

TECHNICAL UNIVERSITY OF KOŠICE
Faculty of Electrical Engineering and Informatics
Department of Electrical Power Engineering

**Proceedings of the 8th International Scientific Symposium on
Electrical Power Engineering**

ELEKTROENERGETIKA 2015

September 16–18, 2015, Stará Lesná, Slovak Republic

GENERAL SPONSOR



RWEGROUP

SPONSORS AND SUPPORTERS



Slovenské elektrárne sú spoločnosťou skupiny Enel



SIEMENS



ELCON
BRATISLAVA a. s.



MEDIA PARTNERS

AUTOMA

ENERGETIKA



Name: Proceedings of the 8th International Scientific Symposium on Electrical Power Engineering
ELEKTROENERGETIKA 2015

Publisher: Technical University of Košice
Faculty of Electrical Engineering and Informatics
Department of Electrical Power Engineering

Published: September 2015

Editors: Michal Kolcun, Iraidá Kolcunová, Juraj Kurimský

Edition: First

Pages: 612

Circulation: 250

CDROM: Technical University of Košice, 2015

Copyright : Technical University of Košice, Slovak Republic © 2015

Manuscripts of papers submitted to Symposium Proceedings are peer reviewed by two reviewers. The review results are compiled according following procedure: the paper is accepted or rejected according match of recommendations of both reviewers. If there is conflict of review results, the paper are reviewed by third reviewer and his result is conclusive.

The Authors are responsible for contentual and lingual accuracy of their papers and the materials presented.

Technical University of Košice © 2015.

Publisher address

Technical University of Košice
Letná 9
Košice
Slovak Republic

CDROM

ISBN 978-80-553-2187-5

ELEKTROENERGETIKA 2015 – General Informations

Symposium Guarantee

Dr. h.c. prof. Ing. Michal Kolcun, Ph.D., Technical University of Košice, SK

Members of International Scientific Committee

- Juraj Altus, Žilinská univerzita, SK
- Anton Beláň, STU Bratislava, SK
- Lubomír Beňa, Technical University of Košice, SK
- István Berta, BME Budapest, HU
- Peter Birkner, Mainova AG, DE
- Lech Borowik Czestochowa University of Technology, PL
- Roman Cimbala Technical University of Košice, SK
- Ivo Doležel, AV ER Praha, CZ
- Nikolay Djagarov, TU Varna, BG
- Emil Dvorský, ZČU Plzeň, CZ
- Sergej Gerasimov, St. Peterburg, RUS
- Georgi Georgiev, 3G, BG
- Janusz K. Grabara, Czestochowa University of Technology, PL
- Valerij G. Goldstein, TU Samara, RUS
- Rainer Haller, Regensburg, DE
- Zdeněk Hradílek, VŠB - TU Ostrava, CZ
- František Janíček, STU Bratislava, SK
- Jaan Järvik, TU Tallin, EE
- Zdzislaw Kabza, TU Opolska, PL
- Péter Kádár, Óbuda University, Budapest, HU
- Rumen Kirov, TU Varna, BG
- Iraida Kolcunová, Technical University of Košice, SK
- Sebastian Kot, Czestochowa University of Technology, PL
- Hristo Krachunov, TU Varna, BG
- Dušan Krokavec, Technical University of Košice, SK
- Juraj Kurimský, Technical University of Košice, SK
- Jaroslav Lelák, STU Bratislava, SK
- Tatiana Loman, TU Riga, LT
- Anatolij Mahnitko, TU Riga, LT
- Zbyněk Martinek, ZČU Plzeň, CZ
- Alexander Mészáros, Technical University of Košice, SK
- György Morva, University of Budapest, HU
- Hans Michael Muhr, TU - Graz, AT
- Vladimir Nagay, NPI, RUS
- Alexander Nazaricev, TU Ivanovo, RUS
- Vladimir Nepomnyashchy, St. Peterburg, RUS
- Karel Nohač, ZČU Plzeň, CZ
- Maria Nowicka-Skowron, Czestochowa University of Technology, PL
- Irina Oleinikova, TU Riga, LT
- Daniela Perduková, Technical University of Košice, SK
- Andrzej Rusek, TU Czestochowa, PL
- Stanislav Rusek, VŠB - TU Ostrava, CZ
- Pavel Santarius, VŠB - TU Ostrava, CZ
- Antanas Sauhatas, TU Riga, LT
- Rasid Sitdikov, TSTU Tashkent, UZ
- Karel Sokanský, VŠB - TU Ostrava, CZ
- Viktor Starovojtenkov, Saint Petersburg, RUS

- Jerzy Szkutnik, Czestochowa University of Technology, PL
- Jan Švec, ČVUT Praha, PL
- Alexey Tazhibae, St. Peterburg, RUS
- Kolio Tasev, TU Varna, BG
- Vasily V. Titkov, Saint Petersburg State Polytechnical University, RUS
- Josef Tlustý, ČVUT Praha, CZ
- Petr Toman, VUT Brno, CZ
- Jiří Tůma, ČVUT Praha, CZ
- Margreta Vasileva, TU Varna, BG
- Zdeněk Vostracký, ZČU Plzeň, CZ
- Irena Wasiak, Polytechnika Lodz, PL
- Romuald Wlodek, AGH Krakow, PL
- Oldřich Závíška, Siemens KWU Erlangen, DE
- Markus Zdrallek, Bergische Universität Wuppertal, DE
- Iveta Zolotová, Technical University of Košice, SK

Symposium Steering Committee

- Iraidia Kolcunová, Technical University of Košice, SK
- Juraj Kurimský, Technical University of Košice, SK
- Jaroslav Džmura, Technical University of Košice, SK
- Jana Varnavčinová, Technical University of Košice, SK
- Dagmar Kramolišová, Technical University of Košice, SK

Table of Contents

Invited Lectures	15
Máslo Karel Improved methods for future power system operation and development assesment	16
Hanzel Andrej Research and development in Slovenske elektrarne, a.s.....	23
Vostracký Zdeněk The Art of Engineering Education.....	25
Grabara Janusz Outsourcing Performance in the Power Plants.....	28
A: Generation of Electricity, Transmission, Distribution and Consumption of Electricity	31
Mezera David Potential for Connection of Distributed Energy Sources in LV grid.....	32
Kašpírek Martin, Mezera David Harmonic Voltage Measurements in the Low Voltage Distribution Grid	36
Mezera David, Šimáček David Voltage Quality in the HV Distribution Grid.....	40
Kašpírek Martin, Krejčí Petr, Santarius Pavel, Procházka Karel Operation of Industry Forging Press and Impact on the Supply Grid.....	46
Fedotov Alexander, Fedotov Eugenii, Chernova Natalia, Vagapov Georgii Sensors and Methods for the Diagnosis of Higher Harmonics in Overhead Power Lines.....	50
Georgiev Georgi, Kryuchkov Igor, Zicmane Inga, Kovalenko Sergey Combined use of Monte Carlo approach and Newton's method for finding the roots of a characteristic polynomial ..	53
Gawlak Anna, Kornatka Miroslaw Comparative Analysis of Operating Conditions in Polish Medium-voltage and 110 kV Networks.....	57
Gawlak Anna Noninvestment Forms of Reducing Energy Losses in Distribution Networks.....	61
Muller Zdenek, Tlustý Josef, Valouch Viktor Flexible Grid Power Control for Distributed Sources	65
Brettschneider Zbynek, Hanuš Radek, Muller Zdenek, Muller Miroslav, Muller Zdenek, Tlustý Josef A Probabilistic Approach to Power Electric Systems Analysis.....	69
Kanálík Martin, Pavlík Marek, Kolcun Michal The Impact of Multi-system Overhead Lines Operation with Different Voltage Levels to Voltage Unbalance	73
Nohacova Lucie, Vykuka Roman, Zak Frantisek, Kropaček Vaclav Electrical distribution networks with isolated neutral point - the value of the capacitive earth-fault current and impact on the operation of these networks.....	77
Suško Filip, Baherník Michal, Látková Martina, Roch Marek, Altus Juraj Comparison of electricity meters accuracy in the case of degraded power factor and non-sinusoidal current load.....	81
Prieložný Stanislav, Jedinák Martin, Kolcun Michal, Janíček František The real test of „Black Start“ units in Eastern Slovakia	85
Straka Milan Decommission of 220 kV system in conditions of the Slovak Republic	89
Kolář Václav, Hrbáč Roman, Mičák Tomáš Investigating Ground Currents Leaking from Rails in DC and AC Traction	93
Oboskalov Vladislav, Gerhards Janis, Kirpikova Irina, Mahnitko Anatolijs Application of the Basis Sections for the Formation of Minimum Sections in the Task of Analysis of Electric Power Systems Reliability	97

Tesarova Miloslava, Vykuka Roman Loading of Interconnected Feeders Fed from Different Substations	101
Orság Petr, Kocman Stanislav, Hrubý Tomáš, Zajaczek Stanislav Energy Efficiency Measurement and Simulation of Broadband Passive Harmonic Filter on The Line Side of a VFD	105
Muller Zdenek, Muller Miroslav, Tlustý Josef Dynamic Behaviour of Overhead Line under Icing Conditions.....	109
Stuchly Jindrich, Misak Stanislav, Prokop Lukas Techno-Economic Analyses of an Off-Grid System using HOMER Simulation Tool	113
Švec Jan, Ehrenberger Jakub Current Unbalance Calculations in Meshed Transmission System.....	117
Ehrenberger Jakub, Müller Zdeněk, Švec Jan Calculation of Magnetic and Electric Field under OHL and its Reduction.....	121
Ilenin Stanislav, Varga Ladislav Swing Up of Conductor Depending on Icing Area, Weight of Ice and Span Size	125
Mészáros Alexander, Gáll Vladimír Calculation of Operating Temperature of the Transmission Line at Different Operating Conditions	129
Bilik Petr, Brunclik Dalibor, Holba Miloslav, Kelnar Michal, Zidek Jan, Mezera David Energy Meter Results Under Fast Changing Energy Flow Condition	133
Bilik Petr, Horinek Marek, Martinek Radek, Vanus Jan Results of Multiple Phasor Measurement Units Testing Procedures.....	136
Látková Martina, Bracíník Peter, Suško Filip The Use of a Finite State Machine Approach for a Simple Photovoltaic System Dynamics Modelling	140
Medved' Dušan, Beluščík Marek, Zbojovský Ján Solution of Thermal Field Around Transformer.....	144
Medved' Dušan, Mišenčík Lukáš, Kolcun Michal, Zbojovský Ján, Pavlík Marek Measuring of Magnetic Field around Power Lines	148
Janda Zbyněk, Noháč Karel Analysis of the Electromagnetic Influences of Overhead Lines on Active Cathodic Protection	152
Petráš Jaroslav, Džmura Jaroslav Innovative Ways for Smart House Control Equipped with Smart Electric Installation by Human Interfaces	156
Chalupecký Peter, Mészáros Alexander Biological Effects of Artificial Light	160
Plöth Martin, Mészáros Alexander The Modified Method of Postage Stamp-preselection	164
Moldřik Petr, Minarik Daniel, Vaculik Jan, Ney Michal, Kacor Petr Hybrid Energy System with Hydrogen Technology in Connection with PV Power Plant.....	168
Prieložný Stanislav, Kret Miroslav, Grega Michal, Jedinák Martin, Kolcun Michal, Janíček František Solar eclipse and its impact on interconnected European electricity network	172
Janša Jiří, Hradílek Zdeňek, Janša Jan Energy Balance of Biogas Station.....	176
Kačor Petr, Minařík Daniel, Moldřik Petr CFD Analysis of Temperature Rise of PEM Type Fuel Cell	180
Tkáč Ján, Hvizdoš Marek Monitoring of Solar Radiation on Measurement Stand	184
Grackova Larisa, Oleinikova Irina, Klavs Gaidis The Planning of Electric Vehicle Charging in the Urban Network.....	188
Nohac Karel, Tesarova Miloslava, Nohacova Lucie The use of accurate WAMS measurement for critical states detection in networks with integrated renewable energy sources.....	192
Nohac Karel, Jirickova Jana, Rakova Lenka, Vajnar Vladimir Dynamic mutual influence of electricity network, nuclear stations, renewable and other energy sources at events associated with the occurrence of faults and subsequent scenarios.....	196

Minarik Daniel, Moldrik Petr Analysis of electrolyzer efficiency and its influence to components parameters in laboratory hybrid photovoltaic-hydrogen stand-alone system	200
Džmura Jaroslav, Petráš Jaroslav, Bernát Milan Physical parameter measurement by KNX/EIB system	204
Kalnacs Ansis, Mutule Anna Specifics of Methods for Estimation of the Hydrokinetic Potential of Rivers	208
Kumar A.Senthil, Alice Hepzibah, Cermak Tomas, Misak Stanislav Analysis and Simulation of PEM fuel cell with Interleaved Soft Switch Boost Converter for Stand-Along Load Conditions	211
Sivalingam Murugan, Horak Bohumil A Novel Approach for Energy Utilization in a Pyrolysis Plant	215
Gawlak Anna, Szkutnik Jerzy Energy saving possibilities in distribution networks	220
Bartłomiejczyk Mikołaj, Polom Marcin Spatial Aspects of Tram and Trolleybus Supply System	223
Zajaczek Stanislav, Cigánek Jiří, Orság Petr, Hrbáč Roman Localization of Current Fields in the Vicinity of a Railway Platform	228
Bos Petr, Baleja Richard, Sokanský Karel, Novák Tomáš, Ullman Ivo Selection of Lighting Systems for Electrical Stations CEPS in Connection with the Introduction of LED	232
Pípa Marek, Kment Attila, Lelák Jaroslav, Janíček František Usability of Armoured Single-core Low Voltage Power Cables	236
Pípa Marek, Kment Attila, Ješko Robert, Halán Igor, Adaiieh Ayid Power Source Based on Peltier Cells	240
Böszörményi László, Bujanská Alena, Bujanský Peter The Conceptual Proposal to Innovative the Concept of Geothermal Project	244
Böszörményi László, Bujanská Alena, Bujanský Peter The environmental and economic aspects of the use of geothermal energy under the innovated concept	249
Sikora Tadeusz, Stuchlý Jindřich Generic Loads for Testing of Low Voltage Inverters for Off-Grids	253
Habrych Richard Automatic Secondary Regulation of Voltage	257
Skala Petr, Dětrich Václav, Bucholcer Oto Quality Factor and Partial Relationship between Costs and Supply Continuity in Distribution Networks	261
Žák František Capacitive Charging Currents and Decompensation in MV Networks	265
B: High Voltage Technique and Diagnostics in Power Engineering	269
Pavlov Luboš, Beláň Anton Method for monitoring synchronous phasors and its use in practice	270
Hrbac Roman, Mlcak Tomas, Kolar Vaclav, Bartłomiejczyk Mikołaj Development of Intelligent Control for Annealing Unit to Ensure the Minimization of Retroactive Effects on the Supply Network	273
Balogh Jozef Surface Partial Discharge Measurement by Inductive Method	277
Rot David, Jirinec Stanislav, Kozeny Jiri, Poznyak Igor Electrical efficiency of induction furnace with cold crucible with varied number of rectangle segments	281
Kovacik Jozef On-line Monitoring System of Power Transformers in Industry of Slovakia	285
German-Sobek Martin, Cimbala Roman, Bucko Samuel, Lisoň Lukáš The Influence of Long-term Stress on Dielectric Parameters of XLPE Insulation at Increased Operating Temperature	288

Perný Milan, Váry Michal, Šály Vladimír, Packa Juraj Impedance Spectroscopy as a Powerful Tool for Characterization of Devices for Electric Power Engineering.....	292
Ďurman Vladimír, Váry Michal, Perný Milan Solar Cells Impedance Spectroscopy at Very Low Frequencies	296
Kment Attila, Pípa Marek, Janíček František Diagnostics of Medium-Voltage Electrical Rotating Machines	300
Kment Attila, Pípa Marek, Halán Igor, Ruhnke Thorsten Testing of Medium Voltage Cables.....	304
Dolník Bystrík Contribution to the Electromagnetic Compatibility of Prototype LED Street Light.....	307
Nazarychev Aleksandr, Tadzhibaev Aleksei, Skorobogatov Andrey, Novoselov Evgeniy Experimental research of the asynchronous motor external magnetic field for short-circuited rotor winding broken bars monitoring	311
Kinsht Nikolay, Petrunko Natalia Regularities of the Formation an Integrated Partial Discharges Picture as a Set of Quasideterministic Processes ...	315
Cimbala Roman The Influence of Test Voltage on Charging Current Steady Element of XLPE Cable	319
Sobota Rafał Thermoluminescence Phenomena of Electrical Porcelain	323
Sobota Rafał, Mandowski Arkadiusz Possible Relation between Thermoluminescence and Chemical Composition of Electrical Porcelain	327
Lumnitzer Ervin, Liptai Pavol, Drahoš Richard Measurement and Assessment of Pulsed Magnetic Fields in the Working Environment.....	331
Kolcunová Iraida, Šipoš Marek Measurement of partial discharge in disc-shaped voids	334
C: Power Systems Relaying, Faults Analysis.....	339
Bermann Jiří, Procházka Martin Distance protection of big network transformers.....	340
Martínek Radek, Vanus Jan, Bilík Petr New Strategies for Application of Recursive Least Square Algorithm in Active Power Filters.....	344
Lomane Tatjana, Aditaja Viktorija Ways Of Efficiency Increase For Distance Measuring Units	348
Procházka Martin Impact of Current Transformer Overexcitation on the Protection System.....	352
Nagay Vladimir, Sarry Sergey, Nagay Ivan Designing Of The Relay Protection Of The High-Voltage Power Equipment for Arc Fault by Sensors of the Electrical And Non-Electrical Values.....	355
Chusovitin Pavel, Georgiev Georgi Investigation of Power System Dynamic Behavior based on Energy Approach and Lyapunov Function	359
Martínek Radek, Vanus Jan, Kelnar Michal, Bilík Petr Control Methods of Active Power Filters Using Soft Computing Techniques	363
Nagay Ivan, Nagay Vladimir, Kireev Pavel, Sarry Sergey, Ukrainev Aleksandr Recognition of Remote Short Circuits with the Transient Resistance of an Electric Arc.....	367
Nagay Vladimir, Nagay Ivan, Kireev Pavel, Sarry Sergey, Chmihalov Gennadiy Problems and Possible Ways to Improve Backup Protection of the Electrical Distribution Networks.....	372
Gono Radomir, Rusek Stanislav, Kratky Michal, Slivka Martin Component Reliability Parameters of Distribution Network.....	376
Kanálík Martin, Buša Ján, Kyncl Jan Analysis of Voltage Transients Caused by Single-line to Ground Fault in Medium Voltage Distribution Networks...	380

Vanus Jan, Martinek Radek, Bilik Petr, Koziorek Jiri, Dracka Alexander Smart Home Remote Monitoring Using PI System Management Tools	384
Vajnar Vladimír, Vostracky Zdenek Analysis of Delayed Current Zero Occurrence Within Generator Fed Faults	388
Misak Stanislav, Pokorný Viktor, Prokop Lukáš The Covered Conductors Faults Selections	392
Grishkevich Andrey Distributive Lattices in the Problems of Structural Reliability Analysis for Power Network Systems	396
D: Power System Control, Liberalisation of Electricity Market	399
Khruslov Lev, Rostovikov Mikhail, Shishov Vladimir Web-based Power Quality Monitoring System of Smart Transformer Substation RTP-34 MPEI for Engineering Education 400	
Fedor Pavol, Perdukova Daniela Fuzzy Model Based Optimal Continuous Line Controller	404
Sowinski Janusz, Tomaszewski Robert Modelling of Power Engineering Processes under Risk	408
Krokavec Dušan, Filasová Anna, Hladký Vratislav On Control Design of Time-Delayed Power Systems	412
Prokop Lukas, Misak Stanislav, Stuchly Jindrich Possibilities of Storage Capacity Sharing Using E-vehicles – an Introduction	416
Mlcak Tomas, Novak Tomas, Hrbac Roman, Ullman Ivo, Sokansky Karel The Development of an Intelligent Control for Online Operation of Power Station Lighting in Czech Transmission System 420	
Knápek Jaroslav, Vašíček Jiří, Vávrová Kamila Competitiveness of intentionally planted biomass with conventional fuels – the impact of logistic chains to energy and economic effectiveness	424
Vanus Jan, Martinek Radek, Bilik Petr, Zidek Jan, Machac Jaroslav Energy Management Strategies in Intelligent Office Building Using PI System	428
Malinina Tatjana, Shklyaruk M Comparative evaluation of supporting systems for the use of renewable energy sources in the European Union and Russia 432	
Beran Hynek Distributed energy as a part of the Energy system	434
Mutule Anna, Kochukov Oleg Load modelling in electrical power system long-term planning tasks	437
Malinina Tatyana, Murina Veronika National policy in the area of spent fuel management in Russia	441
Rusek Andrzej, Lis Marek, Nowak Marcjan, Patro Marek A Mathematical Model for Analysis of Dynamical States of a Drive System for a Rolling Mill-roller Table Including Elastic Connections During Rolling Process	443
Rusek Andrzej, Lis Marek, Nowak Marcjan, Patro Marek Determination of Transients of a Drive System for a Roller Table Line Cooperating with a Rolling Mill using a Three Mass Model for a True Load	447
Czaban Andriy, Rusek Andrzej, Lis Marek, Popena Andrzej, Lis Tomasz Mathematical Modelling of Induction Generator Electrical Circuits using Hamilton's Formalism	451
Pavlova-Marciniak Iva Implementation of Climate Policy Assumptions in Poland	455
Hrochová Michaela Analysis of renewable sources power variability	459
Tomiš Igor, Janíček František, Kolcun Michal Improving Photovoltaic Power Production Profile with Regard to Power Output Variability	463

E: Works of PhD Students	467
Đurica Maroš, Cigánek Jiří An optimization of a calculation of the train electrical energy consumption using a time integration method.....	468
Kocman Stanislav, Hrubý Tomáš, Orság Petr Analysis and Simulation of Disturbance of Saw Drive in Billet Mill.....	472
Otýpka Jan, Stýskala Vítězslav, Kolosov Dmitrii, Mišák Stanislav The Simulation of Connection of the Induction Generator to Grid Using the d-q Coordinate Frame Model.....	476
Holý Jaroslav, Škorpil Jan, Klor Tomáš, Martínek Zbyněk Trends and Technologies in the Field of Energy Storage.....	480
Mikita Miroslav, Kolcun Michal, Vojtek Martin, Čonka Zsolt Simulation of Stand Alone Hybrid Renewable System for Model House.....	484
Koniček Michal, Beláň Anton, Cintula Boris, Viglaš Dominik Reactive power regulation in photovoltaic power plants from the view of voltage in the distribution network.....	488
Koniček Michal, Beláň Anton, Ivanič Marián Impact of Distributed Sources on Safety Operation of Power System.....	492
Bodnar Roman, Otcenasova Alena, Regula Michal, Altus Juraj Methodology for Probabilistic Estimation of Equipment Trips due to Voltage Sags.....	496
Čonka Zsolt, Kolcun Michal, Kosterec Michal, Dudiak Jozef, Vojtek Martin, Mikita Miroslav, Morva Gyorgy Increasing Total Transfer Capacity (TTC) by PST in Central East Europe power system.....	500
Kováč Matúš, Eleschová Žaneta, Pojzl Igor, Volčko Vladimír, Heretík Pavol, Ivanič Marián Evaluation of Voltage Stability of a Power System using Modal Analysis.....	504
Špaček Michal, Hradílek Zdeněk Reactive Power Control in Cogeneration Units.....	508
Volčko V., Grejták F., Janiga P., Eleschová Žaneta, Kováč Matúš The Measurement of Power Quality in Off-grid System of a Passive House.....	512
Helštýnová Barbara, Novák Tomáš, Sokanský Karel, Bos Petr Multicriterial Analysis for Evaluating Lighting Systems.....	516
Cerman Anton, Janicek Frantisek, Halan Igor 2-D Model of Stray Current Distribution in Railway DC Traction System.....	519
Đurica Maroš, Cigánek Jiří A Scheme of an Algorithm for a Calculation of a Temperature Rise in the Traction Mains.....	523
Chesalkin Artem, Minarik Daniel, Moldrik Petr, Otevreil Vit Metal Hydrides as an Energy Storage Systems in Real Operating Conditions.....	527
Wojciechowska Katarzyna, Wasiak Irena, Błaszczuk Piotr Impact of Electric Vehicles on the Supplying Network.....	531
Martínek Zbyněk, Klor Tomáš, Holý Jaroslav The Reliability Operation of the Complicated Networks at the Electrical System.....	535
Bucko Samuel, Cimbala Roman, Lisoň Lukáš, Kosterec Michal Comparative Study of Mineral Transformer Oil and Magnetic Nanofluid by Parameters of Cole-Cole Equation.....	539
Janůšková-Skoršepová Terézia, Váry Michal, Lelák Jaroslav The Dielectric Properties Analysis of 6-AYKCYm 3x240 PVC Cable Insulation by Means of Unconventional Methods of Measurement.....	543
Kolcunová Irida, Lisoň Lukáš, Kmec Miroslav Investigation of Oil Paper Insulation Exposed to Thermal Stress.....	547
Ivanič Marián, Eleschová Žaneta, Koniček Michal The Impact of Overhead Power Lines Parameters Asymmetry on Voltages and Currents Depending on the Operating Conditions.....	552
Zbojovský Ján, Mészáros Alexander, Kurimský Peter Modelling the High Frequency Electromagnetic Field Propagation through the Polystyrene.....	556
Pavlík Marek, Lisoň Lukáš, Kurimský Peter Measuring of Electromagnetic Field Shielding in the Frequency Range from 1 GHz to 9 GHz for Windows.....	560

Kosterec Michal, Kurimský Juraj, Folta Martin, Bucko Samuel, Čonka Zsolt Investigation of effects of non-ionizing electromagnetic fields interacting with biological systems.....	564
Terrich Theodor, Procházka Radek Design of the High-Voltage Optical Sensor.....	568
Bago Drago, Uglešić Ivo Approximation of probability function of medium voltage overhead lines outages caused by lightning	572
Murín Justín, Hrabovský Juraj, Gogola Roman, Lukáč Miroslav Elastostatic and modal analysis of AIFe power lines with coupler.....	576
Ehrenberger Jakub Adaptive Protection Scheme Used for Distributed Generation System Switched into Island Mode.....	580
Kmec Miroslav, Beňa Ľubomír, Lisoň Lukáš Effect of series FACTS devices on distance Relays.....	584
Dudiak Jozef, Kolcun Michal, Conka Zsolt, Kolcun jr. Michal Hierarchical control of microgrid with renewable energy sources and energy storage	588
Kirov Rumen, Gyurov Valentin, Naydenov Nikolay, Iliev Ilian Techno-Economic Analysis of the Consequences of Lower Power Quality	592
Kirov Rumen, Gyurov Valentin, Naydenov Nikolay, Iliev Ilian Study, Analysis and Recommendations for Improving the Electromagnetic Compatibility in Branch Structure of the Republic of Bulgaria.....	597
Gyurov Valentin, Kirov Rumen, Naydenov Nikolay, Chikov Vladimir Study on Indices for Energy Efficiency with the use of Power Measurement and Control Systems in Electrical Distribution Networks.....	601
Kolcun Michal, Vojtek Martin, Mikita Miroslav, Čonka Zsolt Smoothing the Power Output of Photovoltaic Plant using a Battery Energy Storage System Control	605
Astapov Victor, Shuvalova Jelena, Vaimann Toomas, Kallaste Ants, Belahcen Anouar Impact of Wind Parks on the Efficiency of Thermal Power Plants.....	609