Zhao[2], Jingdou Liu[2]
[1]Beijing Jiaotong University, China; [2]Shenzhen 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

Poster 4: Emerging Technologies and Applications
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]
Yongbin 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 Gmyrek[1], Andrea Cavagnino[2], Silvio Vaschetto[2], Gerd Bramerdorfer[3]
[1]Lodz University of Technology, Poland; [2]Politecnico di Torino, Italy; [3]Johannes Kepler University Linz, Austria

Modeling of the Temperature Dependence of Soft Magnetic Material [#1091]
Gereon Goldbeck[1], Gerd Bramerdorfer[1], Wolfgang Amrhein[1], Josef Hinterdorfer[2], Bernhard Weiß
[1]Johannes Kepler University Linz, Austria; [2]Voestalpine 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 Chattopadhyay[1], Md Sariful Islam[1], Rajib Mikail[2], Iqbal Husain[1]
[1]North Carolina State University, United States; [2]ABB US Corporate Research Center, United States

Multi-Physics Analysis to Effectively Evaluate Thermal Performance of Liquid-Cooled Electric Machines [#1539]
Abdul Wahab Bandarkar[1], Md Tawhid Bin Tarek[1], Lavanya Vadamodala[1], Yilmaz Sozer[1],
David Colavincenzo[2], Fernando Venegas[2], Jeffrey Geither[2]
[1]The University of Akron, United States; [2]Bendix Commercial Vehicle Systems, United States

Coupled Electromagnetic and Thermal Optimisation Strategies for Direct-Drive Linear Permanent Magnet Synchronous Motors [#0801]
Soroosh Haji Hosseinnejad[1], Thor F. Besier[2], Andrew J. Taberner[2], Bryan P. Ruddy[2]
The University of Auckland, New Zealand

Thermal Modelling of a Permanent Magnet Synchronous Machine through FEM Simulation with Experimental Validation [#0918]
Alejandro L. Rodriguez[1], Patrick Lombard[1], Vincent Leconte[1], Philippe Wendling[1], Irma Villar[2]
[1]Altair Engineering France, France; [2]Basque 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

Poster 6: Direct Drive, Actuators, Magnetic Gearing, Axial Flux, Non-Conventional Machines
Chair(s): Udochukwu Akuru, Lijian Wu

Eddy Current Loss Reduction in 3D-Printed Axial Flux Motor using 3D-Printed SMC Core [#0441]
Hyun-Jo Pyo[1], Jae Won Jeong[2], Jihun Yu[2], Dong-Woo Nam[1], Seo-Hee Yang[1], Won-Ho Kim[1]
[1]Gachon University, Korea; [2]Korea 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 Jara[1], Gerd Bramerdorfer[2], Carlos Madariaga[1], Javier Riedemann[1], Juan Tapia[3], Gordan Segon[4], Werner Koppelstätter[4], Siegfried Silber[4]
[1]Pontificia Universidad Catolica, Chile; [2]Johannes Kepler University Linz, Austria; [3]University of Concepcion, Chile; [4]Linz 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

Poster 7: DC-DC Converters 2
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 Wei[1], Quanming Luo[2], Dereje Woldegiorgis[1], Alan Mantooth[1]
[1]University of Arkansas, United States; [2]Chongqing 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-Pierre[1], Necmi Altin[2], Ahmad El Shafei[1], Adel Nasiri[1]
[1]University of Wisconsin-Milwaukee, United States; [2]Gazi 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 Benedetto[1], A. Lidozzi[1], L. Solero[1], F. Crescimbini[1], S. Bifaretti[2]
[1]Roma Tre University, Italy; [2]Tor Vergata University, Italy

Integrated Planar Transformer Design of 3-kW Auxiliary Power Module for Electric Vehicles [#0825]

Ramadhan Muhammad[1], Sangjin Kim[1], Chaeyoung Suk[1], Sewan Choi[1], Byeongu Yu[2], Sanghun Park[2]
[1]Seoul National University of Science and Technology, Korea; [2]LG 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 Rathore[1], Kaushik Rajashekara[1], Parthasarathy Nayak[2]
[1]University of Houston, United States; [2]Emerson 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 Wu[1], Mengqi Wang[1], Weiyang Zhou[1], Can Huang[2], Guanliang Liu[1], Xiaoming Wang[3]
[1]University of Michigan-Dearborn, United States; [2]Lawrence Livermore National Laboratory, United States; [3]Somion 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 Dongye[1], Yao Wang[1], Hua Zhang[1], Sheng Zheng[2], Xiaonan Lu[3], Fei Lu[1]
[1]Drexel University, United States; [2]Oak Ridge National Laboratory, United States; [3]Temple 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 Liao[1], Fei Gao[1], Yutong Zhao[1], Daniel Rogers[2]
[1]Shanghai Jiao Tong University, China; [2]University of Oxford, United Kingdom

A New approach for Hybrid AC-DC Circuit Fault Analysis [#1146]
Mohammad Mehdi Rezvani, Shahab Mehraeen
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 Doolla, 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 Carbonieri[1], Lino Di Leonardo[2], Marco Tursini[2], Marco Villani[2], Mircea Popescu[3]
[1]University of Padova, Italy; [2]University of L'Aquila, Italy; [3]Motor Design Ltd., United Kingdom

Influence of Airgap Length on Performance of High Power PM-Assisted Syn-Rel Machines [#1361]
Tianjie Zou[1], David Gerada[1], Adam Walker[1], Gaurang Vakil[1], Salvatore La Rocca[1], Antonino La Rocca[1], Krzysztof Paciura[2], Richard Barden[2], Emil Ernest[2], Shaohong Zhu[2], Naila Qayyum[2], Alastair McQueen[2], Anuvav Bardalai[1], R.M. Ram Kumar[1], Alessandro Marfoli[1], Chris Gerada[1]
[1]University of Nottingham, United Kingdom; [2]Cummins Corporate R&T, United Kingdom

Improvement in Torque Density by Ferrofluid Injection into Interior Permanent Magnet Synchronous Motor [#0463]
In-Jun Yang[1], Seung-Hyeon Lee[1], Dong-Ho Kim[2], Kwang-Soo Kim[3], Ik Sang Jang[4], Won-Ho Kim[1]
[1]Gachon University, Korea; [2]Hanyang University, Korea; [3]Halla University, Korea; [4]Hyundai 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 Park[1], Chaelim Jeong[2], Alberto Bellini[3], Claudio Bianchini[4], Nicola Bianchi[2]
[1]Korea Electrotechnology Research Institute, Korea; [2]University of Padova, Italy;
[3]University of Bologna, Italy; [4]University 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 Jeong[1], Hyun-Jo Pyo[1], Dong-Woo Nam[1], Seo-Hee Yang[1], KangBeen Lee[2], Won-Ho Kim[1]
[1]Gachon University, Korea; [2]Hyundai 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 Wang[1], Zhenpo Wang[1], Lei Zhang[1], D.G. Dorrell[2]
[1]Beijing Institute of Technology, China; [2]University of Witwatersrand, South Africa

Active Voltage Balancing of Integrated Modular Drive with Series DC-Link Capacitors [#0540]

Fan Wu[1], Ayman M. El-Refaie[1], Thomas M. Jahns[2]
[1]Marquette University, United States; [2]University of Wisconsin-Madison, United States

Four-Port Modular Multilevel AC/AC Converter in Continuous Co-Phase Traction Power Supply Application [#1287]

Mingrui Li[1], Xiaoqian Li[1], Yunzhi Lin[2], Yingdong Wei[1], Chao Lu[1], Zhuoxuan Shen[1], Ziming Li[1], Zengqin Li[3]
[1]Tsinghua University, China; [2]China Railway Electrification Engineering Group, China; [3]China 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 Zhang[1], Zhongjing Wang[2], Yu Du[1]
[1]ABB Corporate Research Center, United States; [2]University of Arkansas, United States

A Two-Stage Multiple-Output Automotive LED Driver Architecture [#0575]

Satyaki Mukherjee[1], Alihossein Sepahvand[2], Vahid Yousefzadeh[2], Montu Doshi[2], Dragan Maksimović[1]
[1]University of Colorado, United States; [2]Texas Instruments, Inc., United States

Integrated Motor and Two-Speed Gearbox Powertrain System Development for Electric Vehicle [#0138]

Puhui Liu, Shun Feng
New Energy Vehicle Propulsion Engineering Center, China

Energy Loss Analysis in a SiC/IGBT Propulsion Inverter over Drive Cycles Considering Blanking Time, MOSFET's Reverse Conduction and the Effect of Thermal Feedback [#0671]

Sepideh Amirpour[1], Torbjörn Thiringer[2], Dan Hagstedt[1]
[1]China Euro Vehicle Technology AB, Sweden; [2]Chalmers University of Technology, Sweden

Sizing of DC-Link Capacitor Considering Voltage and Current Ripple Requirements for a 3-Phase Voltage Source Inverter [#0895]

Ali Safayet, Mohammad Islam, Tomy Sebastian
Halla Mechatronics, United States

Evaluation of Parameter Variations of Equivalent Circuit Model of Lithium-Ion Battery under Different SOH Conditions [#0729]

Zhiyong Xia, Jaber A. Abu Qahouq
University of Alabama, United States

A Novel Neural Network with Gaussian Process Feedback for Modeling the State-of-Charge of Battery Cells [#0098]

Abdallah Chehade[1], Ala A. Hussein[2]
[1]University of Michigan-Dearborn, United States; [2]Prince Mohammad Bin Fahd University, Saudi Arabia

Dual Side Control of Wireless Power Transfer with Mutual Inductance Estimation [#1414]

MinJae Sung, Geon-Hong Min, Junk-Ik Ha
Seoul National University, Korea

Novel Load Independent Control Structures for a Resonant LCC EV Wireless Charging Converter [#1619]

Antonio Menchana, Christopher Duke, Dan Gelfer, Pang Vang, Van Xiong, Ali Arbabi, Isabelle Badall, Justin Ortiz, Mohamed Badawy
San Jose State University, United States

Harmonic Optimization Method by SHEPWM for Contactless Power Transfer System with Series-Series Compensation [#0107]

Jichang Yang, Dong Jiang, Yuanzhi Zhang, Ronghai Qu
Huazhong University of Science and Technology, China

Dynamic Response Analysis based on Multiple-Phase-Shift in Dual-Active-Bridge [#0361]

Yu Yan, Hua Bai
The University of Tennessee, United States

Hybrid Power Electronics Architecture to Implement the Fuel Cell Management System [#0686]

Milad Bahrami, Jean-Philippe Martin, Gael Maranzana, Serge Pierfederici, Farid Meibody-Tabar, Mathieu Weber
Université de Lorraine, France

Poster 11: AC-DC Converters and AC-AC Converters (Topology, Modulation, Control)
Chair(s): John Lam, Carl Ho

Optimal Design of Integrated Planar Inductor for a Hybrid Totem-Pole PFC Converter [#0286]

Jun Zou, Hongfei Wu, Yue Liu, Liu Yang, Xingyu Xu
Nanjing University of Aeronautics and Astronautics, China

High-Performance Single-Stage Universal-Input Isolated AC-DC Converter Utilizing an Impedance Control Network [#1352]

Mausamjeet Khatua[1], Ashish Kumar[2], Saad Pervaiz[2], Sombuddha Chakraborty[2], Khurram K. Afridi[1]
[1]Cornell University, United States; [2]Texas Instruments Inc., United States

Load-Independent Self-Tuned Parallel Resonant Power Oscillator [#1390]

Shuya Matsuhashi[1], Yoshiro Hara[1], Kien Nguyen[1], Hiroo Sekiya[1], Takeshi Uematsu[2], Shingo Nagaoka[2], Taichi Mishima[2]
[1]Chiba University, Japan; [2]Omron Corp., Japan

A New Modular SPWM Strategy for Parallel Isolated Matrix Rectifiers to Improve Current Quality [#0413]

Fanxiu Fang, Yuzhuo Li, Yunwei Li
University of Alberta, Canada

AC-DC Isolated Matrix Converter Charger: Topology and Modulation [#1606]

Luca Rovere, Sabino Pipolo, Andrea Formentini, Pericle Zanchetta
University of Nottingham, United Kingdom

Unified Power Quality Conditioner with Shared Legs and High-Frequency Transformer [#1271]

Alan S. Felinto, Cursino B. Jacobina
Federal University of Campina Grande, Brazil

Hybrid Converter with Reduced DC-Link Voltage using an H-Bridge Cell for Split-Phase Power System [#1188]

Bruna S. Gehrke[1], Cursino B. Jacobina[1], Italo R.F.M.P. da Silva[2], Reuben P.R. Sousa[1]
[1]Federal University of Campina Grande, Brazil; [2]Federal Rural University of Pernambuco, Brazil

Single-Phase AC-DC-AC Multilevel Converter based on Three-Leg Modules Series-Connected to H-Bridges through Transformers [#1255]

Rodrigo P. de Lacerda[1], Cursino B. Jacobina[1], Edgard L.L. Fabricio[2]
[1]Federal University of Campina Grande, Brazil; [2]Federal Institute of Paraíba, Brazil

Energy Density Enhancement of a Merged-Energy-Buffer based Two-Stage AC-DC Converter [#1381]

Firehiwot Gurara, Maida Farooq, Mausamjeet Khatua, Danish Shahzad, Khurram K. Afridi
Cornell University, United States

Poster 12: Solid State Transformers, V2G, and Power Converter Control
Chair(s): Akanksha Singh, Mona Ghassemi

Protection Coordination Challenges for Microgrid Distribution Network with High Penetration Inverter-Based Resources [#0603]

Vincentius Raki Mahindara[1], Ardyono Priyadi[1], Margo Pujiantara[1], Mauridhi Hery Purnomo[1], Ahmed Y. Saber[2], Eduard Muljadi[3]
[1]Institut Teknologi Sepuluh Nopember, Indonesia; [2]ETAP, United States; [3]Auburn University, United States

Power and Voltage Regulation of a Solid-State Transformer based Quad-Active Bridge DC-DC Converter using Adaptive Linear Quadratic Regulator and Nonlinear Model Predictive Control [#0077]
Mohammed Hatatah, Brandon M. Grainger
University of Pittsburgh, United States

Study on DC-Voltage Rising of Blocked Port in High-Frequency-Link Converters [#0558]
Chunpeng Zhang, Huaru Li, Wusong Wen, Xin Mo, Zhengming Zhao
Tsinghua University, China

Dynamic DC-Link Current Minimization Control to Improve Current-Source Solid-State Transformer Efficiency [#1083]
Liran Zheng, Xiangyu Han, Rajendra Prasad Kandula, Deepak Divan
Georgia Institute of Technology, United States

500kVA Hybrid Solid State Transformer (HSST): Design and Implementation of the SST [#1432]
Sanjay Rajendran, Soumik Sen, Liqi Zhang, Zhicheng Guo, Qingyun Huang, Alex Q. Huang
The University of Texas at Austin, United States

Quasi-Proportional-Resonant Control Strategy for the Hybrid Distribution Transformer with LCL-Type Converters [#0560]
Yibin Liu, Deliang Liang, Shaofeng Jia, Kun Zhou, Yachen Gao, Shengliang Cai, Dawei Li, Shuai Feng
Xi'an Jiaotong University, China

A Manitoba Converter based Bi-Directional On-Board charger for Plug-In Electric Vehicles [#1512]
Avishek Ghosh, Carl Ngai Man Ho, Ken King Man Siu
University of Manitoba, Canada

Improvement of Transient Current Response of a Single-Phase Inverter in a V2G System using Disturbance Rejection and Command Feedforward Control [#0166]
Horyeong Jeong, Jae Suk Lee
Jeonbuk National University, Korea

Inertia Emulation in Power Converters with Communication Delays [#0331]
Ngoc Bao Lai[1], Andres Tarraso[2], Gregory N. Baltas[1], Leonardo Marin[2], Pedro Rodriguez[2]
[1]Universidad Loyola, Spain; [2]Universitat Politecnica de Catalunya, Spain

Bifurcation Analysis of Converter-Dominated Electrical Distribution Systems [#1142]
Dionysios Moutevelis[1], Javier Roldán-Pérez[1], Milan Prodanovic[1], Santiago Sanchez Acevedo[2]
[1]IMDEA Energy Institute, Spain; [2]SINTEF Energy Research, Norway

DQ Impedance Reshaping of Three-Phase Power-Controlled Grid-Connected Inverter for Low-Frequency Stability Improvement under Weak Grid Condition [#0313]
Weihua Zhou[1], Yanbo Wang[1], Raymundo E. Torres-Olguin[2], Zhe Chen[1]
[1]Aalborg University, Denmark; [2]SINTEF Energy Research Institute, Norway

An RL-Type Active Damper for Stabilizing Wide Band Oscillations in Grid-Tied Inverter Systems [#1401]
Li Cheng, Zeng Liu, Jinjun Liu, Yiming Tu
Xi'an Jiaotong University, China

Power Emulator of Variable Speed Drive with Grid Frequency Support in Multi-Converter based Power Grid Emulation System [#0702]

Shuyao Wang, Yiwei Ma, Taylor Short, Leon M. Tolbert, Fred Wang
The University of Tennessee, United States

Vulnerability Assessments for Power-Electronics-Based Smart Grids [#0788]

Jinan Zhang, Jin Ye, Lulu Guo, Fangyu Li, Wenzhan Song
University of Georgia, United States

Optimal Design of PV Systems Considering Levelized Cost of Energy and Power Density [#0940]

Dongsen Sun[1], Xiaonan Lu[1], Liang Du[1], Yue Cao[2]
[1]Temple University, United States; [2]Oregon State University, United States

Poster 13: Electric Machine Applications in Automotive, Aerospace, Renewable, Robotics
Chair(s): Alireza Fatemi, Rajesh Deodhar

Design and Evaluation of Air-Flow Cooling System for High-Power-Density Motor for Robotic Applications [#0323]

Awungabeh F. Akawung, Yasutaka Fujimoto
Yokohama National University, Japan

An Accuracy Study of Finite Element Analysis-based Efficiency Map for Traction Interior Permanent Magnet Machines [#0903]

Katsuyuki Narita[1], Hiroyuki Sano[1], Nicolas Schneider[1], Kazuki Semba[1], Koji Tani[1], Takashi Yamada[1], Ryosuke Akaki[2]
[1]JSOL Corp., Japan; [2]SUZUKI Motor Corp., Japan

Design of a PM-Assist Synchronous Reluctance Machine for High Performance Applications [#1527]

Amina Shrestha[1], Mazharul Chowdhury[2], Mohammad Islam[1], Christian Ross[1]
[1]Halla Mechatronics, United States; [2]North Carolina State University, United States

A Novel Design for a High Specific Power Interior Permanent Magnet Machine for Aerospace Applications [#1603]

Rasul Hemmati, Sina Vahid, Ayman El-Refaie
Marquette University, United States

Design and Analysis of a High Saliency Transverse Flux Machine with a Novel Rotor Structure for Traction Applications [#1530]

Anik Chowdhury[1], Shuvajit Das[1], Teppei Tsuda[2], Naoto Saito[2], Subrata Saha[2], Yilmaz Sozer[1]
[1]The University of Akron, United States; [2]Aisin AW Co LTD, Japan

Integrated, Eddy-Current-Based Sensing of Rotor Position for Magnetic Levitation [#0647]

Patricio Peralta, Sean Thomas, Yves Perriard
École Polytechnique Fédérale de Lausanne, Switzerland

Design of a Multiphase Coreless Axial Flux Permanent Magnet Machine for Unmanned Aerial Vehicle Propulsion [#0683]

Federico Marcolini[1], Giulio De Donato[1], Fabio Giulii Capponi[1], Maurizio Incurvati[2], Federico Caricchi[1]
[1]Sapienza University of Rome, Italy; [2]Management Center Innsbruck MCI, Austria

Enhanced Torque Estimation in Variable Leakage Flux PMSM Combining High and Low Frequency Signal Injection [#0596]

Diego F. Laborda[1], David Díaz Reigosa[1], Daniel Fernández[1], Kensuke Sasaki[2], Takashi Kato[2], Fernando Briz[1]
[1]University of Oviedo, Spain; [2]Nissan Motor Co., Ltd., Japan

Design of an Axial Flux Machine with an Integrated Hydraulic Pump for Off-Highway Vehicle Electrification [#1113]

Fnu Nishanth[1], Garrett Bohach[2], Md Minal Nahin[2], James Van de Ven[2], Eric L. Severson[1]
[1]University of Wisconsin-Madison, United States; [2]University of Minnesota, United States

Demagnetization Performance Enhancement of Heavy Rare Earth Free Permanent Magnet Machines [#0741]

Md Sariful Islam[1], Rajib Mikail[2], Iqbal Husain[1]
[1]North Carolina State University, United States; [2]ABB US Corporate Research Center, United States

High Voltage Direct Driven Wind Turbine Generator [#0864]

Michela Diana, Sonja Tidblad Lundmark, Torbjörn Thiringer
Chalmers University of Technology, Sweden

Emulation of an Isolated Induction Generator under Unbalanced Conditions [#0376]

Yupeng Liu, Mohammad A. Masadeh, Pragasen Pillay
Concordia University, Canada

Comparative Analysis of Different Halbach Array Structures in the Design Optimization of an In-Wheel Permanent Magnet Machine for Land Speed Racing [#0786]

Guoyu Chu[1], Howard Lovatt[2], M.F. Rahman[1], Rukmi Dutta[1]
[1]University of New South Wales, Australia; [2]CSIRO, Australia

High Torque Density Spoke-Type Ferrite Permanent Magnet Synchronous Machine Assisted by Rare-Earth Magnets for Traction Applications [#1404]

Zhiwei Zhang
The Ohio State University, United States

Dual Three Phase Rare-Earth Free Spoke-Type Permanent Magnet Synchronous Traction Motor using Ferrite Magnets [#1426]

Zhiwei Zhang
The Ohio State University, United States

Poster 14: Converters for Renewable Energy
Chair(s): Gerry Moschopoulos, Qiang Wei

Scalable Thirteen-Level Hybrid Multilevel Inverter using Reduced Components [#0375]

Abhinandan Routray, Shri Prakash Sonkar, Rajeev Kumar Singh, Ranjit Mahanty
Indian Institute of Technology (BHU), India

Hybrid Modular Multilevel Converter with Self-Balancing Structure [#0379]

Yaqian Zhang, Jianzhong Zhang, Zheng Xu, Fujin Deng, Jin Zhao
Southeast University, China

Evaluation of Modular AC Filter Building Blocks for Full SiC based Grid-Tied Three Phase Converters [#1006]

Ripun Phukan[1], Sungjae Ohn[1], Dong Dong[1], Rolando Burgos[1], Gopal Mondal[2], Sebastian Nielebock[2]

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

DC/AC Voltage Sourced Converter with Auxiliary DC Port for Renewable Energy Applications [#0839]

Chatumal Perera, John Salmon, Gregory J. Kish

University of Alberta, Canada

Design for Reliability of SiC-MOSFET-Based 1500-V PV Inverters with Variable Gate Resistance [#1503]

Jinkui He, Ariya Sangwongwanich, Yongheng Yang, Francesco Iannuzzo

Aalborg University, Denmark

A New Switched-Capacitor based Boost Seven-Level ANPC (7L-ANPC) Boost Inverter Topology [#0054]

Atif Iqbal[1], Marif Daula Siddique[1], Mohammed Al-Hitmi[1], Saad Mekhilef[2]

[1]*Qatar University, Qatar;* [2]*University of Malaya, Malaysia*

Design of a Non-Isolated Three-Switch Inverter for Renewable Energy Systems, featuring Simple Circuit, Continuous Output Current, Common Ground and Buck-Boost Operation [#1160]

Ashraf Ali Khan[1], Shehab Ahmed[2], Usman Ali Khan[3]

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

Current Ripple Reduction for the Quasi-Z-Source Inverter with Modified Space-Vector PWM Strategy [#0950]

Wenjie Liu, Yongheng Yang, Tamas Kerekes, Frede Blaabjerg

Aalborg University, Denmark

A State-of-the-Art Strategy to Implement Nonlinear Model Predictive Controller with Non-Quadratic Piecewise Discontinuous Cost Index for Ocean Wave Energy Systems [#0776]

Ali Shahbaz Haider[1], Ted K.A. Brekken[1], Alan McCall[2]

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

SOH Diagnostic and Prognostic of High Energy Application by the Relationship of Health Indicators [#0858]

Pyeong-Yeon Lee[1], SangUk Kwon[1], Deokhun Kang[1], SeungYun Han[1], Woonki Na[2], Jonghoon Kim[1]

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

Bi-Directional 3.3 kW On-Board Battery Charger [#1001]

Tanya Gachovska, Gabriel Scarlatesu, Nikolay Radimov, Mahdi Tude Ranjbar

Solantro Semiconductor Corp., Canada

A New Configuration for Wind/Solar Water Pumping System based on a Doubly Fed Induction Generator [#1034]

Zahra Mousavi[1], Roohollah Fadaeinedjad[1], Hojjatullah Moradi[1], Mohammadali Bagherzadeh[1], Gerry Moschopoulos[2]

[1]*Graduate University of Advanced Technology, Iran;* [2]*Western University, Canada*

Modified EPS Control with Magnetizing Current Injection to Achieve Full Load Range ZVS for Dual Active Bridge Converters [#0334]

Liting Li[1], Guo Xu[1], Wenjing Xiong[1], Hanbing Dan[1], Yonglu Liu[1], Mei Su[1], Dong Liu[2]
[1]Central South University, China; [2]Aalborg University, Denmark

Poster 15: DC-AC Converters
Chair(s): Suzan Eren, Dong Cao

Transformerless Active Isolation in Common-Ground Photovoltaic Microinverter Applications for Reduced Ground Leakage Currents [#0362]

Clint Halsted, Somasundaram Essakiappan, Madhav Manjrekar
University of North Carolina-Charlotte, United States

Analysis and Control of Grid-Tied Quad-PV LLC Converter with MPPT [#1011]

Sumana Ghosh, Reza Rezaii, Abdullah Alhatlani, Issa Batarseh
University of Central Florida, United States

Derivation of a Single-Phase Single-Stage Inverter based on Minimum Indirect Power [#0623]

Diego Serrano, Regina Ramos, Edwin Peredo, Pedro Alou, Jesús A. Oliver, José A. Cobos
Universidad Politécnica de Madrid, Spain

A General Dead Time Compensation Method based on Current Ripple Prediction and Pulse Delay Measurement for Voltage Source Inverter [#0383]

Zewei Shen, Dong Jiang, Jianan Chen, Zicheng Liu
Huazhong University of Science and Technology, China

Common Mode Voltage Cancellation using SHM-PAM for 3Phase Compact Multilevel Inverters [#1551]

Mohammad Sharifzadeh, Mohammad Babaie, Gabriel Chouinard, Kamal Al-Haddad
École de Technologie Supérieure, Canada

Three-Phase Hybrid Multi-Output Converter with Single DC and Multi AC Outputs for Hybrid Microgrid Application [#0622]

Shri Prakash Sonkar, V.N. Lal, R.K. Singh
Indian institute of Technology-Varanasi, India

Three-Phase DC Capacitor-Less Solid-State Variable Capacitor [#0754]

Yunting Liu[1], Leon M. Tolbert[1], Fred Wang[1], Fang Z. Peng[2]
[1]The University of Tennessee-Knoxville, United States; [2]Florida State University, United States

Nine-Switch Current-Source Inverter-Fed Asymmetrical Six-Phase Machines based on Vector Space Decomposition [#0685]

Ahmed Salem, Mehdi Narimani
McMaster University, Canada

Poster 16: Statistical Methods Applied to Power Electronics System Applications

Chair(s): Burak Ozpineci, Osama Mohammad

An Observer based Intrusion Detection Framework for Smart Inverters at the Grid-Edge [#1343]

Zhen Zhang[1,2], Mitchell Easley[1], Mohsen Hosseinzadehtaher[1,2], George Amariucai[1], Mohammad B. Shadmand[1,2], Haitham Abu-Rub[3]
[1]Kansas State University, United States; [2]University of Illinois at Chicago, United States; [3]Texas A&M University at Qatar, Qatar

A Growing Self-Organising Maps Implementation for Coherency Identification in a Power Electronics Dominated Power System [#0697]

Gregory N. Baltas[1], Ngoc-Bao Lai[2], Leonardo Marin[2], Andres Tarraso[2], Pedro Rodriguez[2]
[1]Universidad Loyola, Spain; [2]Universitat Politecnica de Catalunya, Spain

State of Health Estimation of Lithium-Ion Batteries using Neuron Network and 1kHz Impedance Data [#0722]

Zhiyong Xia, Jaber A. Abu Qahouq
University of Alabama, United States

A Machine Learning Clustering Algorithm for Sensorless Multilevel Converters [#1174]

Faete J.T. Filho[1], Parker Zieg[1], Burak Ozpineci[2], Nicholas Hill[1], Leon M. Tolbert[3]
[1]East Carolina University, United States; [2]Oak Ridge National Laboratory, United States; [3]The University of Tennessee, United States

A Machine Learning Approach for Understanding Power Distribution System Congestion [#0270]

Emin Ucer[1], Mithat Kisacikoglu[1], Ali Gurbuz[2], Shahinur Rahman[1], Murat Yuksel[3]
[1]The University of Alabama, United States; [2]Mississippi State University, United States; [3]University of Central Florida, United States

Physical Design Automation for High-Density 3D Power Module Layout Synthesis and Optimization [#0123]

Imam Al Razi, Quang Le, H. Alan Mantooth, Yarui Peng
University of Arkansas, United States

Bridging Gaps in Paper Design Considering Impacts of Switching Speed and Power-Loop Layout [#1051]

Ren Ren[1], Zhou Dong[1], Fred Wang[1,2]
[1]The University of Tennessee-Knoxville, United States; [2]Oak Ridge National Laboratory, United States

Short-Term Solar Irradiance Forecasting based on Multi-Branch Residual Network [#1099]

Saeedeh Ziyabari, Liang Du, Saroj Biswas
Temple University, United States

Medium Voltage Supply Directly to Data-Center-Servers using SiC-Based Single-Stage Converter with 20kW Experimental Results [#1560]

Suvendu Samanta[1], Isaac Wong[1], Subhashish Bhattacharya[1], Birger Pahl[2]
[1]North Carolina State University, United States; [2]EATON, United States

Poster 17: Electric Machines (Synchronous, Induction, Switched Reluctance, Flux-Switching)
Chair(s): Andrea Cavagnino, Alireza Fatemi

Design and Evaluation of a Power Hardware-in-the-Loop Machine Emulator [#1073]
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

Method of Expanding Operating Range for Three-Phase Series-End Winding Motor Drive [#0359]
An Li, Dong Jiang, Xiangwen Sun, Zicheng Liu
Huazhong University of Science and Technology, China

Design and Construction of a Foil Winding Permanent Magnet Machine [#1297]
Michael Rios, Giri Venkataramanan
University of Wisconsin-Madison, United States

Consequent Pole Toroidal Winding Dual Rotor Permanent Magnet Synchronous Machines [#1415]
Zhiwei Zhang
The Ohio State University, United States

Study on Performance Improvement by Rotating Working Bar of Double-Cage Induction Motor [#0606]
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

Improved Rotor Bar Structure in High-Voltage High-Power Induction Motors to Eliminate Local thermal Spot and Avoid Broken Bar Faults [#0928]
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

Modeling and Control of a 4-Pole/8-Pole Induction Motor for Smooth Torque Production during Electronic Pole Changing [#1443]
Taohid Latif[1], Mohamed Zubair M. Jaffar[2], Iqbal Husain[1]
[1]North Carolina State University, United States; [2]FEV NA, Inc., United States

Evaluation of the Detectability of Damper Cage Damages in Synchronous Motors through the Advanced Analysis of the Stray Flux [#0083]
Habib Castro-Coronado, Jose Antonino-Daviu, Alfredo Quijano-Lopez, Vicente Fuster-Roig, Pedro Llovera-Segovia
Universitat Politecnica de Valencia, Spain

Optimum Design of Line-Start Permanent-Magnet Synchronous Motor using Mathematical Method [#0570]
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

Research on Vibration Reduction of Switched Reluctance Motor [#0405]
Ying Xie, Zexin Ma, Yuwen Xu, William Cai, Zhaoyang Ning, Shengming Hu
Harbin University of Science and Technology, China

Alternative Methods for Electric Machine Rated Load Temperature Tests [#1500]
Emmanuel Agamloh[1], Silvio Vaschetto[2], Andrea Cavagnino[2], Annette von Jouanne[1], Alexandre Yokochi[1]
[1]Baylor University, United States; [2]Politecnico di Torino, Italy

Sinusoidal Shaped Surface Permanent Magnet Motor using Cold Spray Additive Manufacturing [#0532]
Sumeet Singh, Pragasen Pillay
Concordia University, Canada

Poster 18: Controls in Alternative Energy Applications
Chair(s): Qiang Wei, Mehdi Narimani

A Novel Decentralized Adaptive Droop Control Technique for DC Microgrids based on Integrated Load Condition Processing [#1541]
Mohammad Noor Bin Shaheed, Yilmaz Sozer, Sifat Chowdhury, J. Alex De Abreu-Garcia
The University of Akron, United States

Reviews on Inertia Emulation Technology with Power Electronics [#1266]
Shimiao Chen, Hua Han, Xinyu Chen, Yao Sun, Xiaochao Hou
Central South University, China

Sequence-Impedance-Based Stability Comparison between VSGs With and Without Inner Loops Control [#0350]
Yang Peng, Yue Wang, Yonghui Liu, Hang Liu
Xi'an Jiaotong University, 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

Optimal RSC Control for Loss Reduction in Wind Turbine Driven DFIG-Grid System [#0285]
Sambasivaiah Puchalapalli, Bhim Singh
Indian Institute of Technology Delhi, India

Ground Leakage Current in Modified Three-Phase Current Source Inverters Depending on Power Semiconductors Parasitic Capacitances [#0687]
Giovanni Migliazza, Emilio Carfagna, Fabio Bernardi, Emilio Lorenzani
University of Modena and Reggio Emilia, Italy

Constant Power Generation Method for Grid-Connected Photovoltaic Systems with Fast Response under Dynamic Irradiance Condition [#0101]
Hyoung-Kyu Yang, Zeeshan Aleem, Junhyuk Lee, Jung-Wook Park
Yonsei University, Korea

Online Condition Monitoring of Photovoltaic (PV) Cells by Implementing Electrical Impedance Spectroscopy using a Switch-Mode DC-DC Converter [#0438]
Linda Shelembe, Paul Barendse
University of Cape Town, South Africa

Risk Assessment of Smart Buildings Equipped with Solar Generation using Information Gap Decision Theory [#1201]

Sima Aznavi[1], Poria Fajri[1], Eric M. Wilcox[2], Mohammad B. Shadmand[3]
[1]University of Nevada-Reno, United States; [2]Desert Research Institute, United States;
[3]University of Illinois at Chicago, United States

Coordinated Power Balance Scheme for a Wind-to-Hydrogen Set in Standalone Power Systems [#1272]

Echezona Ezeodili, Jinho Kim, Eduard Muljadi, Robert M. Nelms
Auburn University, United States

Flux Adaptive RelSync Motor Driven Single Stage Photovoltaic Water Pumping System [#0206]

Anshul Varshney, Utkarsh Sharma, Bhim Singh
Indian Institute of Technology Delhi, India

Design and Implementation of Lithium-Ion Battery based Smart Solar Powered Street Light System [#0929]

Immad Shams[1], Prashant Shrivastava[1], Kok Soon Tey[1], Saad Mekhilef[1,2]
[1]University of Malaya, Malaysia; [2]Swinburne University of Technology, Australia

Poster 19: Multilevel Converters (Topology, Modulation, Control)
Chair(s): Seung-Hwan Lee, Richard Lukaszewski

Optimized DV/DT Filter Design for SiC based Modular Multilevel Converters [#1575]

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

Model Predictive Control of 5L-ANPC Converters with Level-Shifted Pulse-Width-Modulation [#0315]

Dehong Zhou[1], Zhongyi Quan[2], Yunwei (Ryan) Li[2]
[1]University of Electronic Science and Technology of China, China; [2]University of Alberta, Canada

Dual Vienna Rectifiers with a Single DC-Link for Wind Energy Conversion System Applications [#1220]

Amanda P. Monteiro[1], Cursino B. Jacobina[1], Filipe A.C. Bahia[2], Reuben P.R. Sousa[1]
[1]Federal University of Campina Grande, Brazil; [2]Federal University of Bahia, Brazil

Single-Phase AC-DC-AC Multilevel Converter using High-Frequency Link to Improve Power Quality [#1228]

Rodrigo P. de Lacerda[1], Cursino B. Jacobina[1], Edgard L.L. Fabricio[2], Alan Santana Felinto[1]
[1]Federal University of Campina Grande, Brazil; [2]Federal Institute of Paraíba, Brazil

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 Biason[1], Roberto Petrella[1], Sandro Calligaro[2], Mattia Morandin[3], Marco Zordan[3]
[1]University of Udine, Italy; [2]Free University of Bozen, Italy; [3]CAREL Industries s.p.a., Italy

A Novel Voltage Balancing Strategy for Four-Level Hybrid-Clamped Converters under Selective Harmonic Elimination PWM [#0453]

Mingzhe Wu[1], Hao Tian[1], Yun Wei Li[1], Kui Wang[2]
[1]University of Alberta, Canada; [2]Tsinghua University, China

The Active Gate Driver for Switching Loss Reduction of Inverter [#0434]

ByongJo Hyon, Joon-Sung Park, Jin-Hong Kim
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]

Mohammadreza Lak, Bing-Rong Chuang, Ting-Lien Wu, Tzung-Lin Lee
National Sun Yat-Sen University, Taiwan

Optimal Selection of the Voltage Modulation Strategy for an Open Winding Multilevel Inverter [#1525]

A. Testa[1], S. Foti[1], S. De Caro[1], L.D. Tornello[2], G. Scelba[2], G. Scarcella[2]
[1]University of Messina, Italy; [2]University of Catania, Italy

Poster 20: Grid Interactive Converters
Chair(s): Dongbo Zhao, Pedro Rodriguez

Application of Model Predictive Pulse Pattern Control to Control a PMSM [#0718]

Ageda Guerra[1], Roberto García Rochín, Patrick W. Cross[2]
[1]John Deere, Mexico; [2]John Deere, United States

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

Dam Yun, Haneul Kim, Dongwoo Baek, SangIk Cho, Jehyung Yoon, Jungbong Lee
Samsung Electronics, Korea

Optimal Design of Control Strategy for Full-Bridge LLC Converter [#0187]

Aiyun Zhu, Yundong Ma, Zisen Liu, Huijun Lu, Fuchun Zhang
Nanjing University of Aeronautics and Astronautics, China

Virtual Impedance based Control Scheme for Stability Emulation of Grid-Connected Converters [#1519]

Jiashi Wang, Ke Ma
Shanghai Jiao Tong University, China

LCOE Design Optimization using Genetic Algorithm with Improved Component Models for Medium-Voltage Transformerless PV Inverters [#1261]

Kyle J. Goodrick[1], Gab-Su Seo[2], Satyaki Mukherjee[1], Jinia Roy[2], Rahul Mallik[3], Branko Majmunovic[1], Soham Dutta[3], Dragan Maksimovic[1], Brian Johnson[3]
[1]University of Colorado-Boulder, United States; [2]National Renewable Energy Laboratory, United States; [3]University of Washington, United States

Optimization and Design of a High-Voltage Supply for Electrostatic Precipitators [#1323]

Xing Wei[1], Zhan Shen[2], Yuyuan Ye[3], Jingwen Leng[1], Zhike Xu[1], Long Jin[1]
[1]Southeast University, China; [2]Aalborg University, Denmark;
[3]State 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 He[1], Xin Zhang[2]
[1]Nanyang Technological University, Singapore; [2]Zhejiang University, China

Optimization of a SiC MOSFET Behavioural Circuit Model by using a Multi-Objective Genetic Algorithm [#0640]

Gaetano Bazzano[1], Alessandra Raffa[1], Santi Agatino Rizzo[2], Nunzio Salerno[2], Giovanni Susinni[2], PierPaolo Veneziano[1]
[1]STMicroelectronics, Italy; [2]University of Catania, Italy

Development of 3-Phase Current-Fed Dual Active Bridge Converter for Bi-Directional Battery Charger Application [#0450]

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

A Plug-and-Play Design Suite of Converters for the Electric Grid [#1102]

Michael Starke[1], Pankaj Bhowmik, Steven Campbell, Madhu Chinthavali, Bailu Xiao, Radha Sree Krishna Moorthy, Benjamin Dean, Jongchan Choi
[1]Oak Ridge National Laboratory, United States; [2]The University of Tennessee, United States

Decoupling Capacitor Design for Multi-Inverter based Grid Emulator System [#0758]

Yunting Liu, Haiguo Li, Yiwei Ma, Jingxin Wang, Leon M. Tolbert, Fred Wang, Kevin L. Tomsovic
The University of Tennessee-Knoxville, United States

Poster 21: New Technologies, Sensors, Reliability and Testing for Electric Drives
Chair(s): Mahesh Swamy, Jul-Ki Seok

Four-Module Three-Phase Permanent-Magnet Synchronous Motor based PWM Modulation Strategy for Suppressing Vibration and Common Mode Current [#0277]

Kang Liu[1], Zicheng Liu[1], Dong Jiang[1], Qiyuan Wang[1], Zhongxiang He[2]
[1]Huazhong University of Science and Technology, China; [2]Wuhan Institute of Marine Electric Propulsion, China

A Dual Modular Multilevel Converter with High-Frequency Circulating Current Injection for MV Open-End Stator Winding Machine Drives [#0526]

Mohamed S. Diab[1], Xibo Yuan[1], Barry W. Williams[2]
[1]University of Bristol, United Kingdom; [2]University 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

Induction Machine Emulation under Asymmetric Grid Faults [#0698]

Gayatri Tanuku, Pragasen Pillay
Concordia University, Canada

Gigahertz Current Measurement for Wide Band-Gap Devices [#0933]

Luke Shillaber, Li Ran, Yanfeng Shen, Teng Long
University of Cambridge, United Kingdom

Three-Phase Bidirectional-Flyback Differential-Inverter for Synchronous Electrostatic Machines [#1074]

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

Integrated Motor Drive using Soft-Switching Current-Source Inverters with SiC- and GaN-Based Bidirectional Switches [#1180]

Hang Dai, Renato A. Torres, Woongkul Lee, Thomas M. Jahns, Bulent Sarlioglu
University of Wisconsin-Madison, United States

Synchronous Frame Current Estimation Inaccuracies in Permanent Magnet Synchronous Motor Drives [#1246]

Prerit Pramod
Nexteer Automotive Corp., United States

Evaluation of Sensorless Techniques for Surface Permanent-Magnet Integrated Motor Drive using Current-Source Inverter [#1262]

Renato A. Torres, Hang Dai, Woongkul Lee, Thomas M. Jahns, Bulent Sarlioglu
University of Wisconsin-Madison, United States

A Novel Model based Development of a Motor Emulator for Rapid Testing of Electric Drives [#1418]

Visweshwar Chandrasekaran[1], Benjamin Sykora[1], Sanchit Mishra[2], Ned Mohan[2]
[1]Trane Technologies, United States; [2]University 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 Accetta[1], Maurizio Cirrincione[2], Filippo D'Ippolito[3], Marcello Pucci[1], Antonino Sferlazza[3]
[1]National Research Council of Italy, Italy; [2]University of the South Pacific, Fiji; [3]University of Palermo, Italy

Stator Resistance Estimation using DC Injection Robust to Inverter Nonlinearity in Induction Motors [#1618]

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

Poster 22: Microgrid Applications
Chair(s): Jingxin Wang, Yaosuo Xue

Control Hardware-in-the-Loop for Voltage Controlled Inverters with Unbalanced and Non-Linear Loads in Stand-Alone Photovoltaic (PV) Islanded Microgrids [#1547]

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 Khezri[1], Amin Mahmoudi[1], Sajjad Golshannavaz[2]
[1]Flinders University, Australia, Australia; [2]Urmia University, Iran

Distributed Control and Dynamic Optimization of a Microgrid [#0410]

Jameel Ahmad[1], Muhammad Aqil Aslam[2], Muhammad Tahir[2], Sudip K. Mazumder[3]
[1]University of Management and Technology-Lahore, Pakistan; [2]University of Engineering and Technology-Lahore, Pakistan; [3]University of Illinois-Chicago, United States

Influence of PLL Parameters on Small-Signal Stability of Microgrids with Synchronous Generators [#1162]

Diana Patricia Morán-Río[1], Javier Roldán-Pérez[1], Milan Prodanovic[1], Aurelio García-Cerrada[2]
[1]IMDEA Energy Institute, Spain; [2]Comillas Pontifical University, Spain

Design Optimization of the Snubber Circuit for Three-Level NPC Converter Pole for Hard Switching Application [#1464]

Sanket Parashar, Nithin Kolli, Raj Kumar Kokkonda, Subhashish Bhattacharya
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 Sun[1], Syed Qaseem Ali[2], Geza Joos[1], Francois Bouffard[1]
[1]McGill University, Canada; [2]Opal-RT Technologies Inc., Canada

A Real-Time De-Risked Emulation based Testing Platform for AC Microgrids [#0124]

A.S. Vijay, Suryanarayana Doolla, Mukul C. Chandorkar
Indian Institute of Technology-Bombay, India

Poster 23: Power Quality, Reliability, Diagnostics and Fault Analysis
Chair(s): Yue Cao, Malik Elbuluk

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 Assis[1], Darlan A. Fernandes[1], Fabiano F. Costa[2], P.C. Ribeiro[1], Rogério G. de Almeida[1]
[1]Federal University of Paraíba, Brazil; [2]Federal University of Bahia, Brazil

Series Arc Fault Detection and Localization in DC Distribution based on Master Controller [#0131]
Vu Le[1], Xiu Yao[1], Chad Miller[2], Tsao-Bang Hung[2]
[1]State University of New York at Buffalo, United States; [2]Wright 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 Yang[1], Haiyu Wang[1], Haiyu Chen[2], Wensheng Song[2]
[1]Southwest Jiaotong University, China; [2]Xi'an 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 Zheng[1], Xin Yin[1], Sai Tang[1], Chao Zhang[1], Daming Wang[1], Jun Wang[1], Z. John Shen[2], Zishun Peng[1]
[1]Hunan University, China; [2]Illinois 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-Hernandez[1], J. Loranca-Coutino[1], O.F. Ruiz-Martinez[2], J.C. Mayo-Maldonado[1], J.E. Valdez-Resendiz[1], J.C. Rosas-Caro[2], G. Escobar[1], Daniel Guillen[1]
[1]Tecnologico de Monterrey, Mexico; [2]Universidad Panamericana, Mexico

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 Tarisciotti[1], Claudio Burgos[2], Cristian Garcia[3], Jose Rodriguez[1]
[1]Universidad Andres Bello, Chile; [2]University of Nottingham, United Kingdom; [3]Universidad 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 Chen[1], Junjun Deng[1], Wenbo Wang[1], Zhenpo Wang[1], Shuo Wang[1], David G. Dorrell[2]
[1]Beijing Institute of Technology, China; [2]University of Witwatersrand, South Africa

Analytical Control System Synthesis for Dual-Loop Cascaded Stationary Frame Voltage Regulators [#1506]

H. Siraj[1], B.P. McGrath[1], I.U. Nutkani[1], Y. Liao[2], X. Wang[2]
[1]RMIT University, Australia; [2]Aalborg 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]

J. Linares-Flores, R. Heredia-Barba, O. Castro-Heredia, G. Curiel-Olivares, J.A. Juárez-Abad
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 SynRMs [#0483]
Angelo Accetta[1], Maurizio Cirrincione[2], Maria Carmela Di Piazza[1], Giuseppe La Tona[1], Massimiliano Luna[1], Marcello Pucci[1]
[1]National Research Council of Italy, Italy; [2]University of South Pacific, Fiji

Adaptive PI Parameter of Flux-Weakening Controller based on Voltage Feedback for Model Predictive Control of SPMSM [#0496]
Yongchang Zhang[1], Jialin Jin[1], Hao Jiang[1], Dong Jiang[2]
[1]North China University of Technology, China; [2]Huazhong University of Science and Technology, China

Model Predictive Saturation Controller-Based Direct Torque Control of Permanent-Magnet Synchronous Machines [#0523]
Matthew Penne[1], Wei Qiao[1], Liyan Qu[1], Lizhi Qu[1], Jiyao Wang[2], Silong Li[2]
[1]University of Nebraska-Lincoln, United States; [2]Ford Motor Co., United States

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 Yang[1], Peng Huang[1], Yongchang Zhang[1], Jianguo Zhu[2]
[1]North China University of Technology, China; [2]The 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 Kim[1], Muhammad Usama[1], Kwanghee Nam[2]
[1]Chosun University, Korea; [2]POSTECH, 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 Swamy[1], Nathan Seipel[2]
[1]IEEE, United States; [2]Yaskawa 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 Song[1], Wenxi Yao[1], Kevin Lee[2]
[1]Zhejiang University, China; [2]Eaton Corp., United States

Poster 26: Distributed Energy Resources and Utility Interactions
Chair(s): Lina He, Yaosuo Xue

An Intelligent Overcurrent Protection Algorithm of Distribution Systems with Inverter based Distributed Energy Resources [#1210]
Lina He[1], Shuaiang Rong[1], Chengwei Liu[2]
[1]University of Illinois at Chicago, United States; [2]Huazhong University of Science and Technology, China

Group-Based Control for Domestic Electric Water Heaters using Quantum-Inspired Evolutionary Algorithm [#0132]

Sheng Xiang[1], Liuchen Chang[1], Bo Cao[1], Yigang He[2]
[1]University of New Brunswick, Canada; [2]Hefei University of Technology, China

Two-Stage Optimal Sizing of Standalone Hybrid Electricity Systems with Time-of-Use Incentive Demand Response [#0569]

Rahmat Khezri[1], Amin Mahmoudi[1], Mohammed H. Haque[2]
[1]Flinders University, Australia; [2]University 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 Ma[1], Fred Wang[1,2], Leon M. Tolbert[1,2]
[1]The University of Tennessee, United States; [2]Oak 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'Silva[1], Ahmad Khan[1,2], Muhammad Farooq[1,2], Mohammad B. Shadmand[1,2], Haitham Abu-Rub[3]
[1]Kansas State University, United States; [2]University of Illinois at Chicago, United States; [3]Texas A&M University at Qatar, Qatar

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 Duan[1], Wei Wang[1], Dong He[2], Zhikang Shuai[1], Xue Yang[1], Z. John Shen[3]
[1]Hunan University, China; [2]Hunan University of Technology, China;
[3]Illinois 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 Huang[1], Shiqi Ji[1], Dingrui Li[1], Cheng Nie[1], Leon M. Tolbert[1,2], Fred Wang[1,2], William Giewont[3]
[1]The University of Tennessee-Knoxville, United States; [2]Oak Ridge National Laboratory, United States;
[3]EPC 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 Pulvirenti[1], Angelo G. Sciacca[1], Luciano Salvo[1], Massimo Nania[1], Giacomo Scelba[2], Giuseppe Scarcella[2]
[1]STMicroelectronics, Italy; [2]University of Catania, Italy

Turn-On Performance Comparison of SiC Single-Driver Module (SDM) and Multi-Driver Module (MDM) [#0341]

Pengkun Liu[1], Ruiyang Yu[1], Alex Q. Huang[1], Johan Strydom[2], Stephanie W. Butler[2]
[1]The University of Texas-Austin, United States; [2]Texas 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 Rahman[1], Jarno Kukkola[1], Ville Pirsto[1], Mikko Routimo[1,2], Marko Hinkkanen[1]
[1]Aalto University, Finland; [2]ABB Drives, Finland

Control Strategies Generation Mechanism for LLC Resonant Converter [#0514]

Yuqi Wei[1], Quanming Luo[2], Dereje Woldegiorgis[2], Alan Mantooth[1]
[1]University of Arkansas, United States; [2]Chongqing University, China

Soft-Switching Auxiliary Current Control for Faster Load Transient Response of Buck Converter [#0394]

Dongwook Kim[1], Myeongjae Hong[2], Jongun Baek[1], Jisu Lee[1], Joonho Shin[1], Jong-Won Shin[1]
[1]Chung-Ang University, Korea; [2]Samsung, Korea

H-Bridge MMCs with Symmetrical Half-Bridge Submodules [#0198]

Jingyang Fang[1], Zhongxi Li[1], Stefan M. Goetz[1], Shunfeng Yang[2], Haiyu Wang[2]
[1]Duke University, United States; [2]Southwest 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
Universite 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 Kong[1], Nattapat Praisuwanna[1], Liang Qiao[1], Fred Wang[1,2]
[1]The University of Tennessee-Knoxville, United States; [2]Oak 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

Poster 29: Drive Applications
Chair(s): Bilal Akin, Giacono Scelba

Optimisation and Design Performance of a Small-Scale DC Vernier Reluctance Machine for Direct-Drive Wind Generator Drives [#0176]

Udochukwu B. Akuru[1], Maarten J. Kamper[2], Mkhululi Mabhula[2]
[1]Tshwane University of Technology, South Africa; [2]Stellenbosch University, South Africa

Analysis of Double-Output CLL Resonant Converter for All-Electric UAV Applications [#0372]

Erdem Asa[1], Kerim Colak[2], Omer C. Onar[1], Dariusz Czarkowski[3], Burak Ozpineci[1]
[1]Oak Ridge National Laboratory, United States; [2]Hevo Power Inc., United States;
[3]New York University, United States

Model Reference Adaptive Control of Pulse Amplitude Modulated PM Motor Drive for High Power Transport Drone Applications [#0480]

Ching-Lon Huang, Chi-Jun Wu, Shih-Chin Yang
National Taiwan University, Taiwan

Investigation of a Reduced Cost Solution to implement integrated Safe Torque-OFF Function in Cascaded H-Bridge Motor Drives [#0961]

Ahmed Abuelnaga[1], Mehdi Narimani[1], Marius Chis[2], Karthik Kandasamy[1], Navid Reza Zargari[2]
[1]McMaster University, Canada; [2]Rockwell Automation Canada, Canada

An Analytical Solution-Based Hybrid Operation of a Three-Level Converter Drive System for a Dynamic Load [#1465]

Harish Pulakhandam, Subhashish Bhattacharya
North Carolina State University, United States

Modeling and Analysis of Sensor Error Effects on DC-Link Current Ripple in Switched Reluctance Machine Drives [#1542]

Md Ehsanul Haque[1], Sifat M. Chowdhury[1], Omer Gundogmus[1], Anik Chowdhury[1], Yilmaz Sozer[1], Fernando Venegas[2], David Colavincenzo[2]
[1]The University of Akron, United States; [2]Bendix Commercial Vehicle Systems, United States

Comprehensive Efficiency Analysis of Current Source Inverter based SPM Machine Drive System for Traction Applications [#1141]

Feida Chen, Wenda Feng, Hao Ding, Sangwhee Lee, Thomas M. Jahns, Bulent Sarlioglu
University of Wisconsin-Madison, United States

Model-Free Predictive Current Control of Doubly Fed Induction Generator [#0311]

Tao Jiang[1], Yongchang Zhang[1], Jian Jiao[1], Wei Xu[2]
[1]North China University of Technology, China; [2]Huazhong University of Science and Technology, China

Resonant Frequency Tracking Control for a Linear Compressor with Assist Springs [#0817]

Takahiro Suzuki[1], Masaki Koyama[1], Shuhei Nagata[1], Wataru Hatsuse[1], Masatsugu Takemoto[2], Satoshi Ogasawara[3]
[1]Hitachi, Ltd., Japan; [2]Okayama University, Japan; [3]Hokkaido University, Japan

PMSM Six-Step Operation and Dynamic Performance Analysis [#0067]

Zhendong Zhang, Ahmed Sayed Ahmed, Jacob M. Lamb
Rockwell Automation, United States

Minimizating Pulsating Torque in PMSM Drives by using Feedforward-Based Compensation and Flux-Harmonic Estimation [#0194]

Noriya Nakao[1], Kazuaki Tobari[1], Tomohiro Sugino[2], Yoshiki Ito[2], Mitsuhiro Mishima[2], Daisuke Maeda[2]
[1]Hitachi, Ltd., Japan; [2]Hitachi Power Semiconductor Device, Ltd., Japan

Optimal LCL Filter Design for a Regenerative Cascaded H-Bridge (CHB) Motor Drive [#0422]

Zhituo Ni[1], Mehdi Narimani[1], Navid Reza Zargari[2]
[1]McMaster University, Canada; [2]Rockwell Automation Canada, Canada

Standstill Self-Commissioning of an Induction Motor Drive [#1042]

Eemeli Mölsä[1], Lauri Tiitinen[1], Seppo Saarakkala[1], Luca Peretti[2], Marko Hinkkanen[1]
[1]Aalto University, Finland; [2]KTH Royal Institute of Technology, Sweden

Zero-Sequence Current Suppression with Dead-Time Compensation Control in Open-End Winding PMSM [#1060]

Jae-Hoon Shim[1], Hyeon-gyu Choi[2], Jung-Ik Ha[1]
[1]Seoul National University, Korea; [2]Garrett Motion, Korea

Modulation Schemes for Balanced Inverter under Single Upper/Lower Switch Fault Conditions [#1555]

Zhouzhou Wang, Hao Zeng, Bulent Sarlioglu
University of Wisconsin-Madison, United States

Poster 30: Renewables and Energy Storage
Chair(s): Zhiqiang (Jack) Wang, Yaosuo Xue

Solar PV Battery based System for Telecom Tower Application [#0614]

Gaurav Modi, Bhim Singh
Indian Institute of Technology-Delhi, India

Grid-Integrated Solar PV fed SRM Water Pump Drive for Small-Scale Irrigation and Household Supply [#0460]

Amarnath Yalavarthi, Bhim Singh
Indian Institute of Technology-Delhi, India

FACTS-Based Grid Interface Design with Embedded Energy Storage for Ocean Wave Power [#1357]

Ali Shahbaz Haider, Ted K.A. Brekken, Yue Cao, Mario E. Magana
Oregon State University, United States

Evaluation of Wireless Communication Networks on Secondary Control in Underwater Microgrid [#0710]

Luocheng Wang, Yongjie Guan, Tianze Chen, Ephraim Moges, Tao Han, Tiefu Zhao
University of North Carolina-Charlotte, United States

Optimization-Based Design of Power Architecture for 5G Small Cell Base Stations [#1064]

Jorge Alejandro May Alvarez, Francisco Paz, Ignacio Galiano Zurbriggen, Martin Ordonez
The University of British Columbia, Canada

Lyapunov Energy Function based Control of a Soft Switching Solid State Transformer for Three-Phase Standalone Application [#1258]
Vikram Roy Chowdhury, Rajendra Prasad Kandula, Deepak Divan
Georgia Institute of Technology, United States

Frequency Scanning-Based Contributions Identification of Current Control Loop and PLL on DQ Impedance Characteristics of Three-Phase Grid-Connected Inverter [#1594]
Weihua Zhou[1], Yanbo Wang[1], Raymundo E. Torres-Olguin[2], Zhe Chen[1]
[1]Aalborg University, Denmark; [2]SINTEF, Norway

Optimization based Integrated Adaptive Control Architecture for Grid Connected Inverter (GCI) [#1336]
Anuprabha Ravindran Nair, Michael Smith, Sukumar Kamalasadan
University of North Carolina at Charlotte, United States

Poster 31: Gate Drivers, Modules and Packaging
Chair(s): Tanya Gachovska, Hengzhao Yang

Large Signal Stability Analysis of Self-Turn-On in Switching Transients [#0947]
Wen Zhang[1], Fred Wang[1,2]
[1]The University of Tennessee, United States; [2]Oak Ridge National Laboratory, United States

Voltage Balancing Control with Capacitor Charging Method for Series Connected SiC MOSFET Submodules [#1375]
Inhwan Lee, Xiu Yao
University at Buffalo, United States

Novel GaN GIT Gate Driving Technique using Two-Step Turn-Off Fashion [#0189]
Noriyuki Nosaka, Wataru Okada, Takeshi Uematsu, Toshiyuki Zaitsu
OMRON Corp., Japan

Reduction of the Crosstalk Conduction Effect of Parallel GaN HEMTs in Half-Bridge [#0696]
Jean-Sylvio Ngoua Teu Ngoua Teu, Thanh-Long Le
Safran Tech, France

Gate Drive Power Supply for On-Board Marx Circuit using only Charging Path of Marx Capacitor [#1206]
Keisuke Kusaka, Yosuke Ouchi, Jun-ichi Itoh
Nagaoka University of Technology, Japan

A Novel Double-Sided Cooling Inverter Leg for High Power Density EV based on Customized SiC Power Module [#0082]
Xinmin Liu, Yiyang Yan, Cai Chen, Zongheng Wu, Yong Kang
Huazhong University of Science and Technology, China

Optimization of Common Source Inductance and Gate-Drain Capacitance for Reducing Gate Voltage Fluctuation after Turn-Off Transition [#1263]
Yusuke Hatakenaka[1], Kazuhiro Umetani[2], Masataka Ishihara[1], Eiji Hiraki[1]
[1]Okayama University, Japan; [2]Tohoku University, Japan

High Performance Gate-Driver Power Supply for Multilevel-Based 1500 V Converters [#1090]
Emanuel Serban, Mohammad Ali Saket, Martin Ordonez
The University of British Columbia, Canada

Current-Bunch: A Fast and Accurate Tool to Extract and Optimize Parasitics of Power Packaging [#0459]
Liang Wang, Zheng Zeng, Yue Yu, Kaihong Ou, Jin Wang
Chongqing University, China

Enhancing Lifetime of Power Electronic Modules via Thermal Buffers [#0164]
Alexander Stippich, Christoph H. van der Broek, Rik W. De Doncker
RWTH Aachen University, Germany

An Integrated approach to Developing Thermal Models for Automotive Electric Drives [#0367]
Neelakantan Padmanabhan, Abraham Gebregergis, Santhosh Veigas
Veoneer US Inc., United States

Poster 32: Converter Control and Modeling 3
Chair(s): Yongheng Yang, Wei Du

Multifrequency Vibration Suppression of Magnetic Bearing Systems Applied Variable Step-Size Automatic Learning Control [#0038]
Hongbo Sun, Dong Jiang, Jianfu Ding, Jichang Yang
Huazhong University of Science and Technology, China

A Reinforcement Learning-Based Data-Driven Voltage Regulator for Wireless Chargers of Electric Vehicles [#0716]
Jiaxin Teng[1], Lizhi Qu[2], Dariusz Czarkowski[1]
[1]New York University, United States; [2]Toshiba International Corp., United States

A Double-Loop Maximum Power Point Tracking Algorithm for Dual-Input Phase-Shifted LLC Converter [#0848]
Ala A. Hussein[1], Abdullah Alhatlani, Sumana Ghosh, Issa Batarseh
[1]Prince Mohammad Bin Fahd University, Saudi Arabia; [2]University of Central Florida, United States

Optimal Asymmetric Duty Modulation to Minimize Inductor Peak-to-Peak Current for a Dual Active Bridge Converter Over a Wide Voltage Range [#0890]
Di Mou[1], Quanming Luo[1], Jia Li[1], Zhiqing Wang[1], Yuqi Wei[2], Jian Huang[1]
[1]Chongqing University, China; [2]University of Arkansas, United States

An Inductor Current Estimation Approach for DC/DC Converters based on Bisection Method [#0555]
Zhe Zhao, Fei Diao, Yuheng Wu, Nan Lin, Yue Zhao
University of Arkansas, United States

Accelerated Model of Static Power Converter for Co-Phase Traction Power System [#0443]
Zhuoxuan Shen[1], Xiaoqian Li[1], Yingdong Wei[1], Ziming Li[1], Mingrui Li[1], Haiping Guo[2], Qirong Jiang[1], Yunzhi Lin[2]
[1]Tsinghua University, China; [2]Electric Power Research Institute China Southern Power Grid, China; [3]China Railway Electrification Engineering Group Co., Ltd., China

Analysis of Rapid Control Prototyping Performance for Power Conversion Applications [#1024]
Andrés Rón[1], Andrés Tarrasó[1], Álvaro Luna[1], Pedro Rodríguez[2]
[1]*Universitat Politècnica de Catalunya, Spain;* [2]*Universidad Loyola Andalucía, Spain*

Extended Two-Terminal Network Model of Parallel VSMs for Analysis of Active Power-Frequency Response [#0346]
Jiaoxin Jia[1], Xiangwu Yan[1], Benshuang Qin[1], Abubakar Siddique[2], Bo Zhang[1]
[1]*North China Electric Power University, China;* [2]*Khwaja Fareed University of Engineering & Information Technology, Pakistan*

Extended Kalman Filter based State and Parameter Estimation Method for a Buck Converter Operating in a Wide Load Range [#0715]
Muhammed Yusuf Candan[1,2], Mustafa Mert Ankarali[1]
[1]*Middle East Technical University, Turkey;* [2]*Aselsan Inc., Turkey*

Harmonic Filter with Low Coupling Capacitance for Medium Voltage, High DV/DT PWM Converters [#1170]
Vaibhav Uttam Pawaskar, Van Thuan Nguyen, Ghanshyamsinh Gohil, Poras T. Balsara
The University of Texas at Dallas, United States

Estimation of the Internal Junction Temperatures of Resin Encapsulated IGBT Power Modules [#1558]
Matteo Gregorio[1], Fausto Stella[1], Radu Bojoi[1], Fabio Pagani[2]
[1]*Politecnico di Torino, Italy;* [2]*Prima Electro S.p.a., Italy*

Modeling and Control of a Discontinuous Quasi-Switched Boost Cascaded Multilevel Inverter for Grid-Tied Applications [#0612]
Truong-Duy Duong[1], Minh-Khai Nguyen[2], Young-Cheol Lim[1], Joon-Ho Choi[1], Caisheng Wang[2], Mahinda Vilathgamuwa[3]
[1]*Chonnam National University, Korea;* [2]*Wayne State University, United States;* [3]*Queensland University of Technology, Australia*

Poster 33: Magnetic and Insulating Materials and Thermal Management
Chair(s): Maeve Duffy, Zhiqiang (Jack) Wang

Low-Latency High-Speed Saturable Transformer based Zero-Crossing Detector for High-Current High-Frequency Applications [#1456]
Dhrubo Rahman, M.A. Awal, Md Sariful Islam, Wensong Yu, Iqbal Husain
North Carolina State University, United States

Analysis and Prediction of AC Resistance of Litz Wire with Rectangular Cross-Section [#1314]
Shota Kawahara[1], Kazuhiro Umetani[2], Eiji Hiraki[1]
[1]*Okayama University, Japan;* [2]*Tohoku University, Japan*

Design and Performance Evaluation of an Air-Core Inductor for a Point-of-Load (POL) Converter [#1474]
Saket Jha, Sonam Acharya, Sanatnu Mishra
Indian Institute of Technology Kanpur, India

Evaluation of Temperature Effect on Inductance Computation in Variable Magnetic Components for Dual-Active-Bridge Application [#0713]

Sarah Saeed[1], Jorge Garcia[1], Marina S. Perdigão[2,3], Valter S. Costa[2,4], Ramy Georgious[1,5]
[1]University of Oviedo, Spain; [2]Instituto de Telecomunicações, Portugal; [3]Coimbra Polytechnic-ISEC, Portugal; [4]University of Coimbra, Portugal; [5]Port Said University, Egypt

Investigation of Low-Pressure Condition Impact on Partial Discharge in Micro-Voids using Finite-Element Analysis [#1601]

Moein Borghei, Mona Ghassemi
Virginia Polytechnic Institute and State University, United States

Reducing Local Concentrated Gap Loss of a Nanocrystalline Core by Applying Alloy Gap [#0653]

Xuan Guo[1], Li Ran[1], Peter Tavner[2]
[1]University of Warwick, United Kingdom; [2]Durham University, United Kingdom

An Active Junction Temperature Control Method based on Thermoelectric Coolers [#0466]

Xiaofeng Ding, Xinrong Song, Zhenyu Shan
Beihang University, China

Active Thermal Management for Enhancing Peak-Current Capability of Three-Phase Inverters [#1015]

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

Expediting Transient Thermal Frequency Response Characterization and Sensitivity Analysis [#0044]

Timothy A. Polom[1], Robert D. Lorenz[2]
[1]Silicon Austria Labs, Austria; [2]University of Wisconsin-Madison, United States

Power Module Design for Integrated Three-Phase Current Sensing using a Single 3-D Point Field Detector [#1420]

Muhammad H. Alvi[1], Minhao Sheng[2], Robert D. Lorenz[2], Thomas M. Jahns[2]
[1]General Motor Research and Development, United States; [2]University of Wisconsin-Madison, United States

Poster 34: HVDC, FACTS, Implementation and Reliability of Power Converters
Chair(s): Ghanshyamsinh Gohil, Eduard Muljadi

Elimination of 2f Ripple in a Current Shared Interleaved Current Fed Switched Inverter [#0912]

Sonam Acharya, Anil Gambhir, Santanu Mishra
Indian Institute of Technology Kanpur, India

Scalar Approach based PWM Strategy for Two-Level Three-Phase VSIs to Reduce Switching Losses and RMS Current in DC-Link Capacitors [#0103]

Junhyuk Lee, Hyoung-Kyu Yang, Jung-Wook Park
Yonsei University, Korea

An Integrated Control Method for Improving the Input Current of Paralleled Vienna Rectifiers [#0064]

Jiawei Ji[1], Zhao Liu[1], Jianshou Kong[2], Jie Yu[1], Yiyan Lu[1], Kui Xu[3]
[1]Nanjing University of Science and Technology, China; [2]Changshu Intelligent Laser Equipment Research Institute, China; [3]Jiangsu Nicetown Electric Power Automation Co., China

Post Production PMSM Position Sensor Offset Error Quantification via Voltage Estimation [#0021]
Sandun S. Kuruppu, Yu Zou
Saginaw Valley State University, United States

Advances of Modeling and Reduction of Conducted and Radiated EMI in Flyback Converters [#0031]
Juntao Yao, Yiming Li, Zhedong Ma, Shuo Wang
University of Florida, United States

Fault-Tolerant Control Strategy for Reduced Torque Ripple of Independent Twelve-Phase BLDC Motor Drive System under Open-Circuit Faults [#0344]
Hyeoncheol Park, Yongsug Suh
Jeonbuk National University, Korea

Investigation of Dynamic Temperature-Sensitive Electrical Parameters for Medium-Voltage Low-Current Silicon Carbide and Silicon Devices [#0378]
Ze Ni[1,2], Sheng Zheng[1], Madhu Sudhan Chinthavali[1], Dong Cao[3]
[1]*Oak Ridge National Laboratory, United States;* [2]*North Dakota State University, United States;*
[3]*University of Dayton, United States*

An Overvoltage-Less Protection Method for Pole-to-Ground Faults in Symmetrical Monopole HVDC Systems by Half-Bridge MMC [#0060]
Kenichiro Sano, Hiro Nakayama
Tokyo Institute of Technology, Japan

Research on a Multi-Line Electromagnetic Sen Transformer Suitable for Distribution Network [#0499]
Shunkai Xu, Jiaxin Yuan, Shan Yin
Wuhan University, China

High Power Density Power Electronic Transformers using ISOS Multi-Cell Full-Wave Rectifier with GaN TCM Virtual Capacitor Converters [#0062]
Yusuke Hayashi, Hongliang Su, Kazuto Takao
Toshiba Corp., Japan

Sorting-Selecting Modulation Technique for Double-Capacitor Sub-Modules based Modular Multi-Level Converters [#1301]
G. Veera Bharath, Ghanshyamsinh Gohil
University of Texas at Dallas, United States

Backstepping Control for Multilevel STATCOM [#1559]
A.M. Saif[1,2], M. Tinari[1,2], P. Ciammaichella[2], C. Buccella[1,2], S. Di Gennaro[1], C. Cecati[1,2]
[1]*University of L'Aquila, Italy;* [2]*DigiPower srl, Italy*

Coordinated Control of Power and Current of MMC-HVDC and Circulation Suppression in Unbalanced Power Grid [#0116]
Hongbin Pan, Jiale Zhang, Cheng Deng, Haohao Ruan, Shixiang Ma
Xiangtan University, China

Over-Current Protection for Series-Connected IGBTs based on Desaturation Detection [#1100]
Lu Yue, Muhammad Abubakr Saeed, Inhwan Lee, Xiu Yao
State University of New York at Buffalo, United States

Active Damping Control of Multi-Port DC Power Flow Controller for Suppressing Power Oscillation of MMC-MTDC under Unbalanced Grid [#0533]
Wen Wu, Xuezhi Wu, Long Jing
Beijing Jiaotong University, China

Poster 35: Other Devices, Components, and Materials
Chair(s): Mona Ghassemi, Ramanujam Ramabhadran

A Data-Based IGBT Model for Efficient and Accurate Electro-Thermal Analysis [#0507]
Jianpeng Wang[1], Meng Xu[1], Jin Zhang[1], Laili Wang[1], Yongmei Gan[1], Tomoyuki Yamazaki[2]
[1]Xi'an Jiaotong University, China; [2]Fuji Electric Co., Ltd., Japan

Accurate Temperature-Dependent IGBT Model for Predicting Commutation Voltage Overshoot in MW-Level Power Converters [#0335]
Ariya Sangwongwanich[1], Francesco Iannuzzo[1], Rui Wu[2], Morten Hygum[2], Frede Blaabjerg[1]
[1]Aalborg University, Denmark; [2]Vestas Wind Systems A/S, Denmark

Enabling High Efficiency in Low-Voltage Soft-Switching Current Source Converters [#1395]
Aniruddh Marellapudi, Mickael J. Mauger, Prasad Kandula, Deepak Divan
Georgia Institute of Technology, United States

High Current, High Bandwidth Current Measurement Techniques [#0827]
Tianqi Zhang[1], Edward Shelton[2], Luke Shillaber[1], Patrick Palmer[3]
[1]University of Cambridge, United Kingdom; [2]Cambridge Design Partnership, United Kingdom; [3]Simon Fraser University, Canada

Design of a 200 kW Medium-Frequency Transformer (MFT) with High Insulation Capability [#0753]
Zhicheng Guo, Soumik Sen, Sanjay Rajendran, Qingyun Huang, Xianyong Feng, Alex Q. Huang
University of Texas-Austin, United States

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

Design and Optimization Methodology of Transformer for 700/400 V Series Resonant DC/DC Converters with Enhanced Power Density [#0618]
Alex Buus Nielsen[1,3], William Gerard Hurley[2], Pooya Davari[1], Maeve Catherine Duffy[2], Frede Blaabjerg[1], Bo Vork Nielsen[3]
[1]Aalborg University, Denmark; [2]National University of Ireland-Galway, Ireland; [3]Illinois Tool Works Ground Support Equipment, Denmark

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

Effects of Supercapacitor State of Charge on its Maximum Charge Delivery Capability [#0141]
Hengzhao Yang
New Mexico Institute of Mining and Technology, United States

A Thermal Management Strategy for Smoothing the Mission Profile Thermal Cycle of Power Device in the Wind Power Converter [#0308]

Jun Zhang[1], Xiong Du[2], Heng-Ming Tai[3]
[1]Hohai University, China; [2]Chongqing University, China; [3]University of Tulsa, United States

Comparison of Two Hollow-Shaft Liquid Cooling Methods for High Speed Permanent Magnet Synchronous Machines [#0284]

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

Enhanced Inductance and Winding Loss Model for Coupled Inductors [#0942]

Han Cui[1], Lingxiao Xue[2], Khai Ngo[3]
[1]The University of Tennessee, United States; [2]Oak Ridge National Laboratory, United States; [3]Virginia Polytechnic Institute and State University, United States

High-Precision Simulation for Structure and Efficiency Optimization of High-Power High-Frequency Transformer [#0821]

Zheyuan Yi[1], Kai Sun[1], Shilei Lu[1], Guoen Cao[2], Yongdong Li[1], Jung-Ik Ha[3]
[1]Tsinghua University, China; [2]Chinese Academy of Sciences, China; [3]Seoul National University, Korea

Virtual Prototyping of MV and HV Modular Multilevel Power Converter using Evolutionary Optimization based on ρ and η [#1345]

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

Poster 36: Power Converter EMI and Stability
Chair(s): Min Chen, Malik Elbuluk

Common Mode EMI Mitigation at a Power Converter Network [#0366]

Ashik Amin, Seungdeog Choi
Mississippi State University, United States

An EMI Suppression Strategy for Si/SiC Hybrid Switch based Single-Phase Inverter [#0392]

Ling Ou, Zishun Peng, Zeng Liu, Xiaogui Peng, Jun Wang, Shuaige Zhu, Qihui Fu
Hunan University, China

Reduction of Electromagnetic Interference (EMI) in Interleaved DC-DC Converters [#1537]

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

Common-Mode EMI Examination of Three-Phase Voltage-Source and Current-Source Converters Systems using WBG Devices [#1425]

Hang Dai, Renato A. Torres, Jerome Gossmann, Woongkul Lee, Thomas M. Jahns, Bulent Sarlioglu
University of Wisconsin-Madison, United States

CAN Signal Processing for EMI Reduction Cooperating with Switched-Mode Power Supply [#0934]

Ryo Shirai, Keiji Wada, Toshihisa Shimizu
Tokyo Metropolitan University, Japan

Comparison of High-Frequency Impedance of AC Machines with Circumferential and Toroidal Winding Topologies for SiC MOSFET Machine Drives [#1211]
Sangwhee Lee, Mingda Liu, Woongkul Lee, Bulent Sarlioglu
University of Wisconsin-Madison, United States

A Condition to Get Rid of Slope Compensation in Peak Current-Mode Controllers [#0648]
Hideaki Funaki[1], Atsushi Mishima[1], Masahito Shoyama[1], Yuichi Noge[1], Tomonori Kimura[2], Takahiro Yamada[2], Gamal M. Dousoky[3]
[1]Kyushu University, Japan; [2]MIRISE Technologies Corp., Japan; [3]Minia University, Egypt

Accurate *dq* Frame Modeling of a Three-Phase PWM Converter with Digital Control Delay [#0824]
Bo Zhan, WenSheng Song, Jinhui Chen, Shunfeng Yang, Shun Liu
Southwest Jiaotong University, China

Positive-Negative Sequence SRF-PLL Model for Accurate Stability Analysis in Grid-Tied Converters [#0964]
Sante Pugliese, Yongdae Kwon, Marco Liserre
Christian-Albrechts-Universität Kiel, Germany

Wednesday, October 14

Session 13: Additive and Alternative Manufacturing for Electric Machines
Chair(s): Nick Simpson, Nicola Bianchi

Novel Multi-Layer Design and Additive Manufacturing Fabrication of a High Power Density and Efficiency Interior PM Motor [#0700]
Maged Ibrahim, Fabrice Bernier, Jean-Michel Lamarre
National Research Council of Canada, Canada

Minimization of Winding AC Losses using Inhomogeneous Electrical Conductivity Enabled by Additive Manufacturing [#0371]
Fan Wu, Ayman M. El-Refaie
Marquette University, United States

Investigation on the Potential of PCB Winding Technology for High-Dynamic and High-Precision Linear Actuators [#1082]
Guillaume Colinet[1], William Lamberts[1], Francois Baudart[2], Bruno Dehez[1]
Université Catholique de Louvain, Belgium

A Study of Switched Reluctance Motor using Grain-Oriented Electrical Steel Sheets [#0561]
Yuzuki Tsuchiya[1], Kan Akatsu[2]
[1]Shibaura Institute of Technology, Japan; [2]Yokohama National University, Japan

Comparative Analysis of PWM Power Losses in IPM Machines with Different Modulation Schemes using Wide-Bandgap-Based Inverters [#0605]
Le Chang[1], Woongkul Lee[1], Thomas M. Jahns[1], Jihyun Kim[2]
[1]University of Wisconsin- Madison, United States; [2]General Motors Global Propulsion Systems, United States

Design of an Iron Loss Tester for the Evaluation of Assembled Stator Cores of Electric Machines [#0705]
Maged Ibrahim[1], Jaydeep Bhalala[2], Pragasen Pillay[2]
[1]National Research Council, Canada; [2]Concordia University, Canada

Identifying AC Loss Distributions in Electrical Machines through Experimentally Informed Virtual Prototyping [#0936]
Dominic North, Nick Simpson, Phil Mellor
University of Bristol, United Kingdom

Session 14: Renewable Energy and Hybrid Energy Storage Systems
Chair(s): Yongheng Yang, Ahmed Elasser

A Hybrid Model Parameter Extraction Method for Single-Diode Model of PV Module [#0150]
Xiangjian Meng, Feng Gao, Tao Xu
Shandong University, China

Power Electronic Implementation of Electrochemical Impedance Spectroscopy on Photovoltaic Modules [#0356]
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

Practical Design and Evaluation of a High-Efficiency 30-kVA Grid-Connected PV Inverter with Hybrid Switch Structure [#1087]
Hongwu Peng[1], Zhao Yuan[1], Dereje Lemma Woldegiorgis[1], Asif Imran Emon[1], Balaji Narayanasamy[1], Yusi Liu[2], Fang Luo[1], Alan Mantooth[1], Haider Ghazi Mhiesan[1]
[1]University of Arkansas, United States; [2]On Semiconductor, United States

Optimal Planning of Renewable Energy Resources and Battery Storage System for an Educational Campus in South Australia [#0572]
Rahmat Khezri[1], Amin Mahmoudi[1], Hirohisa Aki[2]
[1]Flinders University, Australia; [2]University 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 Nguyen[1], Ettore Colicchio[2], Paolo Primiani[2], Louis Viglione[2], Kamal Al-Haddad[1], Lyne Woodward[1]
[1]École de Technologie Supérieure, Canada; [2]Alizeti Ubimobil Inc., Canada

Energy Management Strategy for Ultracapacitors in Hybrid Electric Vehicles [#0382]
Carlos Villarreal-Hernandez[1], Javier Loranca-Coutino[1], Omar F. Ruiz-Martinez[2], Jonathan C. Mayo-Maldonado[2], Jesus E. Valdez-Resendiz[1], Julio C. Rosas-Caro[2], Gerardo Escobar-Valderrama[1], Carolina Del-Valle-Soto[2]
[1]Tecnologico de Monterrey, Mexico; [2]Universidad Panamericana, Mexico

A Hierarchical Energy Management Strategy for Battery/Ultracapacitor Hybrid Energy Storage Systems via Supervised Learning [#1253]

Yao Lu, Weirong Liu, Yue Wu, Jiahao Huang, Hongtao Liao, Yongjie Liu, Jun Peng, Zhiwu Huang
Central South University, China

Session 15: DC-AC Three-Phase Converters
Chair(s): Leila Parsa, Pahlevani Majid

Minimizing Losses Induced by Parasitic Winding Capacitance in Electric Drives by Means of Soft-Switching GaN-Based ARCP [#0598]

Thiago Pereira[1], Klaus Krischan[2], Annette Muetze[2], Marco Liserre[1]
[1]Christian-Albrechts-Universität zu Kiel, Germany; [2]Graz 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 Loncarski[1], Vito Giuseppe Monopoli[1], Riccardo Leuzzi[2], Pericle Zanchetta[2], Francesco Cupertino[1]
[1]Politecnico di Bari, Italy; [2]University 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

Region-Based Stability Analysis of Resilient Distribution Systems with Hybrid Grid-Forming and Grid-Following Inverters [#1577]

Lizhi Ding[1], Yuxi Men[1], Yuhua Du[1], Xiaonan Lu[1], Bo Chen[2], Jin Tan[3], Yuzhang Lin[4]
[1]Temple University, United States; [2]Argonne National Laboratory, United States; [3]National Renewable Energy Laboratory, United States; [4]University of Massachusetts, Lowell, United States

Power Control of Hybrid Grid-Connected Inverter to Improve Power Quality [#1108]

Wooyoung Choi, Kyungsub Jung, Bulent Sarlioglu
University of Wisconsin-Madison, United States

Current Limitation Strategy for Grid-Forming Converters under Symmetrical and Asymmetrical Grid Faults [#0650]

Roberto Rosso[1], Soenke Engelken[1], Marco Liserre[2]
[1]WRD GmbH, Germany; [2]Christian-Albrechts Universitaet zu Kiel, Germany

Grid Application and Controls Development for Medium-Voltage SiC-Based Grid Interconnects [#1035]

Akanksha Singh, Xiangqi Zhu, Barry Mather, Firehiwot Gurara
National Renewable Energy Laboratory, United States

Session 16: Gate Drivers and Driving Techniques
Chair(s): Tanya Gachovska, Hengzhao Yang

Gate-Driver Integrated Junction Temperature Estimation of SiC MOSFET Modules [#1053]

Slavko Mocevic[1], Vladimir Mitrovic[1], Jun Wang[1], Rolando Burgos[1], Dushan Boroyevich[1], Marko Jaksic[2], Mehrdad Teimor[2]
[1]Virginia Polytechnic Institute and State University, United States; [2]General Motors, United States

Hybrid Voltage Balancing approach for Series-Connected 10 kV SiC MOSFETs for DC-AC Medium-Voltage Power Conversion Applications [#0723]

Xiang Lin, Lakshmi Ravi, Dong Dong, Rolando Burgos
Virginia Polytechnic Institute and State University, United States

A 10 MHz GaN Driver IC with Bang-Bang Dead-Time Control for Synchronous Rectifier Buck Converter [#0770]

Pin Ying Wang[1], Ping Kun Chiu[1], Sheng Teng Li[1], Ching Jan Chen[1], Chih Chao Hsu[2]
[1]National Taiwan University, Taiwan; [2]National Chung-Shan Institute of Science and Technology, Taiwan

Digital Active Gate Control for a Three-Phase Inverter Circuit for a Surge Voltage Suppression and Switching Loss Reduction [#1596]

Daiki Yamaguchi[1], Yu Shan Cheng[1], Tomoyuki Mannen[1], Hidemine Obara[2], Keiji Wada[1], Toru Sai[3], Makoto Takamiya[3], Takayasu Sakurai[3]
[1]Tokyo Metropolitan University, Japan; [2]Yokohama National University, Japan; [3]The University of Tokyo, Japan

A GaN Driver IC with Novel Highly Digitally Adaptive Dead-Time Control for Synchronous Rectifier Buck Converter [#0808]

Ping Kun Chiu[1], Pin Ying Wang[1], Sheng Teng Li[1], Ching Jan Chen[1], Yi Ting Chen[2]
[1]National Taiwan University, Taiwan; [2]National Chung-Shan Institute of Science and Technology, Taiwan

A Resonant Gate Driver with Variable Gain and a Capacitively Decoupled High-Side GaN-FET [#0421]

Nathan Miles Ellis, Evan Sousa, Rajeevan Amirtharajah
University of California-Davis, United States

Automatic Search Method of Robust Gate Driving Vectors for Digital Gate Drivers against Variations in Operating Conditions of IGBT's [#0439]

Ting-Wei Wang[1,2], Toru Sai[1], Ryuzo Morikawa[1], Katsuhiro Hata[1], Takayasu Sakurai[1], Po-Hung Chen[2], Makoto Takamiya[1]
[1]The University of Tokyo, Japan; [2]National Chiao Tung University, Taiwan

Design Guidelines of Current Source Gate Driver for Series Connected SiC MOSFETs [#0317]

Chunhui Liu, Zhengda Zhang, Yifu Liu, Yunpeng Si, Mengzhi Wang, Qin Lei
Arizona State University, United States

Statistics-Based Switching Loss Characterization of Power Semiconductor Device [#0262]

Jiayang Lin, Ke Ma, Ye Zhu
Shanghai Jiao Tong University, China

Session 17: AC Machines and Drives
Chair(s): Andrea Cavagnino, Mahesh Swamy

Analytical Model and Performance Prediction of Induction Motors using Subdomain Technique [#1059]

Emad Roshandel[1], Amin Mahmoudi[1], Solmaz Kahourzade[2], Wen Soong[3]
[1]Flinders University, Australia; [2]University of South Australia, Australia; [3]University of Adelaide, Australia

On the Effects of Ultra-High Switching Frequency on PWM-Inverter-Fed Induction Motors [#1514]

Giacomo Scelba[1], Danilo Camuglia[1], Giulio de Donato[2], Silvio Vaschetto[3], Andrea Cavagnino[3], Emmanuel Agamloh[4]
[1]University of Catania, Italy; [2]Sapienza University of Rome, Italy; [3]Politecnico di Torino, Italy; [4]Baylor University, United States

Parameter Estimation of a Three Phase Induction Machine with a Solid Copper-Coated Rotor and a Large Air Gap [#1556]

Christiane Mellak[1], Josef Deuringer[2], Annette Muetze[1]
[1]Graz University of Technology, Austria; [2]Siemens Healthcare GmbH, Germany

Design of an Energy Efficient Outer Rotor Ceiling Fan Single Phase Induction Motor [#0264]

Utkarsh Sharma, Bhim Singh
Indian Institute of Technology Delhi, India

Sensorless Cascade-Model Predictive Control Applied to a Doubly Fed Induction Machine [#1568]

Jacopo Riccio[1], Shafiq Odhano[2], Mi Tang[1], Pericle Zanchetta[1]
[1]University of Nottingham, United Kingdom; [2]University of Newcastle, United Kingdom

Position Sensorless Control of PMSM Drives based on HF Sinusoidal Pulsating Voltage Injection [#1580]

Jiali Liu, Yongchang Zhang, Haitao Yang, Wenjia Shen
North China University of Technology, China

Novel Compensation Method of Digital Delay for High-Speed Permanent Magnet Synchronous Motor Under Low Carrier Ratio [#0214]

Keyuan Huang, Jiaxin Zhou, He Zhao, Wei Lv, Shoudao Huang
Hunan University, China

Saliency-Based Position Sensorless Drive for Permanent Magnet Machine with Low Cost Shunt Resistor Current Sensing using Modified PWM Voltage Injection [#0657]

Jyun-You Chen, Kuo-Yuan Hung, Guan-Ren Chen, Shih-Chin Yang
National Taiwan University, Taiwan

Session 18: Microgrids 1
Chair(s): Meiqin Mao, Lina He

Transient Load Sharing between Grid-Forming Generators in Islanded Microgrid [#0212]

Yelun Peng[1], Xin Zhang[2], Li Zhan[1]
[1]Nanyang Technological University, Singapore; [2]Zhejiang University, China

Autonomous Current Sharing Control with Integrated Virtual Impedance and Self Synchronisation for Unbalanced Islanded Microgrids [#1557]

A.A. Nazib, D.G. Holmes, B.P. McGrath
RMIT University, Australia

Improved Adaptive Filter FLL Control Algorithm for Enhancing Performance of Islanded Microgrid Supplying Dynamic Loads [#0634]

Rohini Sharma, Seema Kewat, Bhim Singh
Indian Institute of Technology-Delhi, India

A New Current Limiting and Overload Protection Strategy for Droop-Controlled Voltage-Source Converters in Islanded AC Microgrids under Grid Faulted Conditions [#1613]

Zi-lin Li[1], Jiefeng Hu[2], Ka Wing Chan[1]
[1]*The Hong Kong Polytechnic University, Hong Kong;* [2]*Federation University Australia, Australia*

Reduced Battery Usage in a Hybrid Battery and Photovoltaic Stand-Alone DC Microgrid with Flexible Power Point Tracking [#0676]

Hein Wai Yan[1], Aditi Narang[1], Hossein Dehghani Tafti[2], Glen G. Farivar[1], Josep Pou[1]
[1]*Nanyang Technological University, Singapore;* [2]*University of New South Wales, Australia*

Sharing Control Strategies for a Hybrid 48V/375V/400Vac AC/DC Microgrid [#1101]

Carlos Gómez-Aleixandre, Ángel Navarro-Rodríguez, Geber Villa, Cristian Blanco, Pablo García
University of Oviedo, Spain

Adaptive PR and BBO based Control Strategy of Wind-Solar Integrated Standalone Microgrid for Residential Application [#0585]

Farheen Chishti, Bhim Singh, Shadab Murshid
Indian Institute of Technology-Delhi, India

Session 19: Multilevel Converters 1
Chair(s): Younghoon Cho, Marco di Benedetto

A Five-Switch Four-Level Converter [#0029]

Jianfei Chen, Caisheng Wang
Wayne State University, United States

A Novel 7-Level X-Boost Active Neutral Point Clamped Inverter [#0670]

Haider Mhiesan, Dereje Woldegiorgis, Yuqi Wei, Alan Mantooth
University of Arkansas, United States

A Pyramid-Type (PT) Multilevel Converter Topology [#1583]

Vahid Dargahi[1], Keith Corzine[2], Arash Khoshkbar Sadigh[3]
[1]*University of Washington, United States;* [2]*University of California, Santa Cruz, United States;*
[3]*Pennsylvania State University, United States*

A Family of Modular Multilevel Bidirectional DC-DC Converters for High Voltage-Ratio and Low Ripple Applications [#0527]

Pekik Argo Dahono, Andriazis Dahono
Institute of Technology Bandung, Indonesia

A New Asymmetric 49-Levels Cascaded MPUC Multilevel Inverter Fed by a Single DC-Source [#1360]

Samuel C.S. Júnior[1], Cursino Jacobina[1], Edgard L.L. Fabricio[2], Alan S. Felinto[1]
[1]*Federal University of Campina Grande, Brazil;* [2]*Federal Institute of Paraíba, Brazil*

A Seven-Level Switched Capacitor Inverter using Series/Parallel Conversion with Reduced Number of Switches [#0553]

Masaki Sugiyama, Daiki Yamaguchi, Hirotaka Koizumi
Tokyo University of Science, Japan

Design of High-Power Density Interleaved 3-Phase 5-Level E-Type Back-to-Back Converter [#1479]

M. di Benedetto[1], A. Lidozzi[1], L. Solero[1], F. Crescimbini[1], P.J. Grbović[2]
[1]*Roma Tre University, Italy;* [2]*Innsbruck University, Australia*

New Cascaded-Transformers Multilevel Inverter for Renewable Distribution Systems [#0916]

Ahmed Ismail M. Ali[1,2], Mahmoud A. Abdallah[2], Takaharu Takeshita[1]
[1]*Nagoya Institute of Technology, Japan;* [2]*South Valley University, Egypt*

A Novel Solid-State Transformer with Loosely Coupled Resonant Dual-Active-Bridge Converters [#0345]

Jaehong Lee[1], Junghyeon Roh[1], Seung-Hwan Lee[1], Sungmin Kim[2], Myung-Yong Kim[3]
[1]*University of Seoul, Korea;* [2]*Hanyang University, Korea;* [3]*Korea Railroad Research Institute, Korea*

Session 20: Device and Module Packaging
Chair(s): Andrew Lemmon, Kristen Booth

High Power Density 1700-V/ 300-A Si-IGBT and SiC-MOSFET Hybrid Switch-Based Half-Bridge Power Module [#1217]

Amol Deshpande, Asif Imran, Riya Paul, Zhao Yuan, Hongwu Peng, Fang Luo
University of Arkansas, United States

Low-Inductance Double-Sided Cooling Power Module with Branched Lead Frame Terminals for EV Traction Inverter [#0563]

Takeshi Tokuyama[1], Akira Mima[1], Yusuke Takagi[2], Akira Matsushita[2]
[1]*Hitachi, Ltd., Japan;* [2]*Hitachi Automotive Systems, Ltd., Japan*

Design of a Low Multi-Loop Inductance Three Level Neutral Point Clamped Inverter with GaN HEMTs [#0171]

Eduard Dechant[1], Norbert Seliger[1], Ralph Kennel[2]
[1]*Technical University of Rosenheim, Germany;* [2]*Technical University of Munich, Germany*

A 16 kV PCB-Based DC-Bus Distributed Capacitor Array with Integrated Power-AC-Terminal for 10 kV SiC MOSFET Modules in Medium-Voltage Inverter Applications [#1096]

Lakshmi Ravi, Xiang Lin, Dong Dong, Rolando Burgos
Virginia Polytechnic Institute and State University, United States

Applying GaN HEMTs in Conventional Housing-Type Power Modules [#0531]

Lei Kou, Juncheng Lu
GaN Systems Inc., Canada

Chip Metallization Aging Monitoring with Induced Voltage v_{eE} between Kelvin and Power Emitter for High Power IGBT Modules [#1374]
Yu Chen, Fanxu Meng, Ankang Zhu, Wuhua Li, Xiangning He
Zhejiang University, China

Fourier Analysis-Based Evolutionary Multi-Objective Multiphysics Optimization of Liquid-Cooled Heat Sinks [#0504]
Raj Sahu, Emre Gurpinar, Burak Ozpineci
Oak Ridge National Laboratory, United States

Reliability Enhancement of Power Modules by Restricting Junction Temperature Fluctuation through Increased Transient Thermal Capacity [#1236]
Xin Fang[1], Huaping Jiang[1], Xiaoyong Wang[1], Weihua Shao[1], Hai Ren[1], Li Ran[1], Hengchun Mao[2]
[1]Chongqing University, China; [2]Quanten Technologies, United States

Session 21: Permanent Magnet Machines
Chair(s): Tsarafidy Raminosoa, Rajesh Deodhar

A Novel Asymmetric Rotor Interior PM Machine with Hybrid-Layer PMs [#0336]
Yang Xiao[1], Zi-Qiang Zhu[1], Jin-Tao Chen[2], Di Wu[2], Li-Ming Gong[2]
[1]The University of Sheffield, United Kingdom; [2]Midea Shanghai Motors and Drives Research Center, China

Control of a Dual Fed Open End Winding SPMSM with a Floating Capacitor [#1607]
Davide Minaglia[1], Luca Rovere[2], Andrea Formentini[2], Riccardo Leuzzi[3], Sabino Pipolo[2], Mario Marchesoni[4], Pericle Zanchetta[2]
[1]Danieli Automation S.P.A., Italy; [2]University of Nottingham, United Kingdom; [3]University of Pavia, Italy; [4]University of Genoa, Italy

A Novel Toroidal Permanent Magnet Motor Structure with High Torque Density and Enhanced Cooling [#0699]
Maged Ibrahim, Fabrice Bernier, Jean-Michel Lamarre
National Research Council of Canada, Canada

A Novel Spoke-Type Asymmetric Rotor Interior PM Machine [#0157]
Yang Xiao[1], Zi-Qiang Zhu[1], Jin-Tao Chen[2], Di Wu[2], Li-Ming Gong[2]
[1]The University of Sheffield, United Kingdom; [2]Midea Shanghai Motors and Drives Research Center, China

Difference in Reluctance Torque Utility between Concentrated and Distributed Windings [#0290]
Akeshi Takahashi, Wataru Hatsuse
Hitachi, Ltd, Japan

Optimal Study of a High Specific Torque Vernier-Type Axial-Flux PM Machine with Two Different Stators and a Single Winding [#1467]
Murat G. Kesgin, Peng Han, Narges Taran, Dan M. Ionel
University of Kentucky, United States

Sensorless Capacity Evaluation of a New Five-Phase Flux-Intensifying Fault-Tolerant Interior-Permanent-Magnet Motor [#0250]
Li Zhang, Xiaoyong Zhu, Lei Xu, Deyang Fan
Jiangsu University, China

A Method to Estimate the Worst-Case Torque Ripple under Manufacturing Uncertainties for Permanent Magnet Synchronous Machines [#0494]

Yongxi Yang[1], Nicola Bianchi[2], Gerd Bramerdorfer[3], Yong Kong[4], Chengning Zhang[1], Shuo Zhang[1]
[1]Beijing Institute of Technology, China; [2]University of Padova, Italy; [3]Johannes Kepler University Linz, Austria; [4]Southeast University, China

Design and Analysis of Double-Stator Flux Modulated Permanent Magnet Motor based on Flux Modulation Theory [#1007]

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

Session 22: Converters for Electric Vehicles
Chair(s): Yilmaz Sozer, Mohamed Badawy

An Improved Pre-Filtering Moving Average Filter based Synchronization Algorithm for Single-Phase V2G Application [#1326]

Komal Saleem[1], Kamyar Mehran[1], Zunaib Ali[2]
[1]Queen Mary University of London, United Kingdom; [2]Northumbria University Newcastle, United Kingdom

Bidirectional Universal Converter Transformer Design for Electric Vehicle Onboard Charging [#0782]

Jacob Buys[1], Ameer Janabi[1], Wei Qian[1], Xiaorui Wang[1], Yunting Liu[1], Bingsen Wang[1], Xi Lu[2], Ke Zou[2], Chingchi Chen[2], Fang Z. Peng
[1]Michigan State University, United States; [2]Ford Motors, United States;
[3]Florida State University, United States

A Novel Multipurpose V2G and G2V Power Electronics Interface for Electric Vehicles [#0515]

Tamanwè Payarou, Pragasen Pillay
Concordia University, Canada

Control of SiC based Integrated DC-DC Powertrain Charger for Electric Vehicles [#1265]

Saeed Anwar[1], Daniel Costinett[1], Subhajyoti Mukherjee[2], Shajjad Chowdhury[2]
[1]The University of Tennessee, United States; [2]Oak Ridge National Laboratory, United States

Integrated Isolated OBC for EVs with 6-Phase Traction Motor Drives [#0901]

Paolo Pescetto, Gianmario Pellegrino
Politecnico di Torino, Italy

Modeling, Analysis, Design, and Verification of a Reduced Model Capacitive Power Transfer based Wireless Charging System [#0798]

Deepa Vincent, Sheldon S. Williamson
Ontario Tech University, Canada

Session 23: AC-DC and AC-AC Converters
Chair(s): Pritam Das, Z. John Shen

Predictive Direct DC-Link Control for Active Power Decoupling of a Single-Phase Reduced DC-Link MV Solid-State Transformer [#1044]

Liran Zheng, Rajendra Prasad Kandula, Deepak Divan
Georgia Institute of Technology, United States

Modular Filter Building Block for Modular full-SiC AC-DC Converters by an Arrangement of Coupled Inductors [#0955]

Sungjae Ohn[1], Ripun Phukan[1], Dong Dong[1], Rolando Burgos[1], Dushan Boroyevich[1], Mondal Gopal[2], Sebastian Nielebock[2]
[1]Virginia Polytechnic Institute and State University, United States;
[2]Siemens AG Corporate Technology, Germany

Architecture and Control of an Interleaved 6-Level Bidirectional Converter with an Active Energy Buffer for Level-II Electric Vehicle Charging [#1112]

Zitao Liao[1], Derek Chou[1], Kelly Fernandez[1], Yong-Long Syu[2], Robert C.N. Pilawa-Podgurski[1]
[1]University of California-Berkeley, United States; [2]National Taiwan University of Science and Technology, Taiwan

Single-Phase Multilevel Rectifier based on Series and Parallel Connections [#1062]

Filipe Vieira Rocha[1], Cursino Brandão Jacobina[1], Antonio de Paula Dias Queiroz[2], Nady Rocha[2]
[1]Federal University of Campina Grande, Brazil; [2]Federal Institute of Paraíba, Brazil

SVPWM Strategy of Matrix Converter Fed Asymmetrical Six-Phase Induction Motor with Common-Mode Voltage Elimination and Unity Power-Factor Operation [#0478]

Sayan Paul, Kaushik Basu
Indian Institute of Science, India

An Advanced Commutation Method for Bidirectional Isolated Three-Phase AC/DC Dual-Active-Bridge Converter based on Matrix Converter [#0586]

Kazuma Sumiya[1], Yuji Naito[1], Jin Xu[2], Noboru Shimosato[2], Yukihiko Sato[1]
[1]Chiba University, Japan; [2]Myway Plus Corp., Japan

Multilevel Single-Phase AC-DC-AC Converter based on Packed U Cell [#0781]

Jean T. Cardoso[1], Cursino B. Jacobina[1], Maxsuel F. Cunha[1], Antonio de P.D. Queiroz[2], Samuel C.S. Júnior[1]
[1]Federal University of Campina Grande, Brazil; [2]Federal Institute of Paraíba, Brazil

Modulated Model Predictive Control for the 3TSMC [#1579]

Guanguan Zhang[1], Hui Wang[2], Chenghui Zhang[1]
[1]Shandong University, China; [2]Central South University, China

Session 24: Circuits and Topologies for Wind Power Conversion
Chair(s): Frede Blaabjerg, Wei Qiao

Unit Partition Method for the Resonance Research in the DC-Link Busbar of Back-to-Back Converter [#1313]

Yangyang Meng[1], Zipeng Liang[1], Sideng Hu[1], Zhenyu Ma[2], Xiangning He[1]
[1]Zhejiang University, China; [2]CRRC Zhuzhou Institute Co. Ltd, China

Investigation of a New Voltage Balancing Circuit for Parallel-Connected Offshore PMSG-Based Wind Turbines [#0369]

Ahmed A. Elserougi[1], Otavio Bertozzi[2], Ahmed M. Massoud[3], Shehab Ahmed[2]
[1]Alexandria University, Egypt; [2]King Abdullah University of Science and Technology, Saudi Arabia;
[3]Qatar University, Qatar

Variable Stator Frequency Diode Rectifier DFIG for Lower Cost MVDC Interface [#0114]

Chao Wu[1], Ion Boldea[2], Dao Zhou[1], Lucian Tutelea[2], Frede Blaabjerg[1]
[1]Aalborg University, Denmark; [2]Politehnica University of Timisoara, Romania

Integrated Generator-Rectifier Co-Design for Offshore Wind Turbines [#0333]

Phuc Huynh, Samith Sirimanna, Jay Mok, Dongsu Lee, Olaolu Ajala, Sara Linares, Daniel Mulas, Kiruba Haran, Alejandro Dominguez-Garcia, George Gross, Arijit Banerjee
University of Illinois at Urbana-Champaign, United States

Half-Controlled Converters Connecting Open-End Winding Doubly-Fed Induction Generator to a DC-Microgrid [#1069]

Emerson L. Soares[1], Cursino B. Jacobina[1], Ítalo André C. Oliveira[1], Nady Rocha[2], Victor Felipe M.B. Melo[2]
[1]Federal University of Campina Grande, Brazil; [2]Federal University of Paraíba, Brazil

Cascaded Three-Phase H-Bridge Converter Applied as Series Active Compensator for DFIG-Based Wind Energy Conversion Systems [#1131]

Italo A. Cavalcanti de Oliveira[1], Cursino Brandão Jacobina[1], Emerson de Lacerda Soares[1], Nady Rocha[2]
[1]Federal University of Campina Grande, Brazil; [2]Federal University of Paraíba, Brazil

Reduced-Size Converter in DFIG-Based Wind Energy Conversion System [#0536]

Rasoul Akbari, Afshin Izadian
Purdue School of Engineering and Technology, United States

Stand-Alone Wind Power System with Improved Light-Power Efficiency [#0993]

Ramtin Rasoulinezhad, Ebrahim Mohammadi, Adel Abosnina, Gerry Moschopoulos
Western University, Canada

Session 25: Thermal Analysis in Electric Machines
Chair(s): Antonio Griffo, Nick Simpson

A Feasibility Study of Heat Pipes for Thermal Management of Electrical Machines [#0877]

Rafal Wrobel, David Reay
Newcastle University, United Kingdom

A Rotating Double Layer Capacitive Slip Ring Concept for Power & Heat Transfer in Machines using an Ionic Conducting Working Fluid [#1473]

Daniel C. Ludois, Kevin Frankforter
University of Wisconsin-Madison, United States

Measurement of Rotor Thermal Time-Constant for Permanent Magnet Synchronous Machines [#0086]

Eric Armando, Aldo Boglietti, Salvatore Musumeci, Sandro Rubino, Enrico Carpaneto, Daniele Martinello
Politecnico di Torino, Italy

Improved Cooling in Modular Consequent Pole PM Machine Utilizing Flux Gaps [#0120]

R. Zhou, G.J. Li, Z.Q. Zhu, M.P. Foster, D.A. Stone
The University of Sheffield, United Kingdom

Measurement-Based Optimization of Thermal Networks for Temperature Monitoring of Outer Rotor PM Machines [#0517]

Daniel Wöckinger[1], Gerd Bramerdorfer[1], Stephan Drexler[1], Silvio Vaschetto[2], Andrea Cavagnino[2], Alberto Tenconi[2], Wolfgang Amrhein[1], Frank Jeske[3]
[1]*Johannes Kepler University Linz, Austria;* [2]*Politecnico di Torino, Italy;*
[3]*EBM-Papst St. Georgen GmbH and Co. KG, Germany*

Characterization of the Thermal Performances of Low-Cost Sub-Fractional Horsepower BLDC Claw-Pole Motor Designs [#0856]

Stefan Leitner, Thomas Kulterer, Hannes Gruebler, Annette Muetze
Graz University of Technology, Austria

Electromagnetic-Thermal Coupled Fault Analysis of PMASynRM with Turn-to-Turn Short Circuit involving a Few Strands [#0049]

Yanwen Shi, Jiabin Wang, Bo Wang
University of Sheffield, United Kingdom

A Fast Calculation Method for Steady State Performance of High Speed Traction Induction Machine by Finite Element Analysis [#1031]

Haiwei Cai
Southeast University, China

Session 26: Grid-Connected Inverters
Chair(s): Dong Dong, Bo Wen

Grid-Forming Converters: An Overview of Control approaches and Future Trends [#0649]

Roberto Rosso[1], Xiongfei Wang[2], Marco Liserre[3], Xiaonan Lu[4], Soenke Engelken[1]
[1]*WRD GmbH, Germany;* [2]*Aalborg University, Denmark;* [3]*Christian-Albrechts Universitaet zu Kiel, Germany;* [4]*Temple University, United States*

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 Lu[1], Soham Dutta[1], Victor Purba[2], Sairaj Dhople[2], Brian Johnson[1]
[1]*University of Washington, United States;* [2]*University of Minnesota, United States*

Developing a Machine Equivalent Inertial Response for a Virtual Oscillator Controlled Inverter in a Machine-Inverter based Microgrid [#1458]

Jiacheng Li[1], John E. Fletcher[1], D.G. Holmes[2], B.P. McGrath[2]
[1]*University of New South Wales, Australia;* [2]*RMIT, Australia*

PLL-Less Active and Reactive Power Controller for Grid-Following Inverter [#1309]

Ahmad Khan[1,2], Mitchell Easley[1], Mohsen Hosseinzadehtaher[1,2], Mohammad B. Shadmand[1,2], Haitham Abu-Rub[3], Poria Fajri[4]
[1]*Kansas State University, United States;* [2]*University of Illinois at Chicago, United States;* [3]*Texas A&M University at Qatar, Qatar;* [4]*University of Nevada-Reno, United States*

Current Harmonic Analysis of Multisampled LCL-Type Grid-Connected Inverter [#0472]

Shan He, Yiwei Pan, Dao Zhou, Xiongfei Wang, Frede Blaabjerg
Aalborg University, Denmark

Multisampling Control of LCL-Type Grid-Connected Inverter with an Improved Repetitive Filter [#0481]
Shan He, Dao Zhou, Xiongfei Wang, Frede Blaabjerg
Aalborg University, Denmark

Session 27: Multilevel Converters 2
Chair(s): Montie Vitorino, Dragan Maksimov

Switched Capacitor MMC Submodule Voltage Balancing with Reduced Number of Voltage Sensors [#0240]
Robson Bauwelz Gonzatti[1,2], Qichen Yang[2], Hamed Pourgharibshahi[2], Fang Peng[2]
[1]Federal University of Itajuba, Brazil; [2]Florida State University, United States

A Simple Carrier-Based Implementation for a General 3-Level Inverter using Nearest Three Space Vector PWM Approach [#0828]
Aditya Dholakia[1], Sayan Paul[1], Shailesh Ghotgalkar[2], Kaushik Basu[1]
[1]Indian Institute of Science, India; [2]Texas Instrument, India

A New Voltage-Balance Control Method for a Four-Level Hybrid-Clamped Converter [#0913]
Jianfei Chen[1], Jianyu Pan[2], Caisheng Wang[1], Jian Li[2]
[1]Wayne State University, United States; [2]Chongqing University, China

Simplified Model Predictive Control of Multilevel Converters with Internal Identical Structure [#0314]
Dehong Zhou[1], Zhongyi Quan[2], Yunwei (Ryan) Li[2]
[1]University of Electronic Science and Technology of China, China; [2]University of Alberta, Canada

Ripple Decoupling of Modular Multilevel Converter with Flux Cancelled Three-Port Converter [#1339]
Yifu Liu, Yunpeng Si, Mengzhi Wang, Zhengda Zhang, Chunhui Liu, Qin Lei
Arizona State University, United States

Steady-State Analysis of the Switched-Capacitor Modular Multilevel Converter with Γ-Matrix Modulation [#0807]
Qichen Yang[1], Robson Bauwelz Gonzatti[1,2], Hamed Pourgharibshahi[1], Fang Peng[1]
[1]Florida State University, United States; [2]Federal University of Itajuba, Brazil

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

Evaluation of Medium Voltage SiC Flying Capacitor Converter and Modular Multilevel Converter [#0983]
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]
Ailton do Egito Dutra, Montiê Alves Vitorino, Maurício Beltrão de Rossiter Corrêa
Federal University of Campina Grande, Brazil

Session 28: Batteries and Battery Converters
Chair(s): Harish Krishnamoorthy, Sheldon Williamson

Fuzzy Entropy-Based State of Health Estimation of LiFePO$_4$ Batteries Considering Temperature Variation [#0097]

Xin Sui[1], Shan He[1], Jinhao Meng[2], Remus Teodorescu[1], Daniel-Ioan Stroe[1]
[1]Aalborg University, Denmark; [2]Sichuan University, China

Online Li-Ion Battery State of Health Implementation for Grid-Tied Applications [#1114]

Irene Peláez[1], Ramy Georgious[1], Sarah Saeed[1], Pablo García[1], Igor Cantero[2]
[1]University of Oviedo, Spain; [2]CEGASA Energía, Spain

Voltage Variation with Hybrid Pulse as a Novel Indicator for Lifetime Estimation of Li-Ion Battery using in Smart Grid [#0056]

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

Simple and Low-Cost Online AC Ripple Current Injection Methods for a Single-Cell Li-Ion Battery [#0302]

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 Crespo[1], Ramy Georgious[2], Pablo García[2], Geber Villa[2]
[1]Cegasa Energía, S.L.U., Spain; [2]University 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

A Fast Energy-Efficient Pulse Preheating Strategy for Li-Ion Battery at Subzero Temperatures [#0898]

Zhiwu Huang, Zhiwei Gao, Yongjie Liu, Kaifu Guan, Hongtao Liao, Yue Wu, Yinhui Le, Fu Jiang, Jun Peng
Central South University, China

Session 29: Machine Diagnostics and Protection
Chair(s): Narges Taran, Bryan P. Ruddy

Challenges of Common Mode Current and Voltage Acquisition for Stator Winding Insulation Health Monitoring [#0678]

Fernando Alvarez-Gonzalez, David Hewitt, Antonio Griffo, Jiabin Wang
The University of Sheffield, United Kingdom

Detection and Compensation of Inter-turn Short Circuits in Interior Permanent Magnet Synchronous Machines with 2-Level Voltage Source Inverter [#1077]
Pablo Castro Palavicino, Woongkul Lee, Bulent Sarlioglu
University of Wisconsin-Madison, United States

Effect of System Grounding, AC-DC Converter Topology and Inverter Modulation on Motor Insulation Voltage Stress [#1397]
G.Y. Sizov, Z. Vrankovic, M.J. Melfi, G.L. Skibinski, Zhijun Liu
Rockwell Automation, United States

A Novel Method of Monitoring and Locating Stator Winding Insulation Ageing for Inverter-Fed Machine based on Switching Harmonics [#0349]
Dayong Zheng, Pinjia Zhang
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-Ramirez[1,2], Roque A. Osornio-Rios[1], Jose Antonino-Daviu[2]
[1]Universidad Autonoma de Querétaro, Mexico; [2]Universitat Politecnica de Valencia, Spain

Bispectrum Analysis of Stray Flux Signals for the Robust Detection of Winding Asymmetries in Wound Rotor Induction Motors [#0604]
Miguel E. Iglesias-Martínez[1], Pedro Fernández de Córdoba[2], Jose Alfonso Antonino-Daviu[2], J. Alberto Conejero[2]
[1]Universidad de Pinar del Río, Cuba; [2]Universitat 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 Bianchini[1], Ambra Torreggiani[1], Danilo David[2], Matteo Davoli[2], Alberto Bellini[3]
[1]University of Modena and Reggio Emilia, Italy; [2]Raw Power srl, Italy; [3]University of Bologna, Italy

Session 30: Power Converter Control and Applications
Chair(s): Ruxi Wang, Igor Cvetkovic

Grid-Connected Converter without Interfacing Filters: Principle, Analysis and Implementation [#0794]
Yuchen He[1], Yuan Li[1], Qichen Yang[1], Robson Bauwelz Gonzatti[1,2], Allan Taylor[3], Fangzheng Peng[1]
[1]Florida State University, United States; [2]Federal University of Itajuba, Brazil; [3]Kettering University, United States

Virtual Impedance-Based Grid Synchronization for Converters Connected through Long Cables [#0241]
Robson Bauwelz Gonzatti[1,2], Bokang Zhou[2], Yuchen He[2], Allan R. Taylor[3], Fang Peng[2]
[1]Federal University of Itajuba, Brazil; [2]Florida State University, United States; [3]Kettering University, United States

Negative Virtual Capacitance to Eliminate Resonance Oscillations in a Three-Phase Inverter with LCL Filter [#1248]
Vikram Roy Chowdhury, Jonathan W. Kimball
Missouri University of Science and Technology, United States

A Comparative Study between the PQ and IV Droop Control [#1219]
Gustavo P. de Pontes, Camila S. Gehrke, Edison R. Cabral da Silva, Fabiano Salvadori, Lucas V. Hartmann
Universidade Federal da Paraíba, Brazil

Integrated Magnetics Design for an Interleaved Three-Phase Buck Converter [#0325]
Yu-Chen Liu[1], Chen Chen[2], Yu-Chen Chung[1], Meng-Chi Tsai[1], Kim Ann Katherine[3]
[1]National Ilan University, Taiwan; [2]National Taiwan University of Science and Technology, Taiwan; [3]National 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

Demand Response of HVACs in Large Residential Communities based on Experimental Developments [#1496]
Huangjie Gong[1], Evan S. Jones[1], Rosemary E. Alden[1], Andrew G. Frye[1], Donald Colliver[2], Dan M. Ionel[1]
[1]Tennessee Valley Authority, United States; [2]University of Kentucky, United States

Hierarchical Control of Heterogeneous Inverter Air-Conditionings for Primary Frequency Regulation [#0004]
Tingyu Jiang[1], Ping Ju[1], Wenjie Ruan[1], Yang Yang[2], Jian Zhao[2], Fu Shen[2]
[1]Hohai University, China; [2]State Grid Taizhou Power Supply Co., China; [3]State Grid Nanjing Power Supply Co., China

Session 31: AC-DC Power Converters
Chair(s): Mehdi Narimani, Mohamed Youssef

Three-Phase Bidirectional Buck-Boost Current DC-Link EV Battery Charger featuring a Wide Output Voltage Range of 200 to 1000V [#1065]
Daifei Zhang[1], Mattia Guacci[1], Michael Haider[1], Dominik Bortis[1], Johann W. Kolar[1], Jordi Everts[2]
[1]ETH Zürich, Switzerland; [2]Prodrive Technologies, Netherlands

Isolated Three-Phase AC to DC Converter with Matrix Converter Applying Wide Output Voltage Operation [#1198]
Jun-ichi Itoh, Satoshi Nakamura, Shunsuke Takuma, Hiroki Watanabe
Nagaoka University of Technology, Japan

A Direct Three-Phase AC to DC Rectifier with a High-Frequency Open Delta Transformer Isolation [#0783]
Erick I. Pool-Mazun[1], Jose Juan Sandoval[1], Prasad Enjeti[1], Ira J. Pitel[2]
[1]Texas A&M University, United States; [2]Magna-Power Electronics Inc., United States

Control of a Three-Phase Diode Rectifier with an Instantaneous Reactive Power Compensator [#0161]
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 Mannen[2], Keiji Wada[3]
[1]University of Technology-Sydney, Australia; [2]University of Tsukuba, Japan;
[3]Tokyo 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 Wang[1], Shengwen Fan[1], Zhenyu Shan[2], Xiaofeng Ding[2]
[1]North China University of Technology, China; [2]Beihang University, China

Self-Synchronized Class E Resonant Rectifier with Direct Voltage Detection Method [#1340]

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

Session 32: Microgrids 2
Chair(s): Akshay Rathore, Yue Zhao

An Adaptive Virtual Impedance Control for Improving Power Sharing among Inverters in Islanded AC Microgrids [#0126]

A.S. Vijay, N. Parth, Suryanarayana Doolla, Mukul C. Chandorkar
Indian Institute of Technology-Bombay, India

Distributed Average Observation in Inverter Dominated Dynamic Microgrids [#1208]

Yuhua Du[1], Xiaonan Lu[1], Bo Chen[2], Jianzhe Liu[2], Xiongfei Wang[3], Frede Blaabjerg[3]
[1]Temple University, United States; [2]Argonne National Laboratory, United States;
[3]Aalborg University, Denmark

Toward Distributed Control for Reconfigurable Robust Microgrids [#0226]

Xia Miao[1], Marija Ilić[1], Christopher Smith[2], Matthew Overlin[2], Ryan Wiechens[2]
[1]Massachusetts Institute of Technology, United States; [2]MIT Lincoln Laboratory, United States

Controller Design and Implementation of a Medium Voltage (13.8 kV) Modular Multi-Level Converter for Asynchronous Microgrids [#1254]

Dingrui Li[1], Xingxuan Huang[1], Shiqi Ji[1], Cheng Nie[1], Fred Wang[1,2], Leon M. Tolbert[1,2]
[1]The University of Tennessee, United States; [2]Oak Ridge National Laboratory, United States

Dual State-Parameter Estimation for Series Arc Fault Detection on a DC Microgrid [#1049]

Kaushik Gajula, Xiu Yao, Luis Herrera
University at Buffalo, United States

Communicationless Power Management Strategy for the Multiple-DAB-Based Energy Storage System in Isolated DC Microgrid [#1098]

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 Arsalan[1], Jameel Ahmad[2], Muhammad Tahir[3], Sudip K. Mazumder[4]
[1]Khwaja Fareed University of Engineering and Information Technology, Pakistan; [2]University of Management and Technology Lahore, Pakistan; [3]University of Engineering and Technology Lahore, Pakistan; [4]University of Illinois at Chicago, United States

Uncertainty Reduction for Data Centers in Energy Internet by a Compact AC-DC Energy Router and Coordinated Energy Management Strategy [#0923]

Javad Khodabakhsh, Gerry Moschopoulos
Western University, Canada

Session 33: Switched Reluctance and Flux Switching Machines
Chair(s): Gerd Bramerdorfer, Silvio Vaschetto

Direct Voltage Controller for SRMs in Achieving Torque Ripple Minimization over Wide Speed Range [#1544]

Okan Boler, Omer Gundogmus, Yilmaz Sozer
The University of Akron, United States

Voltage Pulsation Induced in DC Field Winding of Different Hybrid Excitation Switched Flux Machines [#0010]

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

The Effectiveness of Radial Force Sum Flattening for Vibration Mode 0 and Noise Reduction in Switched Reluctance Motor [#0881]

Candra Adi Wiguna[1], Yifei Cai[1], Atsuya Ohashi[2], Jihad Furqani[3], Junichi Asama[2], Akira Chiba[1]
[1]Tokyo Institute of Technology, Japan; [2]Shizuoka University, Japan; [3]Bandung 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

Analytical and Experimental Investigations of Radial Force Detection by Strain Gauge for Possible Application for Switched Reluctance Machines [#0866]

Yifei Cai[1], Candra Adi Wiguna[1], Hiroya Sugimoto[2], Akira Chiba[1]
[1]Tokyo Institute of Technology, Japan; [2]Tokyo Denki University, Japan

Session 34: Inverter-Based Resources for Power Quality Enhancement
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 Feng[1], Zhikang Shuai[1], Jun Ge[1], Huimin Zhao[1], Z. John Shen[2]
[1]Hunan University, China; [2]Illinois Institute of Technology, United States

Solar Photovoltaic Array Fed Unified Power Quality Conditioner System Enabling Alleviation of Asymmetrical Voltage Sag [#0436]

Sanjenbam Chandrakala Devi[1], Bhim Singh[1], Priyank Shah[2], Sachin Devassy[3], Hina Parveen[1]
[1]Indian Institute of Technology-Delhi, India; [2]The University of Warwick Coventry, United Kingdom;
[3]CSIR-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 Umar[1,2], Ahmad Khan[1,2], Mitchell Easley[1], Silvanus D'silva[1], Brevann Nun[1], Mohammad B. Shadmand[1,2]
[1]Kansas State University, United States; [2]University 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 Cecati[1], Rongwu Zhu[1], Marco Liserre[1], Xiongfei Wang[2]
[1]Christian-Albrechts-Universität Kiel, Germany; [2]Aalborg 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

Session 35: DC-DC Converters for Renewable Energy Applications
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 Mahmoudi[1], Ali Ajami[1], Ebrahim Babaei[2], Nima Abdolmaleki[3], Caisheng Wang[3]
*[1]Azarbaijan Shahid Madani University, Iran; [2]University of Tabriz, Iran;
[3]Wayne State University, United States*

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

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

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

Minimum Current-Ripple Point Tracking for Renewable Energy Applications [#0229]
C.A. Villarreal-Hernandez[1], J. Loranca-Coutino[1], O.F. Ruiz-Martinez[2], J.C. Mayo-Maldonado[1],
J.E. Valdez-Resendiz[1], J.C. Rosas-Caro[2], Daniel Guillen[1]
[1]Tecnologico de Monterrey, Mexico; [2]Universidad Panamericana, Mexico

A Novel Boost Converter Topology with Non-Pulsating Input and Output Current [#0694]
Enrique Garza-Arias[1], Julio C. Rosas-Caro[2], Jesus E. Valdez-Resendiz[1],
Jonathan C. Mayo-Maldonado[1], Gerardo Escobar-Valderrama[1], Javier Loranca-Coutino[1],
Carlos Villarreal-Hernandez[1], Leonardo J. Valdivia[2]
[1]Tecnologico de Monterrey, Mexico; [2]Universidad 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 Lu[1], Kai Sun[1], Guoen Cao[2], Zheyuan Yi[1], Hanyu Liu[1], Yongdong Li[1]
[1]Tsinghua University, China; [2]Chinese 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

Session 36 : Utility Applications of Power Electronics
Chair(s): Nathan Weise, Necmi Altin

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 Iyer[1], Srinivas Gulur[2], Subhashish Bhattacharya[2]
[1]GE Global Research, United States; [2]North Carolina State University, United States

Coordinated Power Control Strategy of Modified Electrical Energy Router [#0255]

Zixun Pan[1], Xiaofeng Yang[1], Zejie Li[1], Haibo Tao[1], Yanbin Zhang[1], Trillion Q. Zheng[1], Pavel Kobrle[2]
[1]Beijing Jiaotong University, China; [2]Czech 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

500kVA Hybrid Solid State Transformer (HSST): Architecture, Functionality and Control [#1315]

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 Prabowo[1], Vishnu Mahadeva Iyer[2], Subhashish Bhattacharya[1], Eddy Aeloiza[3]
[1]North Carolina State University, United States; [2]GE Global Research, United States;
[3]ABB Inc., United States

High Power DC-DC Converter based on Parallel Hybrid Converter [#1447]

Mohd Shadab Ansari[1], Ibhan Chand Rath[1], Siba Kumar Patro[2], Anshuman Shukla[1]
[1]Indian Institute of Technology Bombay, India; [2]Visvesvaraya National Institute of Technology, India

A Control Technique to Eliminate dc Harmonics in Series-Connected Hybrid VSCs for HVDC Applications [#1446]

Siba Kumar Patro[1], Anshuman Shukla[2]
[1]Visvesvaraya National Institute of Technology, India; {2]Indian Institute of Technology Bombay, India

Virtual Friction for Oscillation Damping and Inertia Sharing from Multi-Terminal VSC-HVDC Grids [#1057]

Alberto Rodríguez-Cabero[1], Javier Roldán-Pérez[1], Milan Prodanovic[1], Jon Are Suul[2], Salvatore D'arco[2]
[1]IMDEA Energy Institute, Spain; [2]SINTEF Energy Research, Norway

Thursday, October 15

Session 37: Reliability, EMI and Fault Tolerance in Electric Drives
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. Eldeeb[1], Haisen Zhao[1,2], Osama A. Mohammed[1]
[1]Florida International University, United States; [2]North 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, Xaiyong 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. Haider[1], M. Guacci[1], D. Bortis[1], J.W. Kolar[1], Y. Ono[2]
[1]ETH Zürich, Switzerland; [2]Nabtesco 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 Zhan[1], Lingyu Zhu[1], Jiangang Dai[1], Ting Hou[2]
[1]Xi'an Jiaotong University, China; [2]State 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

Session 38: Multilevel Converters 3
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 Phukan[1], Sungjae Ohn[1], Dong Dong[1], Rolando Burgos[1], Gopal Mondal[2], Sebastian Nielebock[2]
[1]Virginia Polytechnic Institute and State University, United States; [2]Siemens 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, Montiê 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 Badawi[1], Mehdi Narimani[1], Zhongyuan Cheng[2], Navid Reza Zargari[2]
[1]McMaster University, Canada; [2]Rockwell 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 Khan[1,2], Mohsen Hosseinzadehtaher[1,2], Mitchell Easley[1], Mohammad B. Shadmand[1,2], Haitham Abu-Rub[3]
[1]Kansas State University, United States; [2]University of Illinois at Chicago, United States; [3]Texas 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 Tarraso[1], Jose Ignacio Candela[1], Ngoc Bao Lai[2], Gregory N. Baltas[2], Pedro Rodriguez[2]
[1]Universitat Politecnica de Catalunya, Spain; [2]Universidad 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 Araújo[1], João Raphael Souza Martins[2], André Pires Nóbrega Tahim[1], Darlan Alexandria Fernandes[3], José Renes Pinheiro[1], Fabiano Fragoso Costa[1]
[1]Federal University of Bahia, Brazil; [2]Federal University of Campina Grande, Brazil; [3]Federal University of Paraíba, Brazil

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

Phani R.V. Marthi[1], Suman Debnath[1], Mariesa L. Crow[2]
[1]Oak Ridge National Laboratory, United States; [2]Missouri 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 Jankovic[1], Puneeth Murthy[1], Lixiang Wei[1], Adel Nasiri[2]
[1]Rockwell Automation, United States; [2]University 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 Sun[1], Zhenpo Wang[1], Peng Liu[1], Zhaosheng Zhang[1], Shuo Wang[1], David G. Dorrell[2]
[1]Beijing Institute of Technology, China; [2]University of Witwatersrand, South Africa

Q-Learning-Based Smart Selective Harmonic Current Mitigation-PWM (S^2HCM-PWM) for Grid-Connected Converters [#0992]

Amirhossein Moeini[1], Morteza Dabbaghjamanesh[2], Jonathan W. Kimball[1]
[1]Missouri University of Science and Technology, United States;
[2]The 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 Rong[1], Jun Wang[1], Zhiyu Shen[2], Sizhan Zhou[1], Bo Wen[1], Rolando Burgos[1], Dushan Boroyevich[1]
[1]Virginia Polytechnic Institute and State University, United States;
[2]Delta Electronics (America) LTD., United States

Partial Discharge Signal Propagation in Three-Phase Gas-Insulated Switchgear: CIGRE Recommendations-Based Analysis [#0559]
Ahmad Darwish[1], Shady S. Refaat[2], Haitham Abu-Rub[2], Hamid A. Toliyat[1]
[1]Texas A&M University-College Station, United States; [2]Texas 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 Montero[1], Markus Vogelsberger[2], Martin Bazant[3], Thomas Wolbank[1]
[1]Vienna University of Technology, Austria; [2]Bombardier Transportation Austria GmbH, Austria;
[3]Bombardier Transportation Switzerland Ltd., Switzerland

Improved Sensorless Control Method for Permanent Magnet Synchronous Machines Considering Resistance Asymmetry and Temperature Variation [#0476]
Tianyi Liu[1], Ziqiang Zhu[1], Zhanyuan Wu[2], David Stone[1], Martin Foster[1]
[1]University of Sheffield, United Kingdom; [2]Siemens 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

Position-Sensorless Control Design for Safety-Relevant Steer-by-Wire Applications [#0985]
Kilian Rehorik[1], Abdelrahmen Elsman[2], Benjamin Grothmann[3], Nikolaus Reiland[1],
Dieter Gerling[1], Fabio Giulii Capponi[2]
[1]Bundeswehr University Munich, Germany; [2]University of Rome La Sapienza, Italy; [3]Audi AG, Germany

Mitigating DV/DT Stress Caused by the Line-Line Voltage Polarity Reversal in Model Predictive Controlled VSI Drives [#0958]
Ameer Janabi, Shukai Wang, Jacob Buys, Bingsen Wang
Michigan State University, United States

A Robust Predictive Current Control of Induction Motor Drives [#0505]
Xing Wang[1], Yongchang Zhang[1], Haitao Yang[1], Boyue Zhang[1], Jose Rodriguez[2]
[1]North China University of Technology, China; [2]Universidad Andres Bello, Chile

One Improved Finite-Set Model Predictive Current Control with Nonlinear Speed Regulator for Linear Induction Motor based on Linear Metro [#0957]
Mosaad M. Ali[1,2], Wei Xu[1], Mahmoud F. Elmorshedy[1,3], Yi Liu[1], Minghai Dong[4]
[1]Huazhong University of Science and Technology, China; [2]Kafrelsheikh University, Egypt; [3]Tanta University, Egypt; [4]Foshan Golden Age Motor Technology Co., Ltd., China

Data-Driven Predictive Current Control for Synchronous Motor Drives [#0663]
Paolo Gherardo Carlet[1], Andrea Favato[1], Saverio Bolognani[2], Florian Dörfler[2]
[1]University of Padova, Italy; [2]ETH Zürich, Switzerland

Session 42: Wireless Power Transfer in Transportation
Chair(s): Burak Ozpineci, Salman Harasis

An Inductive Power Transfer System using Soft-Switched AC/AC Active-Clamped Half-Bridge Converter with Predictive Dead-Beat Grid Current Control [#0508]
Phuoc Sang Huynh, Deepak Ronanki, Sheldon S. Williamson
Ontario Tech University, Canada

Multi-Pad Receivers for High Power Dynamic Wireless Power Transfer [#1439]
Benny J. Varghese[1], Regan A. Zane[1], Abhilash Kamineni[1], Reza Tavakoli[2], Zeljko Pantic[2], Chungchih Chou[3], Leo Liu[3]
[1]Utah State University, United States; [2]North Carolina State University, United States; [3]Toyota Research Institute North America, United States

Design of a 7.7 kW Three-Phase Wireless Charging System for Light Duty Vehicles based on Overlapping Windings [#1545]
Samir Chowdhury, Md Tawhid Bin Tarek, Yilmaz Sozer
The University of Akron, United States

Wireless Power Transfer System Integration with an On-Board Conductive Charger for Plug-In Electric Vehicles [#1347]
Mohamed Elshaer[1], Chris Bell[1], Aqil Hamid[1], Jin Wang[2]
[1]Ford Motor Co., United States; [2]The Ohio State University, United States

Electromagnetic Shielding Design for 200 kW Stationary Wireless Charging of Light-Duty EV [#0224]
Bo Zhang[1], Richard B. Carlson[1], Veda P. Galigekere[2], Omer C. Onar[2], Jason L. Pries[2]
[1]Idaho National Laboratory, United States; [2]Oak Ridge National Laboratory, United States

Unfolder-Based Single-Stage AC-AC Conversion System for Wireless Charging Applications [#1354]

Chakridhar Reddy Teeneti, Rees Hatch, Dorai Babu Yelaverthi, Abhilash Kamineni, Hongjie Wang, Regan Zane
Utah State University, United States

Comparative Analysis of DWPT Topologies and Regulation Schemes for Improved Controllability [#1455]

Anindya Chitta Bagchi[1], Abhilash Kamineni[1], Regan Zane[1], Richard Carlson[2]
[1]Utah State University, United States; [2]Idaho National Laboratory, United States

Zero-Crossing Current Detection for Modular and Robust Dynamic Wireless Power Transfer [#1351]

Matthew Hansen, Abhilash Kamineni, Regan Zane
Utah State University, United States

Session 43: DC-AC Single-Phase Converters
Chair(s): Liuchen Chang, Pedro Rodriguez

An Active Power Decoupling-integrated Four-Switch Quasi-Switched Boost Inverter [#0944]

Pramit Nandi, Ravindranath Adda
Indian Institute of Technology Guwahati, India

An n-Phase Interleaved Current Fed Switched Inverter [#1106]

Sonam Acharya[1], Santanu Mishra[1], Arvind Tiwari[2]
[1]Indian Institute of Technology Kanpur, India; [2]GE Global Research, United States

New Five-Level Double-Flying-Capacitor Inverter Fed by a Boost-Flyback Converter [#1123]

Antonio Venancio de M. Filho[1], Edison Roberto C. da Silva[1,2], André Elias L. Costa[1]
[1]Federal University of Campina Grande, Brazil; [2]Federal University of Paraíba, Brazil

Efficiency Improvement with Off-Time Discrete Control for 1 MHz Operated Discontinuous Current Mode Grid-Tied Inverter [#1320]

Cheng Huang, Jiantao Zhang, Tomoyuki Mannen, Takanori Isobe
University of Tsukuba, Japan

Model Predictive Control with Low Switching Frequency for Railway Power Compensator [#1294]

Jeonghyeon Lee, Jehun Woo, Jongmin Jo, Hanju Cha
Chungnam National University, Korea

Verification of Iron Loss Affected by Secondary Frequency in Multi-Core Transformer for Frequency Multiplying Circuit [#0432]

Shogo Nishikawa[1], Koji Orikawa[1], Satoshi Ogasawara[1], Masatsugu Takemoto[2]
[1]Hokkaido University, Japan; [2]Okayama University, Japan

A Resonant Current Regulator for Direct Electrical Heating of Subsea Pipelines [#0173]

Anindya Ray, Kaushik Rajashekara
University of Houston, United States

Dynamic Performance Improvement of Single-Phase DC-AC Converter with Non-Linear Digital Predictive Control [#0826]

Shah Zaman[1], Yan Zhang[1], Liu Jinjun[1], Li Xinying[1], Nauman Ali Larik[2], Zhang Jinshui[1]

[1]Xi'an Jiaotong University, China; [2]South China University of Technology, China

Session 44: Reliability, Diagnostics and Fault Analysis
Chair(s): Huai Wang, Rongwu Zhu

Impact of Mission Profile Dynamics on Accuracy of Thermal Stress Modeling in PV Inverters [#0045]

Ariya Sangwongwanich, Huai Wang, Frede Blaabjerg

Aalborg University, Denmark

A Calculation Method of Analytical DC Fault Current in MMC-HVDC Grid including Current-Limiting Devices [#0304]

Song Tang, Guanlong Jia, Chenghao Zhang, Min Chen

Zhejiang University, China

A Simple Diagnosis Approach for Multiple IGBT Faults in Cascaded H-Bridge Multilevel Converters [#0205]

Dong Xie, Xinglai Ge

Southwest Jiaotong University, China

Separation of Bond-Wire and Solder Layer Failure Modes in IGBT Power Modules [#0775]

Wenzhao Liu[1], Dao Zhou[1], Michael Hartmann[2], Francesco Iannuzzo[1], Frede Blaabjerg[1]

[1]Aalborg University, Denmark; [2]Schneider Electric Power Drives GmbH, Austria

Case Temperature Monitoring-Based Online Condition Monitoring of SiC MOSFET Power Modules using a Radial Basis Function Network [#1586]

Cameron Entzminger, Wei Qiao, Liyan Qu

University of Nebraska-Lincoln, United States

Co-Optimization of Boost Converter Reliability and Volumetric Power Density using Genetic Algorithm [#0544]

Lee Gill, Jason C. Neely, Lee J. Rashkin, Jack D. Flicker, Robert J. Kaplar

Sandia National Laboratories, United States

Preserving Converter Lifetime by Active Thermal Boundary Control [#0917]

Patrick T. Lewis[1], Brandon M. Grainger[2]

[1]Hepburn and Sons, LLC, United States; [2]University of Pittsburgh, United States

Condition Monitoring of DC-Link Capacitors in Grid-Tied Solar Inverters using Data-Driven Techniques [#1103]

Vahe Seferian[1], Ali Bazzi[1,2], Hazem Hajj[1]

[1]American University of Beirut, Lebanon; [2]University of Connecticut, United States

An IGBT Open-Circuit Fault Diagnosis Method for Grid-Tied T-Type Three-Level Inverters [#0210]

Zhan Li[1], Bohui Zhao[1], Xin Zhang[2], Hao Ma[2]

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

Session 45: Multi-Phase Motor Drives
Chair(s): Prerit Pramod, Mario Pulvirenti

Performance Evaluation and Improvement of Symmetrical Six-Phase Drives under Two Open Legs with Star and Hexagon Connections [#0046]
Alejandro G. Yepes, Jesús Doval-Gandoy
University of Vigo, Spain

A Generalized Carrier-Based PWM with Zero-Axis Voltage Elimination for Open-End Winding Motor Drive [#0358]
An Li, Xiangwen Sun, Dong Jiang, Zicheng Liu
Huazhong University of Science and Technology, China

Direct Instantaneous Torque Control of Five-Phase Segmented Switched Reluctance Motor with Bipolar Excitation for In-Wheel Electric Vehicles [#1431]
Deepak Ronanki[1], Apparao Dekka[1], Parthiban Perumal[2], Abdul R. Beig[3]
*[1]Lakehead University, Canada; [2]National Institute of Technology Karnataka, India;
[3]Khalifa University, United Arab Emirates*

Active Disturbance Rejection Control of Synchronous Reluctance Motors [#0616]
Angelo Accetta[1], Maurizio Cirrincione[2], Filippo D'Ippolito[3], Marcello Pucci[1], Antonino Sferlazza[3]
[1]National Research Council of Italy, Italy; [2]University of the South Pacific, Fiji; [3]University of Palermo, Italy

Self-Commissioning of Synchronous Reluctance Motor Drives: Magnetic Model Identification with Online Adaptation [#0215]
Anantaram Varatharajan, Gianmario Pellegrino, Eric Armando
Politecnico di Torino, Italy

Minimum Loss Control of a Five-Phase Permanent Magnet Assisted Synchronous Reluctance Motor under Open Phase Fault [#0424]
Akm Arafat[1], Md. Khurshedul Islam[2], Kazi Nishat Tasnim[2], Seungdeog Choi[2]
[1]Commins Inc., United States; [2]Mississippi State University, United States

Dynamic Overmodulation for Improved Current Regulation of PMSM [#1591]
Jiwon Yoo, Seung-Ki Sul
Seoul National University, Korea

Session 46: Control and Stability of Power Converters
Chair(s): Ke Ma, Mohammad B Shadmand

Asymmetric Parameters Design for Bidirectional Resonant CLLC Battery Charger [#0433]
Jun Min, Martin Ordonez
The University of British Columbia, Canada

Primary Frequency Control in Islanded Microgrids using Solid-State Transformers as Virtual Synchronous Machines [#0926]
Javad Khodabakhsh, Gerry Moschopoulos
Western University, Canada

Design and Optimization of AC-Side Filter using Coupled Inductor for Single-Phase Full-Bridge Inverter [#0706]

Zhe Yang[1], Paige Williford[1], Fred Wang[1], Sandeep Bala[2], Jing Xu[2]
[1]The University of Tennessee, United States; [2]ABB Corporate Research, United States

CCM vs. CRM Design Optimization of a Boost-Derived Parallel Active Power Decoupler for Microinverter Applications [#0749]

Yidi Shen, Michael D'Antonio, Shiladri Chakraborty, Alireza Khaligh
University of Maryland, United States

Using Deterministic Optimization to Compare Interleaved and Coupled Inverters: Results and Experimental Verification [#0329]

Adrien Voldoire[1], Jean-Luc Schanen[1], Jean-Paul Ferrieux[1], Benoit Sarrazin[1], Cyrille Gautier[2], Marwan Ali[2]
[1]University Grenoble Alpes, France; [2]Safran Tech, France

A Hybrid Multi-Loop Current Control of the Grid-Connected Converter with LCL Filter [#0406]

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

A Trigonometric Solution to the Problem of Overmodulation in Five-Phase Inverters [#0599]

Luca Vancini, Michele Mengoni, Giacomo Sala, Gabriele Rizzoli, Luca Zarri, Angelo Tani
University of Bologna, Italy

Session 47: High Frequency DC-DC Converters
Chair(s): Dong Cao, Emanuel Serban

Current Sharing Analysis of Interleaved LCLC Resonant Converter [#0707]

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

Optimal Design of GaN and PCB-Winding based Transformer-Inductor-Integrated Magnetics for CLL Resonant Converter [#0009]

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

An Accurate Voltage Gain Model Considering Diode Effect for LLC Resonant Converter in Wide Gain Range Applications [#1085]

Hao Wen[1], Dong Jiao[1], Jih-Sheng Lai[1], Johan Strydom[2], Lanhua Zhang[2]
[1]Virginia Polytechnic Institute and State University, United States; [2]Texas Instruments Inc., United States

A 48V-to-1V Buck-Assisted Active-Clamp Forward Converter with Reduced Voltage Stress for Datacenter Applications [#0244]

Lixiong Du, D. Brian Ma
The University of Texas-Dallas, United States

Analysis and Design of Active Snubber of a Step-Up Phase Shifted Full Bridge DC-DC Converter Considering Parasitics [#0355]

Manmohan Mahapatra, Anirban Pal, Kaushik Basu
Indian Institute of Science, India

A 27.12-MHz 10-kV Power Amplifier for Compact Particle Accelerators Utilizing an Optimized Matching Network [#1380]

Sreyam Sinha[1], Yuetao Hou[1], Di Ni[1], Qing Ji[2], Arun Persaud[2], Peter Seidl[2], Thomas Schenkel[2], Amit Lal[1], Khurram K. Afridi[1]
[1]Cornell University, United States; [2]Lawrence Berkeley National Laboratory, United States

A 50-MHz Multi-kV Power Amplifier for Ion-Beam Accelerator Utilizing an Optimized Toroidal Inductor [#1273]

Yuetao Hou[1], Sreyam Sinha[1], Di Ni[1], Qing Ji[2], Arun Persaud[2], Peter Seidl[2], Thomas Schenkel[2], Amit Lal[1], Khurram K. Afridi[1]
[1]Cornell University, United States; [2]Lawrence Berkeley National Laboratory, United States

LLC Resonant Converter using Pre-Charged Capacitor for High Input Voltage – High PAPR Envelope Tracking [#1169]

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

Spread Spectrum based Power Line Communication and EM Noise Reduction Technique for Bidirectional HB CLLC Resonant Converter [#0211]

Hwa-Pyeong Park[1], Mina Kim[2], Jongbok Baek[1], Moses Kang[1], Jee-Hoon Jung[2]
[1]Korea Institute of Energy Research, Korea; [2]Ulsan National Institute of Science and Technology, Korea

Session 48: Wireless Power Transfer
Chair(s): Chi-Kwan Lee, Yi Tang

Multiple-Transmitter Achieving Load-Independent Transmitter Current and Compensation of Cross-Interference Among Transmitters for Wide Charging Area Wireless Power Transfer Systems [#1371]

Kodai Matsuura[1], Masataka Ishihara[1], Akihiro Konishi[1], Kazuhiro Umetani[2], Eiji Hiraki[1]
[1]Okayama University, Japan; [2]Tohoku University, Japan

Challenges and Solutions to Passive Rectification in Multi-MHz Frequency Capacitive Wireless Power Transfer Systems for Electric Vehicle Charging [#1264]

Brandon Regensburger, Khurram K. Afridi
Cornell University, United States

A High Frequency Wireless Power Transfer System for Electric Vehicle Charging using Multi-Layer Non-Uniform Self-Resonant Coil at MHz [#0809]

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

A Direct AC-AC Single-Inductor Multiple-Output (SIMO) Converter for Multi-Coil Wireless Power Transfer Applications [#0034]

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

Active Rectifier Design and Synchronization Control for 6.78 MHz Wireless Power Transfer [#1291]

Peter Pham, Spencer Cochran, Daniel J. Costinett, Leon M. Tolbert
The University of Tennessee, United States

A Novel Method to Design High Efficiency Transmission Line Class E Power Amplifier [#0268]

Dongqin Mao, Ke Jin, Xirui Zhu
Nanjing University of Aeronautics and Astronautics, China

A New Control Method of Semi-Bridgeless Active Rectifier for Wireless Power Transfer System based on the Double-Sided LCC Compensation [#0568]

Min Wu, Yongbin Jiang, Longyang Yu, Chengzi Yang, Mengyu Zhu, Jianpeng Wang, Laili Wang, Wenjie Chen, Xu Yang
Xi'an Jiaotong University, China

A Dual Phase Shedding Method for the Improvement of Efficiency and Reduction of Regulating Requirements in Series-Series Inductive Power Transfer [#0679]

Shuxin Chen[1], Yang Chen[2], Hongchang Li[3], Yiming Zhang[1], Xin Li[1], Yi Tang[1]
[1]Nanyang Technological University, Singapore; [2]Southwest Jiaotong University, China; [3]Xinjiang University, China

Optically-Coupled Switched-Mode Converter for Smartphones Wireless Charging Application [#0728]

Weiyang Zhou[1], Mengqi Wang[1], Qunfang Wu[1], Guanliang Liu[1], Wencong Su[1], Can Huang[2]
[1]University of Michigan-Dearborn, United States; [2]Lawrence Livermore National Laboratory, United States

Data-Enabled Estimation and Feedback Control Method Utilizing Online Magnetic Positioning System for Wireless Power Transfer Systems [#0287]

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

Control of Output Power in Primary Side LCC and Secondary Series Tuned Wireless Power Transfer System without Secondary Side Sensors [#1348]

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

Design of Auxiliary Circuit Elements for Achieving Zero Voltage Switching in a Wireless Power Transfer System [#1328]

Tarak Saha[1], Subhajyoti Mukherjee[2], Veda Prakash Galigekere[2], Omer C. Onar[2]
[1]Utah State University, United States; [2]Oak Ridge National Laboratory, United States

Session 49: Noise, Vibration and Reliability in Electric Machines
Chair(s): Jose Antonino-Daviu, Shanelle Foster

Investigation of the Effects of Skew of an Integrated Flux-Switching Motor-Compressor [#1009]

Hao Ding, Leyue Zhang, Ahmed Hembel, Bulent Sarlioglu
University of Wisconsin-Madison, United States

Impact of Damping Material on Vibration Isolation in Switched Reluctance Machines [#1536]

Lavanya Vadamodala[1], Anik Chowdhury[1], Md. Tawhid Bin Tarek[1], Shuvajit Das[1], Abdul W. Bandarkar[1], Omer Gundogmus[1], Yilmaz Sozer[1], Fernando Venegas[2], David Colavincenzo[2]
[1]The University of Akron, United States; [2]Bendix Commercial Vehicle Systems, United States

Analysis of Radial Force Ripple with Sensor Errors and its Effect in NVH Performance for SRMs [#1532]

Omer Gundogmus, Anik Chowdhury, Abdul Wahab Bandarkar, Lavanya Vadamodala, Md Ehsanul Haque, Yilmaz Sozer
The University of Akron, United States

Vibrations and Acoustic Noise Analyses of Modular SPM Machines [#0121]

Guang-Jin Li[1], Xiao-Bin Liang[2], Zi-Qiang Zhu[1], Javier Ojeda[3], Mohamed Gabsi[3]
[1]The University of Sheffield, United Kingdom; [2]State Grid Sichuan Electric Power Institute, China; [3]École Normale Supérieure Paris-Saclay, France

Current Profile Optimization Method for Simultaneous DC-Link Current Ripple and Acoustic Noise Minimization in Switched Reluctance Machines [#1535]

Omer Gundogmus[1], Md Ehsanul Haque[1], Lavanya Vadamodala[1], Abdul Wahab Bandarkar[1], Anik Chowdhury[1], Yilmaz Sozer[1], Fernando Venegas[2], David Colavincenzo[2]
[1]The University of Akron, United States; [2]Bendix Commercial Vehicle Systems, United States

Comparison of Frequency Responses of the Motors with Bearing Voltage Reduction Structures [#0455]

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

Evaluation of Bearing Voltage Reduction in Electric Machines by using Insulated Shaft and Bearings [#1468]

Peng Han[1], Greg Heins[2], Dean Patterson[2], Mark Thiele[2], Dan M. Ionel[1]
[1]University of Kentucky, United States; [2]Regal Beloit Corp., Australia

Combined Numerical and Experimental Determination of Ball Bearing Capacitances for Bearing Current Prediction [#1471]

Peng Han[1], Greg Heins[2], Dean Patterson[2], Mark Thiele[2], Dan M. Ionel[1]
[1]University of Kentucky, United States; [2]Regal Beloit Corp., Australia

Session 50: Battery Management Systems
Chair(s): Jaber Abu Qahouq, Sheldon Williamson

Unbiased Model Identification and State of Energy Estimation of Lithium-Ion Battery [#1325]

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

Data-Driven Nonparametric Li-Ion Battery Ageing Model Aiming at Learning from Real Operation Data: Holistic Validation with EV Driving Profiles [#0418]

Mattin Lucu[1], Markel Azkue[1], Haritza Camblong[2], Egoitz Martinez-Laserna[1]
[1]Ikerlan Technology Research Centre, Spain; [2]University of the Basque Country, Spain

Li-Ion Battery State of Charge Estimation of Multi-Type Working Conditions using a Segmented Multiple Independent Forgetting Factors Recursive Least Squares Method [#0139]

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

Combined SOC and SOE Estimation of Lithium-Ion Battery for Electric Vehicle Applications [#0847]

Prashant Shrivastava, Tey Kok Soon, Mohd Yamani Idna Idris, Saad Mekhilef
University Malaya, Malaysia

Wireless Smart Battery Management System for Electric Vehicles [#1002]

Xinrong Huang[1], Anirudh Budnar Acharya[1], Jinhao Meng[2], Xin Sui[1], Daniel-Ioan Stroe[1], Remus Teodorescu[1]
[1]Aalborg University, Denmark; [2]Sichuan University, China

Comparison of Lithium-Ion Battery Pack Models based on Test Data from Idaho and Argonne National Laboratories [#0409]

Kevin Davis[1], John G. Hayes[2]
[1]Cork Institute of Technology, Ireland; [2]University College Cork, Ireland

The Effect of Pulsed Current on the Performance of Lithium-Ion Batteries [#1010]

Xinrong Huang[1], Yuanyuan Li[2], Jinhao Meng[3], Xin Sui[1], Remus Teodorescu[1], Daniel-Ioan Stroe[1]
[1]Aalborg University, Denmark; [2]University of Electronic Science and Technology, China; [3]Sichuan University, China

Bidirectional AC/DC Converter using GaN HEMT based Non-Isolated DAB for Battery Emulation [#1364]

Sanchit Mishra, T. Sreekanth, Ned Mohan
University of Minnesota, United States

Session 51: Power Converter Control
Chair(s): Frede Blaabjerg, Marco Liserre

Global Optimization for Dual Active Bridge Converters to Minimize RMS Current [#0620]

Ruoyu Li, Linghui Meng, Rongxin Chen, Han Yan, Zeliang Shu
Southwest Jiaotong University, China

Three-Phase-Four-Wire Three-Level Inverter with Neutral Inductor and Neutral Module for Saving AC-Filter-Inductances and DC-Link-Capacitances [#1322]

Li Zhang, Donghan Shi, Wentao Jiang, Tianbo Yang, Chi Jin, Yiming Zhang, Wai Kuan Loh, Yi Tang
Nanyang Technological University, Singapore

Systematic Finite-Control-Set Model Predictive Control Design with Unified Model for Isomorphic and Dual Power Converters [#1363]

Cheng Xue, Yuzhuo Li, Yunwei Li
University of Alberta, Canada

Optimized Cascaded Controller Design for a 10 kW/100 kHz Large Signal Bandwidth AC Power Source [#1561]

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

Inverter Nonlinearity Compensation of Discontinuous PWM Considering Voltage Drop of Power Semiconductor and Dead Time Effect [#1612]

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

Design of Harmonic Tolerant Mock-Up-Load for Distribution System Testbed [#0861]

Hitesh Kumar, Santanu K. Mishra, Mandeep Singh Rana
Indian Institute of Technology Kanpur, India

PI Controller Tuning Optimization for Grid-Connected VSC using Space Mapping [#0133]
Wesam Taha, Mohamed Bakr, Ali Emadi
McMaster University, Canada

Subsynchronous Resonance Analysis in Multi-Bus Multi-VSC Power System based on Two-Port Network Modeling Method [#0219]
Shih-Feng Chou, Xiongfei Wang, Frede Blaabjerg
Aalborg University, Denmark

Design of Control Architecture for Stacked Low-Inertia Converters with Fast Dynamic Control [#1303]
Xiangyu Han, Liran Zheng, Zheng An, Rajendra Prasad Kandula, Maryam Saeedifard, Deepak Divan
Georgia Institute of Technology, United States

Session 52: Multilevel Converters 4
Chair(s): John Shen, Hui Li

Optimized Circulating Current Control Method based on Proportional Resonant and Proportional Integral Controllers for Modular Multi-Level Converter Applications [#0789]
Semih Isik, Mohammed Alharbi, Subhashish Bhattacharya
North Carolina State University, United States

Modeling of MMC based High Power DC-DC Converter Controlled using Trapezoidal Modulation [#1449]
Mohd Shadab Ansari, Anshuman Shukla, Himanshu J. Bahirat
Indian Institute of Technology Bombay, India

Computationally Efficient Optimization Method for Model Predictive Pulse Pattern Control of Modular Multilevel Converters [#0321]
Wei Tian, Yuebin Pang, Xiaonan Gao, Qifan Yang, Ralph Kennel
Technical University of Munich, Germany

A Level-Increased MMC Topology and Modulation Strategy in DC Distribution Grids [#0625]
Jianye Tao, Chen Wang, Yi Wang, Tong Xu
North China Electric Power University, China

A New High-Frequency Multilevel Boost Power Factor Correction Approach with GaN Semiconductors [#0529]
Kevin C. Hodge, Erick I. Pool-Mazun, Jorge Ramos-Ruiz, Prasad Enjeti
Texas A&M University, United States

Flying Capacitor Voltages Estimation in Flying Capacitor Multilevel DC-DC Converters based on Peak Inductor Current Detection and Output Voltage Measurement [#0668]
Hongxiang Chen, Sai Tang, Zhong Zeng, Jun Wang
Hunan University, China

A Simplified Model Predictive Control Strategy for a Nine-Level Hybrid Multilevel Converter [#0681]
Yufei Li[1,2], Fei Diao[2], Yue Zhao[2]
[1]*Northwestern Polytechnical University-Xi'an, China;* [2]*University of Arkansas, United States*

A Five-Level Flying-DC-Source Multilevel Inverter with Self-Regulated Voltages and Boosting Capability [#0420]

Antonio Venancio de M. Filho[1], André Elias L. da Costa[1], Edison Roberto C. da Silva[1,2], Cursino Brandão Jacobina[1], Nady Rocha[2]
[1]Federal University of Campina Grande, Brazil; [2]Federal University of Paraíba, Brazil

Session 53: Design and Control of Electric Drives
Chair(s): Jul-Ki Seok, Kevin Lee

Analysis and Design of Spatial Six-Step Controllers for Permanent Magnet Synchronous Machines [#0386]

Marc S. Petit[1], Hao Zeng[2], Bulent Sarlioglu[2]
[1]Miller Electric Manufacturing, LLC, United States; [2]University of Wisconsin-Madison, United States

NVH Performance of Direct Flux Controlled Switched Reluctance Machine [#1569]

Okan Boler, 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 Tian[1], Qifan Yang[1], Xinyue Li[1,2], Xiaonan Gao[1], Xiao Chen[1], Ralph Kennel[1]
[1]Technical University of Munich, Germany; [2]Bosch 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

Optimal Super-Twisting Sliding-Mode Control using Adaptive Dynamic Programming for Uncertain Linear-Stage Considering PMSM Servo Drive Dynamics [#1332]

Fayez F.M. El-Sousy[1], Mahmoud M. Amin[2], Ghada A. Abdel Aziz[3],
Ahmed Al-Durra[4], Osama A. Mohammed[5]
[1]Prince Sattam bin Abdulaziz University, Saudi Arabia; [2]Manhattan College, United States;
[3]Electronics Research Institute, Egypt; [4]Khalifa University, United Arab Emirates;
[5]Florida International University, United States

Power Converter Topology and Control Strategy for Novel Two-Phase DC-Biased Vernier Reluctance Machine [#1276]

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

Auto Tuning Method to Identify Motor Stator and Rotor Parameter in Field-Orientation-Controlled Induction Motor [#0474]

Masaki Nagataki[1], Keiichiro Kondo[1], Osamu Yamazaki[2], Kazuaki Yuki[2], Yosuke Nakazawa[2]
[1]Waseda University, Japan; [2]Toshiba Infrastructure Systems and Solutions Corp., Japan

Winding Inductance Estimations in Air-Cored Resonant Induction Machines [#1290]

Zhao Jin[1], Matteo F. Iacchetti[1], Alexander C. Smith[1], Rajesh P. Deodhar[2], Yoshiyuki Komi[3],
Ahmad Abduallah[2], Chiaki Umemura[3]
[1]The University of Manchester, United Kingdom; [2]IMRA Europe S.A.S. UK Research Centre, United Kingdom; [3]Aisin Seiki Co., Ltd., Japan

A Non-Invasive Dual-EKF-Based Rotor Temperature Estimation Technique for Permanent Magnet Machines [#0360]
Tianze Meng, Pinjia Zhang
Tsinghua University, China

On-Line Stator Resistance Estimation of Vector-Controlled Synchronous Reluctance Motors using Inductance Information [#1365]
Shu Yamamoto[1], Hideaki Hirahara[1], Ryotaro Eto[2]
[1]Polytechnic University, Japan; [2]Wakayama Polytechnic Center, Japan

Accurate Capacitance Calculation of Multi-Layer Foil Windings in a Medium/High-Frequency High-Power Transformer [#1172]
Annoy Kumar Das, Baylon G. Fernandes
Indian Institute of Technology Bombay, India

Session 54: Power Converter EMI
Chair(s): David Perreault, Bilal Akin

Electromagnetic Interference Spectrum Steering Technique using Switching Angle Modulation in DC-DC Converters [#1526]
Le Yang, Shuo Wang
University of Florida, United States

Modeling, Design, and Implementation of a Novel Transformer-Less Feedforward-Controlled Active EMI Filter for AC-DC Power Converters [#0980]
Zhe Zhang[1], Ali M. Bazzi[1,2]
[1]University of Connecticut, United States; [2]American University of Beirut, Lebanon

Design and Implementation of Selective Active EMI Filter with Digital Resonant Controller [#1070]
Hongwu Peng, Balaji Narayanasamy, Asif Imran Emon, Zhao Yuan, Mustafeez Ul Hassan, Fang Luo
University of Arkansas, United States

A Novel Simulation Model for Common-Mode Inductors based on the Permeance-Capacitance Analogy [#0862]
Shotaro Takahashi[1], Satoshi Ogasawara[2]
[1]Tokyo Metropolitan University, Japan; [2]Hokkaido University, Japan

Analysis of Conducted Electromagnetic Noise Spectra Reduction for Flyback Converter using Frequency Dithering Technique [#0179]
Rong Huang[1], Qing Ji[1], Lihong Xie[2], Min Cheng[1]
[1]Soochow University, China; [2]Bristol University, United Kingdom

Conducted EMI Suppression using Power Semiconductor Filter in Fixed-Frequency Operation [#0178]
Kun Zhang, John Wing-To Fan, Chung-Pui Tung, Henry Shu-Hung Chung
City University of Hong Kong, China

Near Field Coupling's Impact on Radiated EMI and Mitigation Techniques for Power Converters in Automotive Applications [#0030]
Juntao Yao[1], Shuo Wang[1], Zheng Luo[1]
[1]University of Florida, United States; [2]Monolithic Power Systems, Inc., United States

Investigation and Reduction of Near Electric Field Emitted from a Helical Inductor [#1492]
Mohamed El-Sharkh, Shuo Wang, Boyi Zhang
University of Florida, United States

Session 55: Predictive Control
Chair(s): Sheng Zheng, Yuhua Du

Proportional Integral Finite Set Model Predictive Control for a Transformer-Less Compact Multilevel Active Power Filter [#1552]
Mohammad Babaie, Mohammad Sharifzadeh, Kamal Al-Haddad
École de Technologie Supérieure, Canada

A New Constant Switching Frequency Model Predictive Control Method for Grid Connected 5-level ANPC Inverter with Capacitors Sensor-less Voltage Balancing [#1330]
Mostafa Abarzadeh[1], Nathan Weise[1], Liuchen Chang[2], Kamal Al-Haddad[3]
[1]Marquette University, United States; [2]University of New Brunswick, Canada;
[3]École de Technologie Supérieure, Canada

Model Predictive Control of Step-Up Matrix Converters [#0543]
Vladimir Blasko[1], Mahmoud El Chamie[1], Boran Fan[2], Rolando Burgos[2]
[1]Raytheon Technologies Research Center, United States; [2]Virginia Polytechnic Institute and State University, United States

Model-Free Predictive Current Control for Three-Phase Power Converters with LCL Filter [#0578]
Xiang Liu[1], Yongchang Zhang[1], Haitao Yang[1], Jose Rodriguez[2]
[1]North China University of Technology, China; [2]Universidad Andres Bello, Chile

Large Signal Stability Analysis of DAB Converter using Moving Discretized Control Set – Model Predictive Control [#0294]
Luca Tarisciotti[1], Linglin Chen[2], Shao Shuai[3], Tomislav Dragicevic[4]
[1]Universidad Andres Bello, Chile; [2]Huawei Technologies, China; [3]Zhejiang University, China;
[4]Technical University of Denmark, Denmark

A High Performance Feedback Quantized Predictive Control of Induction Machine Drives [#0840]
S.M. Muslem Uddin, Galina Mirzaeva
The University of Newcastle, Australia

A Two-Step Reference Prediction Method for Predictive Current Control of Active Power Filters [#0909]
Haitao Yang, Bingyu Li, Yongchang Zhang
North China University of Technology, China

Model-Free Predictive Current Control of PWM Rectifier under Unbalanced and Distorted Network [#0471]
Yongchang Zhang, Li Bingyu, Jie Liu, Xiang Liu
North China University of Technology, China

Session 56: Dual Active Bridge
Chair(s): Qingyun Huang, Qiang Li

An Alternative Dual Active Bridge Modulation to Minimize RMS Current and Extend ZVS Range [#1337]

Faizah Zahin[1], Alireza Abasian[2], S. Ali Khajehoddin[1]
[1]University of Alberta, Canada; [2]University of Lorraine, France

Small Signal Model of Dual Active Bridge Converter for Multi-Phase Shift Modulation [#1043]

Md Safayatullah, Issa Batarseh
University of Central Florida, United States

Internal Model based PID Tuning of a Phase-Shift Control in a Single-Phase Bidirectional Dual Active Bridge DC-DC Converter [#1462]

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

Design Considerations for PPS Controlled Current-Fed DAB Converter to Achieve Full Load Range ZVS with Low Inductor RMS Current [#0546]

Jing Guo, Hua Han, Guo Xu, Zhiqiang Cai, Hui Wang, Yao Sun, Mei Su
Central South University, China

Adaptive Modulation of a CLC-Resonant DAB Converter for Wide Range ZVS Operation with Minimum Reactive Circulating Power [#1554]

C.A. Teixeira, R.H. Wilkinson, L.D. James, B.P. McGrath, D.G. Holmes
RMIT University, Australia

Analytical Modelling and Control of Dual Active Bridge Converter Considering all Phase-Shifts [#1477]

Muhammad Faisal Fiaz[1], Sandro Calligaro[1], Roberto Petrella[2]
[1]Free University of Bolzano-Bozen, Italy; [2]University of Udine, Italy

A Medium Voltage Dual Active Bridge Converter based on Gen-3 10 kV SiC MOSFETs [#1523]

Anup Anurag[1], Nithin Kolli[1], Sayan Acharya[2], Subhashish Bhattacharya[1], Todd R. Weatherford[3], Andrew Parker[3]
[1]North Carolina State University, United States; [2]ABB US Corporate Research Center, United States; [3]Naval Postgraduate School, United States

Design of 1500V/200kW 99.6% Efficiency Dual Active Bridge Converters based on 1700V SiC Power MOSFET Module [#1150]

Wei Xu, RuiYang Yu, Zhicheng Guo, Alex Q. Huang
The University of Texas at Austin, United States

Design Optimization for Weighted Conduction Loss Minimization in a Dual-Active-Bridge-Based PV Microinverter [#0752]

Michael D'Antonio, Shiladri Chakraborty, Alireza Khaligh
University of Maryland, United States

Session 57: Protection Devices and Solid State Circuit Breakers
Chair(s): John Shen, Oscar Lucia

Main Breaker Switching Control and Design Optimization for a Progressively Switched Hybrid DC Circuit Breaker [#1409]
Md Rifat Kaisar Rachi, Iqbal Husain
North Carolina State University, United States

Accelerated Aging Test of Solid-State DC Circuit Breaker based on 2.5kV Reverse Blocking IGCT [#0506]
Rostan Rodrigues[1], Utkarsh Raheja[1], Pietro Cairoli[1], Luca Raciti[2], Antonello Antoniazzi[2]
[1]ABB Inc., United States; [2]ABB S.p.A, Italy

Optimal Design of a Novel High-Power Thyristor-Based DC Circuit Breaker [#1604]
Siavash Beheshtaein, Mandana Saravani, Farzad Banihashemi, Robert Cuzner
University of Wisconsin-Milwaukee, United States

Experimental Validation of Parallel Connection of RB-IGCTs for High Efficiency Solid State Circuit Breaker [#0521]
Yuzhi Zhang[1], Utkarsh Raheja[1], Rostan Rodrigues[1], Pietro Cairoli[1], Luca Raciti[2], Antonello Antoniazzi[2]
[1]ABB Inc., United States; [2]ABB S.p.A., Italy

Evaluate I^2t Capability of SiC MOSFETs in Solid State Circuit Breaker Applications [#1402]
Zhou Dong[1], Ren Ren[1], Fred Wang[1,2]
[1]The University of Tennessee, United States; [2]Oak Ridge National Laboratory, United States

High Current Medium Voltage Bidirectional Solid State Circuit Breaker using SiC JFET Super Cascode [#1292]
Utkarsh Mehrotra, Bahji Ballard, Douglas C. Hopkins
North Carolina State University, United States

Lightning Impulse Protection for Grid-Connected Solid-State Transformers [#0547]
Chunmeng Xu, Jia Wei, Liran Zheng, Xiangyu Han, Maryam Saeedifard, Rajendra Prasad Kandula, Karthik Kandasamy, Deepak Divan, Lukas Graber
Georgia Institute of Technology, United States

Smart Plug 2.0: Solid State Smart Plugs Preventing Fire and Shock Hazards in Smart Homes and Offices [#1182]
Zhixi Deng, Yuanfeng Zhou, Risha Na, Z. John Shen
Illinois Institute of Technology, United States

Session 58: IPM and PM Motor Drives
Chair(s): David Diaz Reigosa, Paolo Pescetto

Analysis of Implementation Methodologies of Deadbeat Direct-Torque and Flux Control (DB-DTFC) for IPMSMs in Stationary and Rotatory Reference Frames [#0644]
Daniel E. Gaona[1], Hadi El Khatib[2], Teng Long[1], Michael Saur[3]
[1]University of Cambridge, United Kingdom; [2]Bundeswehr University-Munich, Germany; [3]Audi AG, Germany

MTPA Tracking Algorithms for IPMSMs and SynRMs: Accurate Evaluation and Adaptive Tuning of Real Signal Injection and Virtual Signal Injection [#1156]

Sandro Calligaro[1], Davide Marzona[2], Roberto Petrella[2], Amir Shahdadi[2]
[1]Free University of Bozen, Italy; [2]University of Udine, Italy

Overmodulation Strategy for Deadbeat-Flux and Torque Control of IPMSM with Flux Trajectory Control in the Stationary Reference Frame [#0645]

Daniel E. Gaona[1], Hadi El Khatib[2], Teng Long[1], Michael Saur[3]
[1]University of Cambridge, United Kingdom; [2]Bundeswehr University-Munich, Germany;
[3]Audi AG, Germany

A Novel Method for Measuring High Frequency DQ-Axis and Cross-Coupling Inductances in Interior Permanent Magnet Synchronous Machines [#0016]

B. Shuang, Z.Q. Zhu
University of Sheffield, United Kingdom

Enhancement of Disturbance Rejection Capability in Dual Three Phase PMSM System by using Virtual Impedance [#0490]

Luocheng Yan[1], Ziqiang Zhu[1], Ji Qi[1], Yuan Ren[2], Chengwei Gan[2], Simon Brockway[2], Chris Hilton[2]
[1]University of Sheffield, United Kingdom; [2]Protean Electric, United Kingdom

Magnet Temperature Estimation in Variable Leakage Flux Permanent Magnet Synchronous Machines using the Magnet Flux Linkage [#0592]

Diego F. Laborda[1], David Díaz Reigosa[1], Daniel Fernández[1], Kensuke Sasaki[2], Takashi Kato[2], Fernando Briz[1]
[1]University of Oviedo, Spain; [2]Nissan Motor Co. Ltd., Japan

Power Hardware-in-the-Loop based Emulation of an Open-Winding Permanent Magnet Machine [#0411]

K.S. Amitkumar, Pragasen Pillay
Concordia University, Canada

Electric Drives with Wide Bandgap Devices for Two-Phase Very Low Inductance Machines [#1466]

Yibin Zhang, Damien Lawhorn, Peng Han, Aaron M. Cramer, Dan M. Ionel
University of Kentucky, United States

Session 59: Modelling and Stability of Converters and Systems
Chair(s): Ke Ma, Yi Tang

Soft Startup Strategies for DAB-Based DCX in Composite Converters [#0832]

Yucheng Gao, Vivek Sankaranarayanan, Robert W. Erickson, Dragan Maksimovic
University of Colorado-Boulder, United States

Small-Signal Dynamic and High-Bandwidth Design of LLC Resonant Converter [#0530]

Yi-Hsun Hsieh, Fred C. Lee
Virginia Polytechnic Institute and State University, United States

Scalable State-Space Model of a Voltage Source Converter for Low-Frequency Stability Analysis [#1013]

Federico Cecati[1], Rongwu Zhu[1], Marius Langwasser[1], Marco Liserre[1], Xiongfei Wang[2]
[1]Christian-Albrechts-Universität Kiel, Germany; [2]Aalborg University, Denmark

A Master-and-Slave Resonant Tank Switch approach to Effectively Reduce Frequency Range in LCC Converter [#0395]

Zhipeng Cheng[1], Han Peng[1], Jimin Chen[1], Yong Kang[1], Jinglin Wu[2], Xu Chu[2]
[1]Huazhong University of Science and Technology, China; [2]United Imaging Healthcare Co., China

A General Interpolated Model for Voltage Source Converters in Real-Time Simulation and HIL Test Applications [#0747]

Wei Li, Fei Zhang
OPAL-RT Technologies, Canada

Holistic Small-Signal Modeling and AI-Assisted Region-Based Stability Analysis of Autonomous AC and DC Microgrids [#1549]

Yuxi Men[1], Lizhi Ding[1], Yuhua Du[1], Xiaonan Lu[1], Dongbo Zhao[2], Yue Cao[3]
[1]Temple University, United States; [2]Argonne National Laboratory, United States;
[3]Oregon State University, United States

Transfer Learning for Identifying Impedance Estimation in Voltage Source Inverters [#0857]

Mengfan Zhang[1], Xiongfei Wang[1], Dongsheng Yang[2], Zihao Cui[1], Mads Græsbøll Christensen[1]
[1]Aalborg University, Denmark; [2]Eindhoven University of Technology, Netherlands

Stability-Oriented Resonant Parameter Design for CLLC-Type Resonant Dual Active Bridge Converter with Swarm Intelligence [#0583]

Fanfan Lin[1], Xin Zhang[2], Xinze Li[1]
[1]Nanyang Technological University, Singapore; [2]Zhejiang University, China

AC Impedance Characterization of a PV Inverter with Grid-Forming Control [#1000]

Rebecca Rye, Rolando Burgos, Ye Tang, Qing Lin, Dushan Boroyevich
Virginia Polytechnic Institute and State University, United States

Data-Driven based Control Applied to DC Network Converters for Voltage Bus Stabilization [#0298]

J. Loranca-Coutiño[1], C.V. Villarreal-Hernandez[1], O.F. Ruiz-Martinez[2], J.C. Mayo-Maldonado[1],
J.E. Valdez-Resendiz[1], G. Escobar[1], J.C. Rosas-Caro[2], Daniel Guillen[1]
[1]Tecnologico de Monterrey, Mexico; [2]Universidad Panamericana, Mexico

Analysis and Minimization of Neutral Point Current Deviation in Grid Tied 3-Level NPC Converter under Various Grid Fault Conditions [#1344]

Jaehoon Choi, Yongsug Suh
Chonbuk National University, Korea

Small Signal Stability Analysis of Parallel Connected Grid-Tied Inverters with Direct and Self Synchronisation of the Phase Locked Loop [#1485]

Peishuo Mu, Brendan McGrath, Donald Grahame Holmes, Carlos Teixeira
RMIT University, Australia

Accurate PWM Model of Multi-Updated L-filtered Voltage-Source Converters [#1260]

Yangwen Wang, Zheming Jin, Xiongfei Wang
Aalborg University, Denmark

Session 60: Multilevel Converter Control
Chair(s): Tiefu Zhao, Kyo-Beum Lee

Dead-Time Effect Compensation of a 5-Level ANPC WBG Inverter for High Power Density Aviation Applications [#0764]

Dongwoo Han[1], Bokang Zhou[1], Fang Z. Peng[1], Suman Dwari[2]
[1]Florida state University, United States; [2]Raytheon Technologies Research Center, United States

Dual-Loop High Speed Voltage Balancing Control for High Frequency Four-Level GaN Totem-Pole PFC with Small Flying Capacitors [#1056]

Qingxuan Ma, Qingyun Huang, Alex Q. Huang
The University of Texas at Austin, United States

WBG Fractional Power Processing: A New Si-SiC Hybrid Voltage Source Inverter Design [#1229]

Aritra Kundu, Risha Na, Asim Amir, Yuanfeng Zhou, Ian P. Brown, Z. John Shen
Illinois Institute of Technology, United States

Hybrid Modulation Method for Nearest-Level-Control-Based MMC to Suppress DC Power Fluctuation when Enabling Circulating Current Suppression [#1520]

Bin He, Ke Ma, Xikai Xin, Weiyao Wang
Shanghai Jiao Tong University, China

Improvement of the Commandability Zones of a Modular DC-DC Converter based on a Three-Level Boost Converter [#1416]

Mohammad Afkar[1], Roghayeh Gavagsaz-Ghoachani[1], Matheepot Phattanasak[2], Jean-Philippe Martin[3], Serge Pierfederici[3]
[1]Shahid Beheshti University, Iran; [2]King Mongkut's University of Technology North Bangkok, Thailand; [3]Université de Lorraine, France

Indirect Model Predictive Control for a Grid-Tied Three-Level Neutral Point Clamped Converter with an *LCL* Filter [#0863]

Mattia Rossi[1], Petros Karamanakos[2], Francesco Castelli-Dezza[1]
[1]Politecnico di Milano, Italy; [2]Tampere University, Finland

New Modulation Technique for Five-Level Interleaved T-Type Inverters for Switching Loss Reduction [#0014]

Dereje Woldegiorgis, Yuqi Wei, Haider Mhiesan, Alan Mantooth
University of Arkansas, United States

Multilevel Converter for Variable Speed Medium-Voltage Switched Reluctance Motor Drives [#1037]

Ahmed Shehada[1], R. Krishnan[2], Abdul R. Beig[1]
[1]Khalifa University, United Arab Emirates; [2]Virginia Polytechnic Institute and State University, United States

Session 61: Digital Control Implementation and Testing
Chair(s): Issa Batarseh, Daniel Costinett

A Digital Single Period Control Method for Single-Inductor Dual-Output DC-DC Buck Converter [#0203]

Daying Sun, Chao Huang, Chong Wang, Cong Xu, Wenhua Gu
Nanjing University of Science and Technology, China

Control Strategies for a Unified Power Quality Conditioner with Hybrid Energy Storage in a Low-Voltage Distribution Network [#0988]

Jose M. Piedra[1], Pablo Garcia[2], Ramy Georgious[2], Miguel Crespo[3]
[1]Gesinne S.L., Spain; [2]University of Oviedo, Spain; [3]Cegasa Energía, S.L.U., Spain

Robust Control based on Flatness Properties for a DC-DC Switching Power Converter [#1199]

Roghayeh Gavagsaz-Ghoachani[1], Matheepot Phattanasak[2], Jean-Philippe Martin[3], Serge Pierfederici[3]
[1]Shahid Beheshti University, Iran; [2]King Mongkut's University of Technology North Bangkok, Thailand; [3]Université de Lorraine, France

Reduction of Capacitance in Four-Switch Quasi-Switched Boost Inverter using Low-Frequency Ripple Damping Scheme [#0946]

Pramit Nandi, Ravindranath Adda
Indian Institute of Technology Guwahati, India

Overall Interleaved Boost Converter Multiple-Objective Optimization Design based on NSGA2 Algorithm [#0811]

Guanliang Liu, Weiyang Zhou, Qunfang Wu, Mengqi Wang
University of Michigan-Dearborn, United States

Design Issues for Real-Time PMSM Power-Hardware-in-the-Loop: Analysis at Switching Frequency [#1480]

L. Bigarelli[1], M. di Benedetto[1], A. Lidozzi[1], F. Crescimbini[1], P.J. Grbović[2]
[1]Roma Tre University, Italy; [2]University of Innsbruck, Austria

Design Issues for a Real-Time PMSM Power-Hardware-in-the-Loop: Analysis at Fundamental Frequency [#1483]

L. Bigarelli[1], M. di Benedetto[1], A. Lidozzi[1], L. Solero[1], P.J. Grbović[2]
[1]Roma Tre University, Italy; [2]University of Innsbruck, Austria

Accurate Small-Signal Discrete-Time Model of Dual Active Bridge using Saltation Matrices [#1181]

Rahul Mallik, Andrew M. Pace, Samuel A. Burden, Brian Johnson
University of Washington, United States

Session 62: Electric Drivetrains
Chair(s): Prerit Pramod, Taehyung Kim

Optimum PWM Switching Mode Selection of Dual Inverter-Fed Open Winding IPMSM Drive System for High-Power Premium Class EV [#0624]

Hiroaki Matsumori[1], Yuki Makimura[1], Soshi Morishita[1], Yuto Maeda[1], Takashi Kosaka[1], Nobuyuki Matsui[1], Naoto Saito[2], Yoshinobu Ito[2], Subrata Saha[2]
[1]Nagoya Institute of Technology, Japan; [2]Aisin-AW Co., Ltd., Japan

Discrete-Time Torque Control of High-Speed SPM Machine for Aircraft Electric Propulsion [#1433]

Hao Zeng, James Swanke, Dheeraj Bobba, Bulent Sarlioglu, Thomas M. Jahns
University of Wisconsin-Madison, United States

An Improved Direct Torque Control with Battery Power Management of Open-End Winding Induction Motor Drive for Electric Vehicles [#0937]

Utkal Ranjan Muduli[1,2], Abdul R. Beig[2], Khaled Al Jaafari[2], Jamal Y. Alsawalhi[2], Ranjan Kumar Behera[1]
[1]Indian Institute of Technology Patna, India; [2]Khalifa University, United Arab Emirates

Comparison of IGBT and SiC Inverter Loss for 400V and 800V DC Bus Electric Vehicle Drivetrains [#1452]

Alexander Allca-Pekarovic[1], Phillip J. Kollmeyer[1], Parisa Mahvelatishamsabadi[1], Tissa Mirfakhrai[2], Payam Naghshtabrizi[2], Ali Emadi[1]
[1]McMaster University, Canada; [2]Eaton Research Laboratories, United States

Control of Boost Converter Module for Open-End Winding Permanent Magnet Motor Based, Dual Inverter Drive [#0076]

Ryan Brody, Brandon M. Grainger
University of Pittsburgh, United States

Half Bridge Sub-module Based Modular Multilevel Converter in 50Hz/50Hz Railway Continuous Co-phase Power Supply Application [#1282]

Ziming Li[1], Xiaoqian Li[1], Yingdong Wei[1], Chao Lu[1], Zhuoxuan Shen[1], Mingrui Li[1], Yunzhi Lin[2], Zengqin Li[3]
[1]Tsinghua University, Dept. of Electrical Eng., China; [2]China Railway Electrification Engineering Group, China; [3]China Railway Electric Industry Co., Ltd, China

A Turboelectric Distributed Propulsion based on Brushless Doubly-Fed Machines [#1270]

Peng Peng[1], Julia Zhang[1], Adam Brugmann[2], Lloyd Utt[2], Xiaodan Wang[1], Boxue Hu[1], Eric Kline[2], Longya Xu[1], Jin Wang[1]
[1]The Ohio State University, United States; [2]Safran Group, United States

Modeling of Negative Resistance Converter Traction Power System [#0305]

Zhan Shang, Xiaofeng Yang, Jingda Gu, Trillion Q. Zheng
Beijing Jiaotong University, China

On-Line Detection of Dc Arc Faults using Hurst Exponents for Hybrid-Electric Vehicles [#0976]

Benjamin Shaffer[1], Yousef Abdullah[1], Jin Wang[1], Babak Arfaei[2], Matt Volpone[2]
[1]Ohio State University, United States; [2]Ford Motor Co., United States

Disturbance Rejection Ability Enhancement using a Repetitive Observer in Phase-Locked Loop for More Electric Aircraft [#0493]

Mi Tang[1], Stefano Bifaretti[2], Sabino Pipolo[1], Andrea Formentini[1], Shafiq Odhano[3], Pericle Zanchetta[1,4]
[1]University of Nottingham, United Kingdom; [2]University of Rome Tor Vergata, Italy; [3]University of Newcastle, United Kingdom; [4]University of Pavia, Italy

Machine Learning Enabled Fast Multi-Objective Optimization for Electrified Aviation Power System Design [#0819]

Derek Jackson[1], Syrine Belakaria[2], Yue Cao[1], Janardhan Rao Doppa[2], Xiaonan Lu[3]
[1]Oregon State University, United States; [2]Washington State University, United States; [3]Temple University, United States

Recoverability of Shipboard MVdc Architectures [#1115]

Jacob Gudex, Mark Vygoder, Rounak Siddaiah, Robert M. Cuzner
University of Wisconsin-Milwaukee, United States