

# **2018 IEEE 3rd International Conference on Intelligent Energy and Power Systems (IEPS 2018)**

**Kharkiv, Ukraine  
10 – 14 September 2018**



**IEEE Catalog Number: CFP1805X-POD  
ISBN: 978-1-5386-9546-3**

**Copyright © 2018 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:	CFP1805X-POD
ISBN (Print-On-Demand):	978-1-5386-9546-3
ISBN (Online):	978-1-5386-9545-6

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# CONTENTS

## Section I. Modern Energy Systems & Power Electronics

<b>Optimal Components Design for Modified Z-source Based IPT Approach</b>	11
<i>Bohdan Pakhaliuk, Oleksandr Husev, Ryszard Strzelecki and Kostiantyn Tytelmaier</i>	
<b>Influence of Direct Lightning Strikes and Lightning Strikes Near Power Lines with Protected and Non-Insulated Wires</b>	17
<i>Sergey Shevchenko, Dmytro Danylchenko, Stanislav Dryvetskyi and Kseniia Minakova</i>	
<b>Design and Simulation Verification of Low Power Wireless Charging Battery System for Electric Bicycle</b>	22
<i>Viktor Shevchenko, Oleksandr Husev, Bohdan Pakhaliuk and Ihor Kondratenko</i>	
<b>The Efficient Power Supply Scheme of Alternating Current Electric Arc Furnaces</b>	28
<i>Anton Malinovskyi, Volodymyr Turkovskyi, Andrii Muzychak and Yurii Turkovskyi</i>	
<b>Voltage Harmonic Distortion In Autonomous Electric Power System With An Adjustable Power Line Conditioner</b>	33
<i>Oleksandr Zhuk, Dmytro Zhuk and Dmytro Kryvoruchko</i>	
<b>Intensification of Biogas Fermentation Processes in the Bioenergy System</b>	39
<i>Mykola.M Zablodskiy, Vitaliy Savchenko, Petr Klendiy and Vladyslav Pliuhin</i>	
<b>Maximum Permissible Value Correction for Dielectric Loss Tangent of 110 kV Air-Tight Bushing Basic Insulation Subject to Operational Factors Impact</b>	45
<i>Oleg Shutenko and Aleksandra Zagaynova</i>	
<b>Detection of Accident Causes on Turbine-Generator Sets by Means of Numerical Simulations</b>	51
<i>Andrey Rusanov, Gennadii Martynenko, Konstantin Avramov and Volodymyr Martynenko</i>	
<b>Modeling Of Electrical Supply Restoration In Local Electrical Systems After Loss Of Centralized Power</b>	55
<i>Petro Lezhnyuk, Serhii Kravchuk, Iryna Kotylko, Iryna Hunko and Natalia Sobchuk</i>	
<b>About Electromagnetic Compatibility of Rail Circuits With the Traction Supply System of Railway</b>	59
<i>Tetiana Serdiuk, Vitaliy Kuznetsov and Yevheniia Kuznetsova</i>	
<b>An Error Estimation Of The Current Sensors Of The Automated Control System Of The Technological Process Of Graphitization</b>	64
<i>Dmytro Yarymbash, Mikhaylo Kotsur, Serhiy Yarymbash and Iryna Kylymnyk</i>	
<b>Electromagnetic Parameters Determination of Power Transformers</b>	70
<i>Dmytro Yarymbash, Tetyana Divchuk, Mikhaylo Kotsur and Serhiy Yarymbash</i>	
<b>Parameters Determination of the Trolley Busbars by Electromagnetic Field Simulation</b>	76
<i>Dmytro Yarymbash, Mikhaylo Kotsur, Yulia Bezverkhnia, Serhiy Yarymbash and Igor Kotsur</i>	
<b>Analysis of Three-Phase Parallel Active Power Filter Operation Mode With Arc Furnace Active Power's Fluctuations</b>	80
<i>Ruslan Vlasenko, Olexiy Bialobrzheskyi and Andrii Gladyr</i>	
<b>Synchronous Mode Analysis of an Asynchronized Generator in the Scheme of Power Bridge "Ukraine-EU"</b>	
<i>Kostyantyn Pokrovskyy, Olherd Mavrin and Andrii Muzychak</i>	
<b>Mathematical Modelling of the Electric Field in Systems With Conductive Rods for Lightning Protection</b>	89
<i>Marina Rezinkina, Yevgen Sokol, Oleg Rezinkin and Svitlana Lytvynenko</i>	
<b>Determination of the Conditions of Inception of an Upward Leader From Grounded Objects in Thunderstorm Conditions</b>	93
<i>Marina Rezinkina, Oleg Rezinkin, Svitlana Lytvynenko, Boris Kubrik, Elena Svetlichnaya and Elena Sosina</i>	
<b>A Pulse-Width Regulation of a Compound Excitation System for a Synchronous Generator</b>	97
<i>Andriy Kutsyk, Mykola Semeniuk, Taras Galiantyi and Vasyl Tutka</i>	
<b>Estimation of Energy Efficiency of the Frequency Converter Based on the Resonant Inverter with Pulse-Density Control</b>	101
<i>Gennadiy Pavlov, Irina Vinnichenko and Mikhail Pokrovskiy</i>	

<b>Modeling and Active Shielding of Magnetic Field in Residential Buildings Located near Group of High Voltage Power Lines</b>	106
<i>Borys Kuznetsov, Tatyana Nikitina, Aleksandr Voloshko and Ihor Bovdui</i>	
<b>The Formed Autonomous Source For Power Supply of Single-Phase Consumers on the Basis of the Three-Phase Asynchronous Generator</b>	110
<i>Volodymyr Chenchevoi, Iurii Zachepa, Oleksii Chorny, Vita Ogar, Dmytro Shokarov and Nataliia Zachepa</i>	
<b>The Increase in Efficiency of the Modes Power Resources Consumptions of the Processing Equipment of the Enterprises of Oil-processing Industry</b>	116
<i>Dmytro Shokarov, Oleksandr Lazurenko, Halyna Cherkashyna and Viktoria Chorna</i>	
<b>Improvement of the Spectral Composition of the Input Currents of a Three-to-One-Phase Matrix Converter at Sector Boundaries</b>	121
<i>Svetlana Podnebennaya, Vladimir Burlaka and Sergey Gulakov</i>	
<b>Residential Uninterruptible Power Supply System with Renewable Energy Sources and Battery Pack</b>	125
<i>Vladimir Burlaka, Svetlana Podnebennaya and Sergey Gulakov</i>	
<b>Geomagnetic Induction Currents as the Factor of Automatic Disconnections in Trunk Transmission Lines 750 kV</b>	
<i>Valerii Kyryk and Bohdan Zhuk</i>	
<b>Load Characteristics of the Serial-to-serial Resonant Converter with Pulse-number Regulation for Contactless Inductive Energy Transfer</b>	133
<i>Pavlov Gennadiy, Mikhail Pokrovskiy and Irina Vinnichenko</i>	
<b>Combination of Distributed MPPT and Distributed Supercapacitor Energy Storage Based on Cascaded Converter in Photovoltaic Installation</b>	139
<i>Ihor Shchur, Daniel Kulwas and Robert Wielgosz</i>	
<b>Cell Equalizer for Series-connected Lithium Batteries</b>	145
<i>Bohdan Styslo, Vadym Makarov, Mykola Tymchenko, Viktoriia Varvianska, Serhii Kryvosheiev, Michael Shyshkin and Liudmyla Fetiukhina</i>	
<b>Experimental Research of Effectiveness of Active Shielding System of Overhead Transmission Lines Magnetic Field with Various Control Algorithms</b>	151
<i>Ihor Bovdui, Borys Kuznetsov, Aleksandr Voloshko and Tatjana Nikitina</i>	
<b>Full Soft Switching Dual DC/DC Converter With Four-Quadrant Switch for Systems With Battery Energy Storage System</b>	155
<i>Volodymyr Ivakhno, Volodymyr Zamaruev, Bohdan Styslo and Yevgen Sokol</i>	
<b>The Incentive Scheme for Maintaining or Improving Power Supply Quality</b>	161
<i>Oleksandr Miroshnyk, Oleksandr Savchenko and Irina Trunova</i>	

## Section II. Renewable Energy Systems & Distributed Generation

<b>Evaluation of the Small-Scale Wind Turbine Converter's Efficiency Built with Various Types of Semiconducting Devices</b>	166
<i>Stanislav Piriienko, Martin Neuburger, Po-Wen Cheng, Ulrich Ammann, Alexander Balakhontsev and Duleepa J. Thrimawithana</i>	
<b>Investigation of the Supernominal Power Throws Factors on the Wind Turbine With Variable Speed</b>	172
<i>Olga Pankova, Dmitry Alekseevskiy, Alexsandr Alyeksyeyev, Konstantin Turyshev and Sergey Shmaliy</i>	
<b>High-speed Flywheel Energy Storage System (FESS) for Voltage and Frequency Support in Low Voltage Distribution Networks</b>	176
<i>Shahab Karrari, Mathias Noe and Joern Geisbuesch</i>	
<b>Topological Task of Distributed Generation Placement Using a Pareto Optimization</b>	183
<i>Vadim Bodunov, Tetiana Kulko, Anatoliy Prystupa and Alexander Gai</i>	
<b>Criteria Based Assessment of the Level of Ecological Safety of Exploitation of Electric Generating Power Plant That Consumes Biofuels</b>	
<i>Olexander Kondratenko, Yana Suchikova, Igor Mishchenko, Gennadiy Chernobay and Yuriy Derkach</i>	

<b>Contribution of Small Hydropower Plants in Regulation of Electric Energy in Power System</b> <i>Oksana Dovgalyuk, Alexander Lazurenko and Sherali Saidov</i>	195
<b>Analysis of Modern Geoinformation Systems for Renewable Energy</b> <i>Pavlo Bezkostnyi and Oksana Dovgalyuk</i>	201
<b>Solving the Hydrodynamical Tasks Using CFD Programs</b> <i>Kseniya Rezvaya, Evgeniy Krupa, Aleksandr Shudryk, Viktor Drankovskiy and Vadym Makarov</i>	205
<b>Energy Co-ops as a Driver for Bio-energy Sector Growth in Ukraine</b> <i>Tetiana Kurbatova and Yevgeniy Hyrchenko</i>	210
<b>Selective Compensation of Current Harmonics in Grid-Connected Doubly-Fed Induction Generator based Wind Energy System</b> <i>Ivan Shapoval, Valerii Mykhalskyi, Volodymyr Sobolev, Vasyl Chopyk and Serhii Polishchuk</i>	214
<b>Forming of Current of the Single-Phase Grid Inverter of Local Combined Power Supply System with Photovoltaic Solar Battery</b> <i>Olexandr Shavolkin and Iryna Shvedchykova</i>	219
<b>The Development of Technology CdTe and CdS Layers for Thin-film Solar Cells Creation</b> <i>Eugen Sokol, Alina Khrypunova, Dmitriy Kudii and Maksim Khrypunov</i>	224
<b>The Optical and Electrical Properties ITO Thin Film</b> <i>Alina Khrypunova, Dmytro Kudii and Irina Khrypunova</i>	229
<b>Meteorological Parameters Analysis for Hourly Forecast of Electricity Generation by Photovoltaic Power Station on the Day Ahead</b> <i>Petro Lezhnyuk, Vyacheslav Komar, Serhii Kravchuk, Vladislav Lesko and Volodymyr Netrebkiy</i>	235

### Section III. Intelligent & Adaptive Systems in Smart Grid

<b>Intelligent Locomotive Decision Support System Structure Development and Operation Quality Assessment</b> <i>Oleksandr Gorobchenko, Oleksiy Fomin, Igor Gritsuk, Victoria Saravas, Yuriy Grytsuk, Mykola Bulgakov, Mykyta Volodarets and Dmitriy Zinchenko</i>	239
<b>Analysis of Efficiency Of Primary Load-Frequency Control of Integrated Power System of Ukraine</b> <i>Oleksandr Yandulskyi, Anatolii Marchenko and Volodymyr Hulyi</i>	244
<b>On the Influence of Electromagnetic Processes of Power Transformer on Parameters of Normal Regime of Electric Network Operation</b> <i>Igor Khomenko, Ivan Stasiuk and Sergey Iglin</i>	248
<b>Analyses of Energy Efficiency of Interleaving in Active Voltage-Source Rectifier</b> <i>Oleksandr Plahtii and Volodymyr Nerubatskyi</i>	253
<b>Six-Phase Multi-Inverter System with Power Balancing and Voltage Waveform Symmetries</b> <i>Valentin Oleschuk and Vladimir Ermuratskii</i>	259
<b>Optimization of Reactive Energy Flows in the Electric Grid Taking Into Account Allowable Voltage Fluctuations</b> <i>Volodymyr Kulyk, Oleksandr Burykin, Juliya Malogulko and Viktor Pirnyak</i>	265
<b>Evaluating and Ensuring the Cybersecurity of Power Line Remote Monitoring Systems</b> <i>Andrey Zuev, Oleg Gryb, Vadym Makarov and Sergey Shvets</i>	271
<b>Energy Efficiency of Microgrid Implementation with Solar Photovoltaic Power Plants</b> <i>Dmitry Tugay, George Zhemerov, Serhii Kotelevets and Serhii Korneliuk</i>	275

### Section IV. Industrial Electronics & Electrical Drives

<b>Adaptive Current Control for Shunt Active Power Filters Under Resistance and Inductance Uncertainty</b> <i>Sergei Peresada, Yurii Zaichenko, Dmytro Pushnitsyn and Viktor Reshetnik</i>	280
---	-----

<b>Efficiency of Application of Electric Fields in Biogas Plants at Different Temperature Modes</b> <i>Yuriy Kachan, Viktor Kovalenko and Olesia Lapikova</i>	286
<b>18-Pulse Rectifier With Electronic Phases Shifting And Width-Pulse Modulation</b> <i>Volodymyr Zamaraiev, Yurii Voitovych, Olha Butova, Vadym Makarov, Eugene Sokol and Volodymyr Ivakhno</i>	290
<b>Investigation of the Energy Consumption on Performance of Handling Operations Taking Into Account Parameters of the Grasping System</b> <i>Roman Mykhailishyn, Volodymyr Savkiv, Frantisek Duchon, Volodymyr Koloskov and Illia Diahovchenko</i>	295
<b>Analysis of Frontal Resistance Force Influence During Manipulation of Dimensional Objects</b> <i>Roman Mykhailishyn, Volodymyr Savkiv, Frantisek Duchon, Volodymyr Koloskov and Illia Diahovchenko</i>	301
<b>Parametric Synthesis of Electromechanical Servo Systems</b> <i>Borys Kuznetsov, Ihor Bovdii, Aleksandr Voloshko and Tatjana Nikitina</i>	306
<b>Robust Passivity-Based Controllers for Fast Output Voltage Regulated, Non-Ideal DC-DC Boost Converter in Hamiltonian Representation</b> <i>Ihor Shchur and Yurii Biletskyi</i>	310
<b>A Model of the Assessment of an Induction Motor Condition and Operation Life, Based on the Measurement of the External Magnetic Field</b> <i>Zagirnyak Mykhaylo, Bisikalo Oleg, Chorna Olga and Chorny Oleksii</i>	316
<b>Modelling Distortions of an Optical Signal by a Recording Optoelectronic Device</b> <i>Anton Bukariev, Viktor Liesnoi and Oleksandr Kyslytsyn</i>	322
<b>Accounting for an Interconnection of Electrical, Magnetic and Mechanical Processes in Modeling the Dynamics of Turbomachines Rotors in Passive and Controlled Active Magnetic Bearings</b> <i>Gennadii Martynenko</i>	326
<b>Efficiency of a Linear Pulse Electromechanical Converter of Induction Type with a Two-section Power Capacitor of Energy</b> <i>Vladimir F. Bolyukh, Alexander I. Kocherga and Igor S. Schukin</i>	332
<b>Mathematical Model, Research and Improvement of the Switched Reluctance Generator Voltage Stabilization Methods</b> <i>Maksym Shykhnenko, Leonid Mazurenko, Oleksandr Dzhura and Oleksandr Bilyk</i>	338
<b>Adaptive Filter of Input Information Signal for Discharge Pulse Installation Control System</b> <i>Sergey Kozhev, Dmitriy Vinnichenko and Natalia Nazarova</i>	343

## Section V. Special Power Electronics Systems & Applications

<b>Analysis of Gas Content in High Voltage Equipment With Partial Discharges</b> <i>Oleg Shutenko and Ivan Yakovenko</i>	347
<b>Axial Flux Permanent Magnet Controlled Generator</b> <i>Mykola Ostroverkhov, Vadim Chumack and Eugene Monakhov</i>	353
<b>The Ways of Stabilization of High-Current Glow Discharge in Welding</b> <i>Gennady Bolotov, Maksym Bolotov and Serhii Stepenko</i>	358
<b>Research of the Influence of Input Voltage Deviations on the Pulse-Width Converter With Microprocessor Control System</b> <i>Ievgen Korol and Andrii Kipenskiy</i>	363
<b>Research of the Electromagnetic Method for the Control Rolled Steel of the Same Grade of Various Manufacturer</b> <i>Boris Gorkunov, Anna Tyshchenko, Sergey Lvov and Abbasi Jabbar</i>	367
<b>Perfection of Methods for Constructing Remote Monitoring Systems for Patients in Emergency Situations</b> <i>Kolisnyk Kostyantyn and Zamiatin Petro</i>	371
<b>Automatic Implantable Insulin Pump, adapted to Normal Activity of the Pancreas</b> <i>Yevgen Sokol, Stanislav Lapta, Iurii Karachntsev, Nona Kravchun, Olga Solovyova, Nikolay Mustetsov, Natalya Pichko, Yana Zubova and Olga Goncharova</i>	377