2024 IEEE 18th International Conference on Compatibility, Power Electronics and Power Engineering (CPE-POWERENG 2024)

Gdynia, Poland
24-26 June 2024

IEEE Catalog Number: CFP24851-POD
ISBN: 979-8-3503-1827-2

Copyright © 2024 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP24851-POD
ISBN (Print-On-Demand):	979-8-3503-1827-2
ISBN (Online):	979-8-3503-1826-5
ISSN:	2166-9538

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Enhancing Low Voltage Ride Through of Microinverters 1
Abdullah Berkay Bayindir, Ali Sharida, Sertac Bayhan, Haitham Abu-Rub

Maximum Attainable Phase Shift Angle in Practical Current Source Fed Semi-Active Rectifier 7
Andrey Vulfovich, Pavel Strajnikov, Alon Kuperman

Harmonic State and Power Flow Estimation in Distribution Systems Using Jaya Algorithm 13
Walace Do Nascimento Sepulchro, Lucas Frizera Encarnacao

Influence of Frequency of Current Feeding LED Modules on Their Electrical, Optical and Thermal Properties 19
Przemyslaw Ptak, Krzysztof Górecki

Reduced Switch Fault Tolerant Converter for an 8/6 SRM Drive with Multilevel Voltage Characteristics 25
V. Fernão Pires, Daniel Foito, A. J. Pires, Armando Cordeiro, J. F. Martins

Learning the Dynamics of Human Patterns for Autonomous Navigation 31
Ravi Raj, Andrzej Kos

A New Single-Switch Wide Voltage Gain Nonisolated DC-DC Buck-Boost Converter Integrating a Switched Inductor Network 37
V. Fernão Pires, Daniel Foito, Armando Cordeiro, J. Fernando Silva

Application of an Active DC Link to Commercial LED Driver 43
Pavel Strajnikov, Andrey Vulfovich, Vladimir Yuhimenko, Nissim Amar, Ilan Aharon, Alon Kuperman

Resonant DC Transformer for Grid-Interactive Energy Efficient Buildings 48
Edivan Laercio Carvalho, Andrei Blinov, Andrii Chub, Akshay Kumar Rathore, Dmitri Vinnikov

Efficiency Evaluation of a Modular Step-Down 48-to-1V Converter with Shared Load Current 54
Robert Stala, Zbigniew Waradzyn, Serhii Stepenko, Yevhenii Yatchenko, Anatoliy Prystupa

Thermal Management Experience in GaN-Based DC-DC Converter 60
Parham Mohseni, Oleksandr Husev, Dmitri Vinnikov

Partial Power Control with a Hybrid Solid State Transformer 66
Fádua Cozac, Thiago Silva Amorim, Lucas Frizera Encarnação

Framework for Risk Assessment of the Electrical Power Grid Under Extreme Weather Conditions 72
João Martins, Thomas Rijo, Adriana Mar, André César, Patricia Fortes, Teresa Calvão, Kashyap Raiyani, Pedro Pereira, V. Fernão Pires

DC-Ready Flyback-Based Micro-Converter 78
Hossein Afshari, Oleksandr Husev, Oleksandr Matiushkin, Dmitri Vinnikov, Carlos Roncero-Clemente

Interlinking Unipolar and Bipolar DC Microgrids Using a Bidirectional DC-DC Converter with Voltage Balancer Support 84
Armando Cordeiro, V. Fernão Pires, Daniel Foito, J. Fernando Silva

Selected Problems Related to On-Shore Power Supply for Sea-Going Ships 90
Kalina Detka, Adam Muc, Krzysztof Górecki

Assessment of Diagnostic Capabilities of Methods of Recreation of Voltage Fluctuations 95
Piotr Kuwalek

Laboratory Setup for Testing Low-Frequency Disturbances of Power Quality..... 101
Piotr Kuwalek, Grzegorz Wiczynski

Intelligent Battery Protection System for Electric Vehicle Applications 107
Abhinav Chinnusamy, Daniel Dsa, Satish Naik Banavath

A DC Link-Based Approach to Realize Zero Feed-in Under Both Static and Dynamic Power System Events 112
A. Paspatis, B. Adebisi, G. Orfanoudakis, K. Siderakis, E. Karapidakis, Nikos Hatziargyriou

Linkage of a Decentralised Green Energy Generation System to the Requirements of Railway Operations 118
Steffen Roth, Pietro Tricoli

Implementation of MPPT Hill Climbing Technique for Forward Based DC-DC Converter..... 124
Oleksandr Matiushkin, Oleksandr Husev, Enrique Romero-Cadaval, Carlos Roncero-Clemente

Grid-Connected PV System's Voltage Stabilisation Using Model Predictive Control Based MPPT During Abrupt Changes in Irradiance..... 130
Basit Ali, Adnan Ashraf, Mothanna S. A. Alsunjury, Pietro Tricoli

Software-Based Power Sharing Control in Parallel Dual-Output Phase-Shift Full-Bridge Converters 136
Lohith Kumar Pittala, Jiayi Geng, Sara Baldisserri, Riccardo Mandrioli, Mattia Ricco, Gabriele Grandi

Reducing Calculation Time in Finite-Set Model Predictive Control of Open-End Winding Synchronous Reluctance Motors 142
Mahdi S. Mousavi, S. Alireza Davari, Behnam Nikmaram, Abolfazl Nassaji, Freddy Flores-Bahamonde, José Rodríguez

Dc Leakage Current in Isolated Grid-Connected Dc Nanogrid - Origins and Elimination Methods 148
Mohammadreza Azizi, Oleksandr Husev, Oleksandr Veligorskyi, Marek Turzvnski, Ryszard Strzelecki

Modular DC/DC Boost Converter for Efficient and Ripple-Free Conversion in Fuel Cell-Based Powertrains..... 154
Paolo Pilati, Francesco Lo Franco, Vincenzo Cirimele, Valerio Mariani, Riccardo Mandrioli, Mattia Ricco

TCAD-Based Investigation of a 3.3 kV Planar SiC MOSFET: BV-RON Trade-Off Optimization 160
Ciro Scognamillo, Antonio Pio Catalano, Vincenzo D'Alessandro, Michele Riccio, Alessandro Borghese, Luca Maresca, Andrea Irace, Giovanni Breglio, Munaf Rahimo, Iulian Nistor, Marina Antoniou, Kyrylo Melnyk, Neophytos Lophitis

A Full Bridge Series-Series Resonant IPT System Optimized for Charging Electric Vehicle Batteries Across an Extensive Range 164
Dharavath Kishan, Marupuru Vinod, Andrii Chub

A Survey on Application of Artificial Intelligence Techniques in Microgrid Control 170
Javier Gutiérrez-Escalona, Carlos Roncero-Clemente, Oleksandr Husev, Eva González-Romera, María Isabel Milanés-Montero, Tomislav Dragicevic

Efficient Integration of BLDC Motors for Grid-Tied Solar PV Powered Water Pumping Sysytem 177
Geethu Krishnan, Moshe Sitbon, Shijoh Vellayikot

Active Power Cycling of SiC Modules Extended by Long-Term Monitoring of After Test 183
Sebastian Baba, Grzegorz Palesa, Jaroslaw Wisniewski, Filip Manka, Andrzej Gieraltowski

Stability Improvement of the Speed Observer of Induction Motor for Electric Vehicles 188
Lelisa Wogi, Marcin Morawiec, Tadele Ayana, Deepak Vyas, Roland Ryndzionek

Application of a HF Signal Injection Sensorless Method for an Extra Low Voltage PMSynRel 194
Hadj Ahmed Belghazali, Najla Haje Obeid, Ngoc-Tu Trinh, Lahoucine Id-Khajine, Eric Monmasson

A Grid-Tied AC Drive Using a Multilevel Topology Obtained from the Nine-Switch Converter 200
Joaquim Monteiro, V. Fernão Pires, J. Fernando Silva, Sónia Pinto

Comparative Evaluation of 12-Switch Single-Stage Bidirectional Isolated AC-DC Power Converters 206
Rafal Kopacz, Jacek Rabkowski

Implementation of Smooth Transitions for Grid Connected PV System Between the Operating Modes 213
Burak Onar, Ugur Fesli, Sevki Demirbas

Effect of Leakage Inductance Variation on Currents and Torque Pulsations of Induction Motor Under Subharmonics 219
Piotr Gnacnlski, Damian Hallmann

Model Predictive Control Method with Auto-Tuning Weighting Factor for Bidirectional DC-DC Battery Chargers 225
Naki Guler, Sertac Bayhan, Hasan Komurcugil

Deep Learning Based Phase Current Prediction Model in Three-Phase IGBT Two-Level Inverter for Electrical Drives 231
Murat Akin, Yavuz Canbay, Cemil Ocak

Advancing Solar Energy: Machine Learning Approaches for Predicting Photovoltaic Power Output 237
Kawsar Nassereddine, Marek Turzynski, Mykola Lukianov, Ryszard Strzelecki

Standardizing the Energy Storage Architecture for Battery Electric Vehicles 243
Olaseinde David Olagbegi, Mariusz Stepien, Pawel Lasek

A Current Control Method for an Interleaved Boost Converter Under CCM/DCM Operation in a PV System 249
Luis Martínez-Caballero, Radek Kot, Adam Milczarek, Mariusz Malinowski

Design of the LLC Filter for AC Grid-Based Converter 255
Arsalan Muhammad Soomar, Piotr Musznicki

Partially Isolated Multi-Active Bridge DC-DC Converter with Bidirectional EV Charging Ports 261
Mykola Lukianov, Enrique Romero Cadaval, Gabriele Arena, Ryszard Strzelecki

Feasibility Study of a DC House Connected to a Conventional AC Distribution Network 268
Hossein Nourollahi Hokmabad, Noman Shabir, Victor Astapov, Eduard Petlenkov, Oleksandr Husev, Juri Belikov

Short-Term Residental DC Load Forecasting Using Extreme Gradient Boost (XgBoost) Algorithm 274
Noman Shabbir, Oleksandr Husev, Kamran Daniel, Muhammad Jawad, Argo Rosin, Joao Martins

An Economical Optimization for the Participation of a Residential Microgrid in Flexibility Markets Providing Ancillary Services 280
Anas Abdullah Alvi, Eva González-Romera, Enrique Romero-Cadaval, Dmitri Vinnikov, María Isabel Milanés-Montero, Fermín Barrero-González

Model-Free Deep Reinforcement Learning-based Current Control for the Dual-Purpose Dc-dc/ac Power Converter 286
Javier Gutiérrez-Escalona, Carlos Roncero-Clemente, Oleksandr Husev, Oleksandr Matiushkin, Fermin Barrero-González, Eva González-Romera

Dead-Beat-based Model Predictive Current Control for the Dual-Purpose Dc-dc/ac PWM Modular Power Converter 292
Carlos Roncero-Clemente, Javier-Gutiérrez Escalona, V. Fernão Pires, Oleksandr Matiushkin, María Isabel Milanés-Montero, Enrique Romero-Cadaval

Estimation of Peak Voltage Value and Its Occurrence Timing Upon Non-Sinusoidal Supply Voltage 298
Kamran Daniel, Lauri Kütt, Muhammad Naveed Iqbal, Noman Shabbir, Marek Jarkovoi

Power Diode Packages with Embedded Microchannel Cooler: is Further Improvement Possible? 304
Ewa Raj, Salvatore Paciello

The Three-Phase Converter with Configurable DC Input and Multilevel AC Output 307
Adam Muc

Integrated Model Predictive Control of Permanent Magnet Synchronous Motor Drive Fed by a 3-Phase Interleaved Boost Converter 313
Reza Zolfagharian, S. Alireza Davari, Freddy Flores-Bahamonde, Jose Rodriguez

Filter-Less Sub-Multilevel DC/AC Power Converters for MV Connection 319
Javed Jamshed, Rosa Anna Mastromauro

Selecting Temperature Sensitive Parameter for a Transient Thermal Impedance Measurements of E-Mode Power GaN HEMT 326
Pawel Górecki

Multiport Current Fed Push/Pull Partial Power Converter for Battery Integration in DC Microgrid 331
Neelesh Yadav, Andrii Chub

Using Model-Free Predictive Current Control in the Quadratic Buck Converter for More Efficient Data Centers 337
F. Flores-Bahamonde, S. Alireza Davari, Mahdi S. Mousavi, Shirin Azadi, Carlos A. Torres-Pinzón, J. Rodríguez

Practical Cost Effectiveness Analysis for Solar Energy Systems: Case Study of Stand-Alone Retail Building 343
Inoussa Legrene, Tony Wong, Louis-A. Dessaint

Review and Outlook of Isolated Capacitive Coupling Based Converters 348
Saeid Pourjafar, Oleksandr Husev, Carlos Roncero-Clemente

Protection of Bidirectional Step-Up/Down Partial Power Converter Against Short Circuit and Open Circuit Faults and Mode Transition Issues 354
Naser Hassanpour, Andrii Chub, Andrei Blinov, Neelesh Yadav, Sayeed Hasan, Dmitri Vinnikov

Comparative Study of Possible Implementations of the Flexible Power Electronic Interface for Wide-Range High Step-Up Applications in DC Microgrid 360
Salman Khan, Andrii Chub, Dmitri Vinnikov, Matthias Kasper, Gerald Deboy

Influence of Battery Parameters in MMC-Based Fast Charging Stations with 400 V/800 V Charging Ports 366
Marzio Barresi, Edoardo Ferri, Luigi Piegari, Rafael Souza Baquero

Sliding Mode Control of a Single-Phase Grid-Connected VSI with LCL Filter : Single Sensor Approach for Controlling Current Injection into the Grid 373
Youssef Lamkharbach, Mohammed-Amine Mossadak, Ahmed Chebak, Ghassane Aniba

The Twelve-Pulse Controlled Rectifier with Magnetically Coupled Reactors for Powering Marine Electrical Equipment 381
Adam Muc, Andrzej Kasprowicz, Agata Bielecka, Piotr Mysiak, Jan Iwaszkiewicz

Study of Battery Energy Storage Operation in Droop-Controlled Residential DC Nanogrid 387
Sayeed Hasan, Andrii Chub, Dmitri Vinnikov, Andrei Blinov

Double Deep Q Networks Reinforcement Learning-Based Dynamic Weighting Factor of FCS-MPC for Multilevel Inverters 392
Alamera Nouran Alquennah, Mohammad Alshaikh Saleh, Haitham Abu-Rub, Ali Ghrayeb, Sertac Bayhan, Mohamed Trabelsi

Enhanced Switched Impedance Inverter with Tapped Inductor 399
Mohsen Hasan Babayi Nozadian, Naser Hassanpour, Salman Khan

Minimum DC Link Capacitance for a Family of Three-Phase Three-Level Grid-Connected Converters Operating with Arbitrary Power Factor 405
Yarden Siton, Martin Mellincovsky, Alon Kuperman

Envelope Modeling of Capacitor-Powered Resonant Inverter Feeding a Time-Varying Series RLC Load 411
Ohad Akler, Yarden Siton, Alon Kuperman

An Enhanced Predictive Control Scheme for Vehicle-To-Grid Integration During Voltage Sag 416
Anas Karaki, Sertac Bayhan, Mohammad Shadmand

A PINN-Based Lifetime Predictor for Oil-Impregnated Paper Insulation Degradation in Power Transformers Using Degree of Polymerization 422
Mohammad Alshaikh Saleh, Alamera Nouran Alquennah, Ali Ghrayeb, Shady S. Refaat, Haitham Abu-Rub, Mohammed Al-Hajri, Sunil P. Khatri, Marek Olesz, Jaroslaw Guzinski

Exploratory Data Analysis for the Techno-Economic Impact of Renewable Energy and Dynamic Line Rating on Grid Reliability 428
Olatunji Ahmed Lawal, Bader Alharbi, Jiashen Teh

Power Optimized PV Microinstallation in the Field Condition Tests 434
Maciej Sibinski, Szymon Rogowski

Series-Parallel Resonant Current-Source DC-DC Converter with Wide Output Voltage Range 439
Andrei Blinov, Edivan Laercio Carvalho, Ievgen Verbytskyi, Dmitri Vinnikov

Voltage Sag/Swell and Harmonics Compensation for Sensitive Loads: A Dynamic Voltage Restorer Approach with PI - Fuzzy Controller 445
Hafte Tkue Geberekidan, Getachew Hagos Geleta

Author Index