

2023 International Conference on Electrical Drives and Power Electronics (EDPE 2023)

**The High Tatras, Slovakia
25-27 September 2023**



**IEEE Catalog Number: CFP23EDQ-POD
ISBN: 979-8-3503-0000-0**

**Copyright © 2023 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:	CFP23EDQ-POD
ISBN (Print-On-Demand):	979-8-3503-0000-0
ISBN (Online):	979-8-3503-2275-0
ISSN:	2770-7644

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

Wide-Bandgap Semiconductors for Multilevel Inverters – a Comparison with Si IGBT	1
<i>Rudolf Mecke</i>	
Design of Headlight Power Electronic Supply for Automotive Applications.....	7
<i>Michal Frivaldsky, Pavol Spanik, Peter Drgona</i>	
MTPA Control Strategy for ALA Rotor SynRM Based on Reactive and Apparent Power Calculation Under Sensorless V/f Control with Stabilization	13
<i>Michal Vidlak, Sorin Agarlita, Ion Boldea</i>	
Tuning of Traction Power Station Converter Output Characteristics	19
<i>Petr Žižlavský, Ladislav Mlynárik</i>	
Emulation of Electrical Arc Furnace in Laboratory Conditions Using Measured Data from Real Furnace Operation	26
<i>Martin Bejvl, Miroslav Chomát, Petr Šimek, Martin Černan, Viktor Valouch</i>	
Possibilities of Permanent Magnet Synchronous Motor Efficiency Increasing Using Flux Weakening Method.....	32
<i>Oleg Sivkov, Jaroslav Novák, Martin Novák</i>	
BEV Energy Consumption Estimation for Route Planning.....	39
<i>Zdenek Mašek, Michal Závodník</i>	
High Bandwidth Integrator for Differential, PCB Integrated Rogowski Coils.....	48
<i>Markus Zocher, Veit Starost, Norbert Grass, Michael Schmidt, Timo Wilfling</i>	
Design and Analysis of the Characteristics of a Brushless Permanent Magnet Motor for Critical Drive.....	56
<i>Mariusz Korkosz, Krystyna Krzywdzinska-Kornak, Kamil Parfianowicz, Jan Prokop, Ihor Shchur</i>	
Analysis of the Characteristics of a Six-Phase Induction Motor	61
<i>Mariusz Korkosz, Andriy Kutsyk, Krystyna Krzywdzinska-Kornak, Marek Nowak, Mykola Semeniuk</i>	
Analysis of the Characteristics of a Dualchannel Three-Phase Induction Motor	67
<i>Mariusz Korkosz, Andriy Kutsyk, Krystyna Krzywdzinska-Kornak, Mateusz Suliga, Mykola Semeniuk</i>	
Online Stator and Rotor Resistance Estimation for Current Sensor Fault-Tolerant Control of Induction Motor Drives	73
<i>Michał Adamczyk, Teresa Orłowska-Kowalska</i>	
Dynamic Flux Balance Control of a Phase-Shifted Full Bridge.....	79
<i>Jan Martiš, Pavel Vorel, Radek Tománek</i>	
Low Input Voltage DC-DC Converter for Energy Harvesting Using Iron-Constantan Thermoelectric Cells	84
<i>Pavel Vorel, Jan Martiš, Tomáš Macík</i>	

Design of Piece-Wised Linearized Simulation Model of the Traction Inverter Suited for Efficiency Performance Evaluation	91
<i>Jakub Simcak, Michal Frivaldsky, Patrik Resutik</i>	
The Analysis, Modeling, and Control of the Forward DC/DC Converter	97
<i>Juraj Simko, Michal Prazenica, Roman Konarik</i>	
Signal Processing and Machine Learning Techniques for Predictive Maintenance of Rotor Bars in Induction Machine.....	103
<i>Karolina Kudelina, Hadi Ashraf Raja, Viktor Rjabtšikov, Muhammad Usman Naseer, Toomas Vaimann, Ants Kallaste</i>	
A New Quadratic Buck-Boost Converter	110
<i>Felix A. Himmelstoss, Johannes V. Gragger</i>	
Digital Twin of Wind Generator for Modelling Various Turbine Characteristics	116
<i>Hadi Ashraf Raja, Siarhei Autsou, Karolina Kudelina, Viktor Rjabtšikov, Toomas Vaimann, Ants Kallaste, Raimondas Pomarnacki, Van Khang Hyunh</i>	
Comparison of Bi-Directional DC/DC Converter Using Si and WBG Devices.....	121
<i>Kusuma Priya Krovi, Pavel Skarolek, Jan Bauer</i>	
Optimizing Constrained Series PIDA Controller for Speed Loops Inspired by Ziegler-Nichols	128
<i>Mikulas Huba, Pavol Bistak, Damir Vrancic</i>	
Experimental Verification of Neural Network-Based Fault Types Classifier for Current Sensors in Induction Motor Drive.....	134
<i>Krystian Teler, Maciej Skowron, Teresa Orlowska-Kowalska</i>	
Mission Profile Parameter Extraction for Automotive Body Power Devices with Rapid Control Prototyping Systems.....	142
<i>Andreas Warmuth, Alexander Ulbing, Markus Sievers</i>	
An Overview of Advanced Gate Driver Concepts for SiC Semiconductors	149
<i>Tomislav Ivaniš, Marinko Kovacic</i>	
An Impact of Model Accuracy on Control Performance in Finite Control Set Model Predictive Current Control for Reluctance Synchronous Motor.....	158
<i>Robert Surus, Mateusz Tejer, Lukasz J. Niewiara, Tomasz Tarczewski</i>	
Mutual Control of Interleaved and Single Phase DCDC Converters for Improved Light Load Efficiency and Peak Power Increase.....	165
<i>Kristians Gaspersons, Kaspars Kroics</i>	
Advantages of System Level Testing and Modelling for Automotive Smart Power Switches	172
<i>Dibakar Bala, Alexander Ulbing, Shivam Pathak</i>	
Energy Management Algorithm for Battery Sharing Based on Model Predictive Control Integrating Electro-Thermal Simulation and Demand Forecast.....	179
<i>Herbert Hackl, Manuel Freiberger, Philip Matzick, Martin Stoiber, Bernhard Auinger</i>	
Effect of Heat Treatment on Magnetic Properties of Selective Laser Melting Processed INVAR Alloy.....	186
<i>Miroslav Novák</i>	

Investigation of the Influence of Geometry of Wireless Power Transfer (WPT) Coupling Coils on Transmitting Performance	194
<i>Jakub Skorvaga, Patrik Resutik, Michal Frivaldský, Vladimír Kindl, Martin Zavrel</i>	
Electric Drive for the Looper of the Rolling Mill in Providing the Required Tension of the Metal Strip	199
<i>Victor Meshcheryakov, Evgenij Didenko, Vladislav Gladyshev, Elena Grachieva, Stanimir Valtchev, Rosario Miceli, Nicola Campagna</i>	
Dynamic Model of Five-Phase Induction Motor	205
<i>Pavel Záskalický, Ján Kanuch</i>	
Designing Automatic-Reset Controllers with Higher-Order Derivatives	211
<i>Mikulas Huba, Pavol Bistak, Damir Vrancic</i>	
Experimental Study on the Strength of Geared Motor Units by Using Vibration Spectrum	219
<i>Genadijs Kobenkins, Marks Marinbahs, Nikita Rilevs, Olegs Sliskis</i>	
The Use of Time Series Database in Measurements.....	224
<i>Simona Kirešová, Milan Guzan, Branislav Sobota, Viliam Fedák, Richard Baca, Daniel Bakší</i>	
BESS Application for Wireless Car Charging in Motion	232
<i>Rodions Saltanovs, Ilya Galkin</i>	
Modeling of Electromagnetic Phenomena in Small Hydroelectric Plants.....	238
<i>Pavol Fedor, Daniela Perdukova, Petr Bernat, Libor Stepanec, Viliam Fedak</i>	
Data Science-Based Techniques for Modelling and Diagnostics of Battery Cells Based on End-of-Life Criteria	245
<i>Rolando Antonio Gilbert Zequera, Anton Rassõlkin, Toomas Vaimann, Ants Kallaste</i>	
Torque Ripple Reduction Utilizing Pole-Shoe Extensions for a Traction Wound Field Synchronous Machine	251
<i>Branko Ban, Ian Brown Illinois, Anton Kersten, Lars Sjöberg, Tushar Batra</i>	
Analysis of the Heat Dissipation of Synchronous Motor with Reluctance Rotor with Goal of Power Density Increasing.....	259
<i>Ludmila Lavrinovica, Karlis Gulbis, Andrejs Podgornovs, Anatolijs Bižans</i>	
On the Design of an Islanding, Neutral Loss and Meter Tampering Detection Kit for Low Voltage Electrical Installations	264
<i>Nick Rigogiannis, Christos Pechlivanis, Andreas Tichalas, Nick Papanikolaou</i>	
Power Quality Measurements in Shipboard Microgrids: A Case Study	271
<i>Nick Rigogiannis, Ioannis Bogatsis, Christos Pechlivanis, Konstantinos Terzopoulos, Anastasios Kyritsis, Nick Papanikolaou, Michael Loupis</i>	
Experimental High-Voltage AC Generators for Cardiological Purposes	279
<i>Martin Folprecht, Dalibor Cervinka, Jiri Ctibor, Pavel Vorel, Martin Hemzal, Veronika Novotna</i>	
Analysis of Conducted Electromagnetic Interference in Bidirectional Interleaved DC-DC Converter	286
<i>Martin Makar, Martina Kutija, Marinko Kovacic, Tomislav Ivaniš</i>	
Drive Model for Kinetic Energy Storage System.....	293
<i>Jiří Kubín, Želma Ferková, Lukáš Krcmár</i>	

Nonlinear PMSM Model Implementation in MATLAB-Simulink for Sensorless Polarity Detection	298
<i>István Szalay, Dénes Fodor</i>	
Filament Dryer for FDM 3D Printing.....	308
<i>Ján Briežnik, Katarína Žáková, Mikuláš Huba</i>	
Overview of Active Balancing Methods and Simulation of Capacitor Based Active Cell Balancing for Battery Pack in EV	315
<i>Daniel Marcin, Milan Lacko, Dávid Bodnár, Lukáš Pancurák, Lukáš Stach</i>	
Simulation of a Hybrid Power Supply for Robotic Applications Depending on Storage Capacity.....	323
<i>Slavomír Kascák, Patrik Resutik, Michal Prazenica</i>	
Fuzzy Observer of Induction Motor Torque and Speed Based on Dynamic Filters	328
<i>Marek Fedor, Pavol Fedor, Daniela Perduková, Viliam Fedák</i>	
Neural Network Speed Controller for DC Motor	335
<i>Peter Girovský, Jaroslava Žilková, Marek Pástor, Ján Kanuch</i>	
On the Simulation of Bearing Faults in Induction Machines	341
<i>Florian Floh, Helmut Weiss</i>	
Power Control of Three Port MAB Converter.....	349
<i>Adrian Marcinek, Marek Pastor</i>	
Educational Model of Material Processing Line	357
<i>Pavol Smolen, František Durovský</i>	
Artificial Intelligence in Control of BLDC Motor.....	365
<i>Peter Girovský, Jaroslava Žilková, Marek Pástor, Ján Kanuch, Tadeáš Kmecík</i>	
Temperature Dependence of Li-Ion Battery Hysteresis for Battery Modeling Purposes.....	371
<i>Dávid Bodnár, Daniel Marcin, František Durovský</i>	
Automated Inductance and Resistance Measurement of Electric Motor Windings - An Engineering Guide	377
<i>Tomáš Basarik, Daniel Gordan, Viktor Šlapák, Marek Pástor</i>	
Optimization of Soft-Switching DC-DC Converter	382
<i>Marek Pastor, Jaroslav Dudrik, Adrian Marcinek</i>	
Rotary Shears Control in Material Processing Lines.....	387
<i>František Durovský, Viktor Šlapák, Pavol Smolen, Karol Kyslan, Emil Spišák</i>	
Finite Control Set Model Predictive Direct Speed Control of PMSM	396
<i>Lukáš Pancurák, Tomáš Jure, Karol Kyslan</i>	
Load Torque and Permanent Magnet Flux Linkage Estimation of Surface-Mounted PMSM by Using Unscented Kalman Filter	402
<i>Krisztián Horváth</i>	

Author Index