

2018 19th International Scientific Conference on Electric Power Engineering (EPE 2018)

**Brno, Czech Republic
16 – 18 May 2018**



**IEEE Catalog Number: CFP1873X-POD
ISBN: 978-1-5386-4613-7**

**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:	CFP1873X-POD
ISBN (Print-On-Demand):	978-1-5386-4613-7
ISBN (Online):	978-1-5386-4612-0
ISSN:	2376-5623

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

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

Part A – Electric Networks

Compatibility of Turbine Models for Stability Studies	2
Karel Maslo, Karel Maslo, Tomas Haba	
From the past to the future of the Czech, Slovak and Central European Power Systems	7
Jiri Ptacek, Petr Modlitba, Svatopluk Vnoucek, Andrew Kasembe, Milan Straka	
Possibilities of Event Tree Analysis Method for Emergency States in Power Grid	13
Vaclav Muzik, Zdenek Vostracky	
Voltage Withstand Properties of the Insulation of Different Types of Medium Voltage Covered Overhead Line Conductors	18
Ivar Kiitam, Paul Taklaja, KaurTuttelberg	
Significance of Specific Information on Phase Shifter in Power System State Estimation in Polar Coordinate System	22
Tomasz Okon, Kazimierz Wilkosz	
Short Circuit Current Calculations	28
Branislav Batora, Zsolt Conka, Karel Maslo	
Electric Power System Inertia Increasing by Flywheels	32
Emil Dvorsky, Lenka Rakova, Pavla Hejtmankova	
Smart Grids Analysis-View of the Transmission Systems Voltage Stability	37
Jozef Bendik, Matej Cenky, Zaneta Eleschova, Anton Belan	
The Influence of Smart Grids on a Large Synchronous Generators Operation	43
Jozef Bendik, Matej Cenky, Zaneta Eleschova, Anton Belan, Vladimir Volcko	
The Study of Economic Effects When Different Distributed Generators (DG) Connected to a Distribution System	49
Pathomthat Chiradeja, Suntiti Yoomak, Aththapol Ngaopitakkul	
Determination of Critical Factors for Optimal Positioning of Phase-Shift Transformers in Interconnected Systems	54
Semir Hadzimuratovic, Lothar Ficker	
Black Start Test Of Pumped Storage Dlouhé Stráně	60
Oldrich Rychly, Tomas Linhart, MartinPistora	
The Potential of Distribution Grid as an Alternative Source for Reactive Power Control in Transmission Grid	64
Victor Astapov, Poria Divshali, Söder Hasanpor Lennart	
Optimization of Local Cogeneration Stations	70
Jan Votava, Jan Kyncl, Libor Straka	
Influence of Different Weather Conditions on the Maximum Load Current of Overhead Power Lines	76
Jozef Bendik, Matej Cenky, Zaneta Eleschova, Anton Belan, Boris Cintula	
Analysis of Faults Impact on Gas and Electricity Systems	80
Antons Kutjuns, Sergejs Kovalenko, Laila Zemite, Ansis Zbanovs	
Improvement of Voltage Profile and Mitigation of Power Losses in Case of Faults Using DG Units	85
Ibrahim Ahmad, Ghaeth Fandi, Zdenek Müller, Tlusty Josef	
End-user electricity consumption modelling for power quality analysis in residential building	91
Muhammad Iqbal, Naveed, KüttLauri	
Energy Management System for the Off-Grid Power Distribution Systems	97
Jan Vysocky, Vojtech Blazek, Michal Petruzal, Stanislav Mišák, Prokop Lukas	

Machine Learning Approach to Integrate Waste Management Companies in Micro Grids	103
Marcel Graus, Philipp Niemietz, Mohammad Touhidur Rahman, Michaela Hiller, Markus Pahlenkemper	
Hybrid Mean Variance Mapping Optimization for Dynamic Economic Dispatch With Valve Point Effects . . .	109
Noha Shouman, Y. Hegazy, G. Omran, A. Walid, Gerhard Krost	
Specific Issues of Reliability Simulations of MV Distribution Networks	114
Petr Skala, Oto Bucholzer	
Power Loss Reduction through Distribution Network Reconfiguration Using Feasibility-Preserving Simulated Annealing	119
Szczezan Moskwa, Slawomir Koziel, Rojas Landeros Alberto	
The Applicability of Zero Inflated Beta Distributions for Stochastic Modeling of PV Plants Power Output . .	124
Victor Astapov, Sergei Trashchenkov	
 Part B – Power Quality	
Transformer Inrush - Harmonics in the Current	131
Jiri Bermann, Martin Prochazka	
The Effectiveness of On-board Aircraft Power Sources in Line with the Trend of a More Electric Aircraft	135
Lucjan Setlak, Rafal Kowalik	
Evaluation of the VSC-HVDC System Performance in Accordance with the More Electric Aircraft Concept	141
Lucjan Setlak, Rafal Kowalik	
Voltage Quality Problems in Power Supply System of Boiler Stations Using Pumps with Variable-Frequency Drive	147
Gulsim N. Tulepova, Ivan I. Artyukhov, Svetlana V. Molot, Sergey F. Stepanov, Svetlana G. Kalganova, Sergey V. Trigorly	
Power Hardware-in-the-Loop Test of the Energy Feedback Device in Urban Rail Transportation System	153
Ziqian Zhang, Lothar Ficker	
Ensuring Power Quality and Stability in Industrial and Medium Voltage Grids	157
Arun Kannan, Thorsten Reimann, Diana Strauß-Mincu, Marvin Rolle, Christian Dresel	
Analysis of Supraharmonic Propagation in a MV Electrical Network	163
Alexander Novitskiy, Steffen Schlegel, Dirk Westermann	
Statistical Methods by Detection of Voltage Harmonics in Electric Power Net	169
Vaclav Kus	
 Part C – Electrical Protections	
Earth Fault Current Distribution and Proof Method of Global Earthing Systems	176
Lothar Fickert, Mallits Thomas, Resch Markus	
Unsymmetrical Fault Location on 110 kV Lines	180
Zuzana Bukvisova, Jaroslava Orsagova, David Topolánek	
Sharing Sampled Values Between Two Protection Relays According To Standard IEC 61850-9-2LE	185
Kinan Wannous, Petr Toman	
Transmission Line Impedance-Differential Protection with Improved Stabilization for External Fault Cases . .	191
Justyna Herlender, Justyna Herlender, Jan Izykowski	
Application of the Directional Overcurrent Relays with Directional Comparison System in Medium Voltage Networks	197
Marek Höger, Marek Bañas, Juraj Altus	

Interoperability testing for IEC61850 Based Substation Automation System	203
Mayada Daboul, Jaroslava Orsagova	
The Influence of the Short Circuit on the Parallel Conductors of the Multi-circuit Transmission Line	208
Tomas Nazarcik, Zdenka Benesova	
Study about some Two Main Dopants for a ZnO based Varistor Material with 5 Additives, Applied in Overvoltage Protection Equipment	214
Emil Lazarescu, Cosmin Rimescu, Flaviu Mihai Frigura-Iliasa, Mihaela Frigura-Iliasa, Lia Dolga, Filipescu Hannelore	
CAD Project of a Class D Surge Arrester Module for Domestic and Residential Low Voltage Applications . .	218
Emil Lazarescu, Cosmin Rimescu, Flaviu Mihai Frigura-Iliasa, Mihaela Frigura-Iliasa, Lia Dolga, Filipescu Hannelore, Anamaria Andreea	

Part D – Power Electronics, Drives and Apparatus

Reducing Sparking in the Transient Layer of the Sliding Electrical Contact Unit	223
Toomas Vaimann, Oksana Kozyreva, Igor Plokhov, Anton Rassolkin, Nikita Kotkov, Igor Savraev, Alexandr Ilyin, Ants Kallaste, Levon Gevorgov	
Reactive Power Compensation of Wind Permanent Magnet Synchronous Generator - Part II	228
Nikolay Djagarov, Zhivko Grozdev, Julia Djagarova, Milushev Hristo, Sergey Kokin	
Reactive Power Compensation of Wind Permanent Magnet Synchronous Generator - Part I	234
Nikolay Djagarov, Zhivko Grozdev, Julia Djagarova, Milushev Hristo, Sergey Kokin	
The Tuning Method of Continuous Controllers for Controlled Systems Approximated by Nth-order Inertial Models with Delay	240
Michal Laskawski	
Single Shunt Phase Current Reconstruction for Sliding Mode Control Algorithm Driven PMSM	246
Pavel Skarolek, Jiri Lettl	
Experimental Investigation of Fault Tolerant Converter Connected to Unbalanced Grid	250
Viktor Valouch, Petr Simek, Jiri Skramlik	
Simulink Based Model of Electric Drive for Throttle Valve in Pumping Application	256
Levov Gevorgov, Ants Kallaste, Anton Rassolkin, Toomas Vaimann	
Dynamic State Space Model Based Analysis of a Three-Phase Induction Motor Using Nonlinear Magnetization Inductance	260
Bilal Asad, Anton Rassolkin, Toomas Vaimann, Anouar Belahcen	
Study about the Active Power and Energy Losses of a 400V 57 kW Asynchronous Motor	266
Calin Mihai Vinga, Adrian Paun, Flaviu Mihai Frigura-Iliasa, Doru Vatau, Emil Cazacu, Lucian Petrescu	
Analysis of Open Phase Condition Influence on an Induction Motor	270
Matti Lehtonen, Antti Alahäivälä	

Part E – Heat Systems

Induction System for Hardening of Small Parts	277
Jakub Jirinec, David Rot, Jiri Kozeny, Antonin Podhrazky, Jiri, Hajek, Stanislav Jirinec	
Estimation of Electric Arc Power Loss using Net Emission Coefficient of Argon	283
Ilona Laznickova, Josef Senk, Ivana Jakubova	
Natural Convection From Flat Side's of Coil System	288
Payam Shams Ghahfarokhi, Toomas Vaimann, Anouar Belahcen, Ants Kallaste	
Analysis of passive heat removal system by ANSYS CFX software	293
Taron Petrosyan, Tsolak Malakyan, Karel Katovsky	

Part F – High Voltage

Very Fast High Voltage Impulse Generator	300
Jan Hlavacek, Martin Knenicky	
Investigation Into High Voltage Network Reliability Predictive Calculation	304
Pavel Markovskii, Alexei Merkushev	
High Voltage Current Analyzer with Galvanic Separation	308
Michal Krbal, Jaroslav Stepanek, Vojtech Wasserbauer, Jaroslava Orsagova, Stanislav Sumec	

Part G – EMC and Diagnostics

Abrasive Properties of Transformer Oil-Based Magnetic Nanofluid	314
Jan Zbojovsky, Samuel Bucko, Martin Krchnak, Roman Cimbala, Lukas Kruzela	
Influence of Shielding Paint on the Combination of Building Materials for Evaluation of Shielding Effectiveness	318
Jan Zbojovsky, Marek Pavlik, Zsolt Conka, Lukas Kruzela, Michal Kosterec	
Enclosure Shielding Effectiveness Calculation Using SHADE Algorithm	322
Stanislav Kovar, Jan Valouch, Tomas Kadavy, Martin Pospisilik, Milan Adamek	
Impact of Volume Resistance on the Surface Resistance of Paper	326
Lukas Kruzela, Nikola Sekelova, Roman Cimbala	
Polypropylene Foil Response to Voltage Impulses	331
Lukas Kruzela, Bystrik Dolnik	
Partial Discharges and Dielectric Parameters of Epoxy Resin filled with Nanoparticles	337
Jozef Kudelcik, Emil Jahoda, Jaroslav Hornak, Ondrej Michal, Pavel Trnka	
Operational Testing of Grid-tied Micro Inverters	343
Jan Moravek, Petr Mastny, Jiri Drapela, Marcelo Bicca Thiele, Gabriel Felipe Chaguri Felicio	
Thermal Design Related Errors of Assemblies for Constructing Sites Discovered During the Temperature Rise Tests	349
David Simek, Lukas Dostal	
Experimental Set-up for Observing the Influence of Radio Frequency Electromagnetic Field on the Ticks . . .	353
Michal Kosterec, Juraj Kurimsky, Blazena Vargova	
Dielectric Properties of Biodegradable Vegetable Oil Based Nanofluid	357
Ondrej Michal, Jaroslav Hornak, Vaclav Mentlik, Pavel Trnka, Pavel Totzauer	
Dielectric Behaviour of Gaseous Insulation with Synthetic Air	361
Petr Martinek, Rainer Haller, Roman Hammar, Eva Mullerova	
Verifying the Functionality of Electrical Regulated Drainage in Real Operating Condition	365
Vaclav Kolar, Roman Hrbac, Tomas Mlcak	
Thermographic Diagnostics of a DC Traction Railway System	370
Michal Vary, Milan Perny, Vladimir Saly, Marta Puzova, Vladimir Kujan	
Polarization in Cables with Current Load	375
Michal Vary, Juraj Packa, Vladimir Durman, Jaroslav Lelak, Vladimir Saly	

Part H – Measurements and Signals Analysis

Partial Discharge Signal De-Noising by Morphological Filters	381
Michal Kosterec, Jaroslav Petras, Jaroslav Dzmura	
The Parameters Measurement of Heat Recovery Units	386
Jakub Jirinec, David Rot	
Energy Consumption Measurements Based on Numerical Integration	390
Libor Straka, Jan Kyncl, Jan Votava	

Frequency Measurement in the Power System	394
Martin Prochazka, Karel Maslo	
Influence of Power Regulators on the Measurement of Consumption and Supply of Electricity	399
Tadeusz Sikora, Richard Velicka, Pavel Santarius, Petr Krejci	
Usage of Data Acquisition Device NI PCI-6221 for Power Engineering Applications	404
Milan Belik	
Application of The Numerical Inverse Laplace Transform to Transition Process-Related Problems in Electrical Circuits	409
Jan Pígl	
 Part I – Renewable Energy Sources	
Micro Hydro Power for Off Grid Electrification: A Case Study of Hhaynu River - Mbulu,Tanzania	415
Zdenek Müller, Urbanus F. Melkior, Josef Tlustý	
Utilization of Energy Storages in Low Voltage Grids with High Penetration of Photovoltaics - Addressing Voltage Issues	420
Martin Vojtek, Michal Kolcun, Michal Špes	
Control of Hybrid Energy Systems and Evaluation of Integration into Virtual Power Plant	426
Michal Vrana, Jan Moravec Petr Mastný, Marcelo Bicca Thiele, Gabriel Felipe Chaguri Felicio, Ondřej Smugala	
Autonomous Power Supply System Based on a Diesel Generator and Renewable Energy Sources for Remote Rural Areas	432
Ivan Artyukhov, Sergey F. Stepanov, Svetlana V. Molot, Gulsim N.Tulepova, Erbol T. Erbaev, Kubaidolla K. Tulegenov	
3D Analysis of Vertical Axis Wind Turbine with Enclosure	438
Jan Vysocký, Michal Petruzela, Vojtech Blázek, Stanislav Misák	
Energy Storage in La-Ni Based Metal Hydrides	443
Artem Chesalkin, Petr Moldri	
Intelligent System for Power Load Forecasting in Off-grid Platform	448
Ibrahim Salem Jahan, Michal Přilepok, Stanislav Misák, Václav Šnašel	
 Part J – Illumination Systems	
Simulation of Skylight in TracePro and Comparison with Laboratory Measurement	454
Jan Nekvapil, Jan Škoda, Martin Motyčka, Jaroslav Štěpánek, Michal Krbal	
Testing of the Software Goniophotometer in Wils - Building Design Computational Programme	458
Petr Běca, Tomáš Novák, Richard Baleja, Karel Šokanský	
Reactive Power in Street Lighting Network and Relation with Smart Metering in Slovakia	463
Peter Janiga, Dionyz Gasparovsky, Lukas Lipnický, Dragan Minovski	
CCTV Systems that Work with the Security Lighting	467
Karel Šokanský, Petr Běs, Richard Baleja, Tomáš Novák	
Changes of Blue Light Hazard for RGB LED	471
Jaroslav Štěpánek, Jan Nekvapil, Jan Škoda, Martin Motyčka, Michal Krbal	
The Calibration of Integrating Sphere with Spectroradiometer with Traceability to Goniophotometer	475
Martin Motyčka, Jaroslav Štěpánek, Jan Škoda	

Part K – Nuclear Systems

Measurement of $^{100}\text{Mo}(n, 2n)^{99}\text{Mo}$ Reaction Cross-Sections using 10-20 MeV Quasi-monoenergetic Neutrons	481
Surjit Mukherjee, Siddharth Parashari, Rajnikant Makwana, N.L. Singh, Ratan K. Singh, N. Naik, S.V. Suryanarayana, B.K. Nayak, S.C. Sharma, Mayur Mehta, Sai Akhil Ayyala, Jan Varmuza, Karel Katovsky	
Defects Studies in as-synthesized and Neutron-irradiated Mn, Li co-doped ZnO Using Positron Annihilation Spectroscopy	486
Hari Shnaker Palsania, Narendra Jakhar, Naresh Chejara, S.K.Gupta, R.K. Singhal, S.N. Dolia, B.L. Prashant	
Neutron Induced Reaction Cross-section for the Plasma Facing Fusion Reactor Material- Tungsten Isotopes	491
N.L. Singh, Mayur Mehta, R. Makwana, Surjit Mukherjee, V. Vansola, S. Khirwadkar, M. Abhangi, S. Vala, H. Naik, R. Acharya, S.V. Suryanarayana, Y. Santhi Sheela, Jan Varmuza, Karel Katovsky	
Measuring and Simulation of Dose at Irradiation by Bremsstrahlung Gamma Beam	497
Robert Golomb, Ivan Haysak, Vasyl Martishichkin, Ruslan Plekan, Olexandr Takhtasiev, Karel Katovsky, Jan Varmuza	
Investigation of Thorium Utilization in Accelerator Driven Systems	501
Dusan Kral, Miroslav Zeman, Radek Vespalec, Pavel Tichy, Jindrich Adam, Jurabek Khushvaktov, Alexandr Solnyshkin, Karel Katovsky	
Cadmium and Gadolinium Spectral Filters Comparison	507
Jan Varmuza, Karel Katovsky, Ondrej Stastny, Dusan Kral, Miroslav Zeman, Stepan Foral, Robert Golomb	
Process of Heat Generation and its Transfer Monitoring at Uranium Spallation Target QUINTA	511
Josef Svoboda, Miriama Brunciakova, Anton Baldin, Sergey Gustov, Sergey Tyutyunnikov, Miroslav Zeman, Radek Vespalec, Pavel Tichy, Jindrich Adam, Jurabek Khushvaktov, Alexandr Solnyshkin, Karel Katovsky	
Cross-Sections of Nuclear Isomers in the Interaction of Protons on Thin Thorium Target	516
Robert Golomb, Radek Vespalec, Jindrich Adam, Jurabek Khushvaktov, Alexander Solnyshkin, Karel Katovsky, Miroslav Zeman, Sandor Tari, Ivan Haysak, Yur Kish, Jitka Vrzalova, Lukas Zavorka	
Experimental Investigation of the Radionuclides Produced in Massive Spallation Target	521
Miroslav Zeman, Anton Baldin, Sergey Gustov, Sergey Tyutyunnikov, Ondrej Stastny, Radek Vespalec, Pavel Tichy, Jindrich Adam, Jurabek Khushvaktov, Alexandr Solnyshkin, Karel Katovsky, Jitka Vrzalova, Lukas Zavorka, Josef Svoboda	
Utilization of Expert Systems in Severe Accident Management	527
Martin Gajdos, Frantisek Janicek	
Piezoelectric Transformer as a Power Supply for GM Radiation Detector	531
Pavel Valenta, Vaclav Koucky, Jiri Hammerbauer	
The Influence of the Fuel Thermal Conductivity on the Core Temperatures During LOCA Accident	535
Stepan Foral, David Salomon, Jakub Rolecek, Jan Varmuza, Karel Katovsky	
Analysis of the unplanned Shutdowns and Estimation of Reliability in Temelin	540
Ales Hromadka, Jana Jirickova, Zbynek Martinek	