Conference Program Book Conference Program Conference Book Program Book

2020 21st International Scientific Conference on ELECTRIC POWER ENGINEERING (EPE)

October 19-21, 2020, Prague, Czech Republic





Welcome...

to the 2020 21th International Scientific Conference on Electric Power Engineering (EPE). On behalf of the organizing committee who has been working for over a half year to put this conference together, we cordially welcome all participants. The EPE conferences are organized in turns by three technical universities. This year it is a cooperation of Brno University of Technology and Czech Technical University in Prague.

Our goal in planning this meeting has been to provide an intellectually stimulating atmosphere for the exchange of scientific ideas concerning research, development and service in electrical power engineering area in a relaxing environment. Please don't hesitate to contact one of us if any questions arise.

Thanks for participation, and enjoy!



The Conference Program

Monday 19 th of October 2020		
12:00 - 12:15	Conference Ope	ening Ceremony
12:15 - 12:30	Break	
12:30 - 14:00	Parallel Sessions 1	
	Session A1	Session B1
		EMC, Power Quality Measurement and
	Advanced Distribution Systems, Smart	Improvement & FACTS Controllers in
	Grids, Micro Grids I	Transmission and Distribution Systems
		l I
14:00 - 14:15	Bre	eak
14:15 - 15:45	Parallel Sessions 2	
	Session A2	Session B2
	Advanced Distribution Systems, Smart	Electrical Heat in Industrial
	Grids, Micro Grids II	Technologies and Intelligent Buildings I

Tuesday 20 th of October 2020		
9:00 - 10:30	0:30 Parallel Sessions 3	
	Session A3	Session B3
	Electrical Machines, Drives and Power	Nuclear Energy Research, Utilization
	Electronics I	and Safety I
10:30 - 10:45	Bre	eak
10:45 - 12:15	Parallel S	Sessions 4
	Session A4	Session B4
	Electrical Machines, Drives and Power	Nuclear Energy Research, Utilization
	Electronics II	and Safety II
12:15 - 12:30	Bro	eak
12:30 - 14:00	12:30 - 14:00 Parallel Sessions 5	
	Session A5	Session B5
	Advanced Distribution Systems, Smart	Nuclear Energy Research, Utilization
	Grids, Micro Grids III	and Safety III
14:00 - 14:15	Bre	eak
14:15 - 15:15 Parallel Sessions 6		Sessions 6
	Session A6	Session B6
	Power Systems Reliability and	Smart Artificial Outdoor and Indoor



The Conference Program

Wednesday 21 th of October 2020		
9:00 - 10:30	Parallel Sessions 7	
	Session A7	Session B7
	High Voltage Technology,	New Trends in Electrical Power
	Measurements and Diagnostics I	Transmission, HVDC, WAMPaC I
10:30 - 10:45	Bre	ak
10:45 - 12:15	:15 Parallel Sessions 8	
	Session A8	Session B8
	Renewable Energy Sources and Storage	Transient Voltages, Insulation
	Devices I	Coordination, Overvoltage Protection I
12:15 - 12:30	Bre	ak
12:30 - 14:00	Parallel Sessions 9	
	Session A9	Session B9
	Renewable Energy Sources and Storage	Power Systems Planning and
	Devices II	Development I



The Conference Program in Detail

	Session A1
	Advanced Distribution Systems, Smart Grids, Micro Grids I
L1	Electric vehicle charging loads in residential areas of apartment houses
	Oula Lehtinen, Sami Pitkäniemi, Atte Weckman, Mikael Aikio, Michel Mabano, <mark>Matti Lehtonen</mark>
14	Low Voltage Ride Through Characteristics of Grid Forming inverters
L4	Ziqian Zhang, <mark>Robert Schürhuber</mark> , <mark>Lothar Fickert</mark> , Guochu Chen, Yongming Zhang
10	Duplex Reactor - Forgotten Element to Reduce Short-Circuit Currents
LO	Jakub Urbansky, Lubomir Bena, Vladimir Kristof, Marek Hvizdos
126	The impact of a electric vehicle charging on the distribution system
L30	Maksym Oliinyk, Jaroslav Dzmura, Daniel Pal
1.4.1	Concept of Real-Time Communication in Off-Grid System with Vehicle-to-Home Technology
L41	Vojtech Blazek , Michal Petruzela, Jan Vysocky, Lukas Prokop, Stanisav Misak, David Seidl
172	Negative sequence changes calculation for purposes of fault localization
L/Z	Vit Krcal, David Topolanek

Session A2 Advanced Distribution Systems, Smart Grids, Micro Grids II

<mark>L76</mark>	A Review of the Holonic Architecture for the Smart Grids and the Self-Healing Application
	Mohamed F. Abdel-Fattah, Hannah Kohler, Peter Rotenberger, and Leonard Schöler
L78	The impact of reconfiguration on power losses in smart networks
	Daniel Pal, Lubomir Bena, Jakub Urbansky, Maksym Oliinyk
L84	Communication and intelligent control in a power grid using open source technology
	Vaclav Muzik, Zdenek Vostracky
104	
104	Modelling of AC Electric Railway System using PSCAD/EMTDC
L94	Modelling of AC Electric Railway System using PSCAD/EMTDC Mohamed S. Elbelkasi, Ebrahim A. Badran, Mansour H. Abdel-Rahman and Zdeněk Müller
L94	Modelling of AC Electric Railway System using PSCAD/EMTDC Mohamed S. Elbelkasi, Ebrahim A. Badran, Mansour H. Abdel-Rahman and Zdeněk Müller Smart Substation Emulation for BPL Evaluation
L94 L95	Modelling of AC Electric Railway System using PSCAD/EMTDCMohamed S. Elbelkasi, Ebrahim A. Badran, Mansour H. Abdel-Rahman and Zdeněk MüllerSmart Substation Emulation for BPL EvaluationJan Slacik, Petr Mlynek, Petr Musil, Lukas Benesl, Jan Hlavnicka
L94 L95	Modelling of AC Electric Railway System using PSCAD/EMTDCMohamed S. Elbelkasi, Ebrahim A. Badran, Mansour H. Abdel-Rahman and Zdeněk MüllerSmart Substation Emulation for BPL EvaluationJan Slacik, Petr Mlynek, Petr Musil, Lukas Benesl, Jan HlavnickaP2P electric energy market based on smart contract blockchain technology



Session A3

Electrical Machines, Drives and Power Electronics I

L3	A comparative study of synchronverter stability
	Lavr Vetoshkin, Zdenek Muller
L21	Comparison of power control method for B4 converter connected to unbalanced grid
	Petr Simek, Viktor Valouch
122	Analysis of Three-Phase Delta-Connected Converter for Compensation of Unsymmetrical Loads
LZZ	Martin Bejvl, Petr Simek, Viktor Valouch, Radim Hauptmann
	A supervisory MPC for synchronverter
LZ/	Lavr Vetoshkin, Zdenek Muller
1.20	Influence of Deadtime on Si, SiC and GaN Converters
L29	Pavel Skarolek, Jiri Lettl
1.25	A High Efficiency High frequency Gan Converter
L35	Filipp Frolov, Jiri Lettl

Session A4 Electrical Machines, Drives and Power Electronics II

L42	Overview of Thyristor Module Parameters for fast static VAr Compensation Available on the Market
	Miroslav Novák, Pavel Ringelhán and Leoš Kukačka
L46	Design of capacitors in SST
	Jakub Zednik
L77	Optimum Flux Search Control on Induction Motor Drive with Predictive Torque Control
	Karlovsky Pavel, Lettl Jiri, Bauer Jan
	Simulation analysis of switching performance of GaN power transistors in a high-voltage
L108	configuration
	Richard Zelnik, Michal Pipiska
	Analysis ok High-Voltage Converters With Serial Connection Units and with Input Current
L126	Correction
	Yury Skorokhod, Sergey Volskiy, Dmitriy Philin
1122	Power Supply System for Aircraft eith Electric Traction
L132	N.V. Kuznetsov, S.I. Volskiy, D. A. Sorokin, M.V. Yuldashev, R.V. Yuldashev
1122	Data Acquisition System for the Modern Induction Motor Drive applications
L133	Daniel Kouril, Jakub Baca, Martin Sobek, Martin Kuchar, Jan Strossa
	Induction motor drive with field-oriented control and speed estimation using feedforward neural
L138	network
	Jakub Baca, Daniel Kouril, Petr Palacky, Jan Strossa



Session A5 Advanced Distribution Systems, Smart Grids, Micro Grids III L101 Compensation of reactive power in LV network and its impact on reactive power flow through distribution grid Viktor Jurak, Zuzana Bukvisova, Jaroslava Orsagova, David Topolanek L119 Measurements for effective potential increase in event of high-current earth fault Christin Schmoger, Lothar Fickert Overview of communication scenarios for IEC 60870-5-104 substation model Petr Musil, Petr Mlynek

Session A6 Power Systems Reliability and Maintenance, Asset Management I

L20	Dynamic stability in large power system
	Štefan Korčak
L44	The Use of Probabilistic Approach in Power System Security Analyses
	Maksymilian Przygrodzki, Pawel Kubek, Rafal Gwozdz
L74	Optimal Reactive Power Control in a Multi-Machine Thermal Power Plant
	Tarmo Trummal, Guido Andreesen, Jako Kilter

Session A7

High Voltage Technology, Measurements and Diagnostics I

L10	Comparison of behavior of electroinsulating oils using thermo-hysteresis dependencies
	Roman Cimbala, Peter Havran, Pavol Bartko
L32	Simulation of Impulse Generator Followed by Practical Verification
	Ludek Pelikan, Michal Krbal, Jaroslava Orsagova
	Optimal Adjustment of Double Exponential Model Parameters to Reproduce the Laboratory Volt-
151	Time Curve of Lightning Impulse
LDT	Mahdi Pourakbari Kasmaei, <mark>Matti Lehtonen</mark> , Farhan Mahmoud, Michal Krbal, Ludek Pelikan,
	Jaroslava Orságová, Petr Toman
155	Partial Discharges Pattern Analysis of Various Covered Conductors
LDD	Ondřej Kabot, Jan Fulneček, Stanislav Mišák, Lukáš Prokop, Jan Vaculík
1402	Lightning stroke incidence to transmission overhead lines
LIUZ	Pavel Janys, Radek Prochazka
1106	Calibration of Unipolar High Current Impulses for Resistance Spot Welding
L100	Jan Hlavacek, Martin Knenicky, Karel Draxler
1144	The disturbance of high-voltage apparatus thermal fields and ways of its diagnostics
L144	VVV Titley NAL Subjector D. D. Tulegay, Delegan E. Sereenberry A



Session A8

Renewable Energy Sources and Storage Devices I

L15	Bioenergy Electricity on Internet of Renewable Energy (IoRE) Framework for Sustainable Electricity
	Grid Integration in the European Union (EU)
	Famous O. Igbinovia, Jiri Krupka,Petr Hajek, Zdenek Muller, Josef Tlusty
122	Validation of PV inverters frequency response using laboratory test platform
L33	Petr Mastny, Martin Vojtek, Jan Moravek, Michal Vrana, Jan Klusacek
	Analysis of PV Roof Installation Potential and Basic Load Diagram Evaluation Base on Cooperation
L53	with EV and BESS at Village with 3,000 Residents
	Martin Stefek, Robin Filip, Martin Paar, Tomas Sacha
150	Electricity Storage in Internet of Renewable Energy (IoRE) Domain for Sustainable Smart Cities
L58	Famous O. Igbinovia, Jiri Krupka,Petr Hajek, Zdenek Muller, Josef Tlusty
L81	Particular silicon type photovoltaic cells prolonged degradation
	Milan Belik, Lucie Nohacova
L91	Design of High Voltage Battery Topology Based on Experience with Integrated BMS Modules
	Jan Moravek, Petr Mastny, Mateus de Paula Ramos Umbelino

Session A9 Renewable Energy Sources and Storage Devices II

L98	Power Generating Modules Field Testing Concepts for Verification of Compliance with Operational Requirements
	Jiri Drapela, Jan Moravek, Michal Vrana, Petr Mastny
L109	Comparison of control methods for power stage of battery management systems with 4 cells
	Pavol Spanik, Marek Simcak
1420	Stability and reliability of power system operation due to use of renewable energy resources
<mark>L128</mark>	<mark>Viktor Elistratov</mark> , Irina Kudryasheva
1124	Active Battery Management System for Home Battery Energy Storage
L134	Jan Zich, Jan Jandik
L142	Demand Responsive Power Flow Controller Providing Resistive Load Perspective Regulation in
	Cooperation with Small Generation Units
	Jan Klusacek, Michal Vrana, Jiri Drapela
1454	Potential of Technical Losses Reduction in Low Voltage Feeder Using Small Photovoltaics
L151	Ahmad Alshammari, Martin Čerňan, Zdeněk Müller



Session B1

EMC, Power Quality Measurement and Improvement & FACTS Controllers in Transmission and Distribution Systems I

L7	Smart Control System based on Power Quality Parameter Short-term Forecasting
	Ibrahim Salem Jahan, Stanislav Misak, Vaclav Snasel
126	Comparison of Electromagnetic Fields around Electric Power Lines
LZO	Dusan Medved, Jan Zbojovsky, Marek Pavlik, Iraida Kolcunova, Jakub Urbansky
127	Harmonic Factors for Electromagnetic Field Evaluation in Power Systems accourding to 2013/35/EU
	Katrin Friedl, <mark>Robert Schürhuber</mark>
1112	Impact of Cable Impedance on the Harmonic Emission of LED Lamps
L113	Muhammad Naveed Iqbal, Lauri Kutt, Noman Shabbir, Bilal Asad
120	Investigation of a Damaged Filter-Compensation Unit
L28	Stanislav Nowak, Stanislav Kocman
120	Numerical Environment for Modeling and Analyzing Transients in Static VAR Compensators
L30	Leoš Kukačka, Jakub Nečásek, Miroslav Novák

Session B2

Electrical Heat in Industrial Technologies and Intelligent Buildings I

L25	Intelligent Scheduling of Heat Pump to Minimize the Cost of Electricity
	Behzad Lashkari, Yuxiang Chen, Michal Musilek, Petr Musilek
L38	Theoretical measurement limits of parameters of commissioned heat pumps
	Jan Rimbala, Jan Kyncl
L71	The Control System for Heating of Small Buildings with Heat Recovery unit and Heat Pump
	Jakub Jirinec, David Rot
L100	Primary Energy Reduction Using Small CHP
	Jan Votava, Jan Kyncl, Zdeněk Müller, Lavr Vetoshkin, Jan Rimbala
L149	The possibilities of reducing energy consumption for the preparation of hot water by suitable
	switching of the heat pump
	Jan Rimbala, Jan Kyncl



	Session B3 Nuclear Energy Research, Utilization and Safety I
L47	Validation of the Serpent2 code for the VR-1 reactor core calculation
	Ondrej Novak, Jan Frybort
154	A Monte Carlo Study of Radiation Resistant Materials using JA-IPU Code
L54	N.S.Raghaw, V.Kumar, Sajeev Kumar, Karel Katovsky
	Experimental and simulated data at fragment productions in 100 MeV proton-induced reaction on
100	232Th
LOU	R.R. Holomb, K. Katovský, <mark>I.Haysak</mark> , I. Adam, R. Vespalets, J. Vrzalova, M.Zeman,V.B. Brudanin, L.
	Zavorka, D.V. Karaivanov, A. A. Solnyshkin, D.V. Philosophers, J. Khushvaktov, V.M. Tsupko-Sitnikov
102	Monte Carlo Calculations of Fast Neutron Transport in Chloride Salts
LõZ	Ondrej Stastny, Antonin Krasa, Dusan Kral, Kamil Stevanka, Karel Katovsky
107	Validation of results of Brno CHF experimental loop in annular channel
L87	Ladislav Suk, Kamil Stevanka, Taron Petrosyan, Karel Katovsky
	Measurement of activation products in chloride salts irradiated by spallation neutrons
L103	Dusan Kral, Miroslav Zeman, Jindrich Adam, Karel Katovsky, Josef Svoboda, Ondrej Stastny, Jitka
	Vrzalova, Pavel Tichy, Jurabek Khushvaktov, Alexander Solnyshkin

Session B4 Nuclear Energy Research, Utilization and Safety II

<mark>L105</mark>	Monte Carlo simulation of bremsstrahlung spectra for low energy electron accelerators
	A. Tanchak, <mark>I.I. Haysak</mark> , O.V. Takhtasiev, R.R. Holomb, K. Katovsky
<mark>L111</mark>	Generation of neutrons on Microtron M-10
	Vasyl Martyshychkin, <mark>Ivan Haysak</mark> , Anhelina Tanchak, Olexander Okynev, Olexey Fradkin, Karel
	Katovsky, Robert Holomb
L112	Comparison of Neutron Flux Density in Carbon Prism filled with NaCl and Air
	Kamil Stevanka, Dusan Kral, Ondrej Stastny, Humberto Martins, Robert Holomb, Karel Katovsky
<mark>L116</mark>	A Comprehensive Review of Developments of Accelerator Driven Subcritical Systems and Future
	Requirements
	<mark>Vinod V. Kumar</mark> , Karel Katovsky
L135	XS data preparation for 3D full core calculations
	Pavel Suk, Jan Frýbort
L136	Verification of the MCNP model of Manganese Bath
	Jan Rataj, Tomáš Bílý, Ondřej Huml, Ondřej Novák, and Pavel Suk



Session B5 Nuclear Energy Research, Utilization and Safety III

L137	The Training Reactor VR-1 - 30 Years of Operation
	Lenka Frybortova, Jan Rataj, Lubomir Sklenka, Jan Frybort, Filip Fejt, Ondrej Novak
L150	Assessment of Various Candidate Salts Properties for Molten Salt Reactor Application by MCNP
	Software
	Taron Petrosyan, Elmira Melyan, Karel Katovsky

Session B6 Smart Artificial Outdoor and Indoor Lighting Systems I

L61	Influence of Angle of Rotation of Luminaires with Asymmetrical Luminous Intensity Distribution Curve on Calculated Photometric Parameters
	Marek Mokran, Roman Dubnicka, Dionyz Gasparovsky
L97	Fence Lighting System in Transmission System Substastions - Night Visibility
	Ullman J., Šebesta J., Novák T., Ullman I.
L114	Light Trespass in Street LED Lighting Systems
	Marek Balsky, Theodor Terrich
L120	Photodetectors for cylindrical illuminance sensor
	Michal Kozlok, Petr Žák

Session B7

New Trends in Electrical Power Transmission, HVDC, WAMPaC I

L45	Energy Harvesting and Communication Systems for Power Lines Inspection Robot
	Valenta Pavel, Zahour Jiri, Krivka Jindrich, Kosturik Kamil, Skala Jiri, Georgiev Vjaceslav
L50	Fault localization method using WAM systems
	Zsolt Čonka, Vladimir Kohan, Michal Kolcun, Judith Pálfi, Imre J. Rudas
L56	Optimization of electric power system modes by methods of artificial intelligence
	Sergey Kokin, <mark>Nikolay Djagarov</mark> , Uyangasaikhan Bumtsend , Javod Ahyoev ,Stepan Dmitriev ,
	Murodbek Safaraliev
L57	Concept of Smart Automatic Reclosing for Transient Stability Improvement of Large Power Systems
	Jakub Slavik, Zaneta Eleschova
L79	The Effect of Temporal Discretization on Dynamic Thermal Line Rating
	Tomas Barton, Michal Musilek, Petr Musilek
L85	Factors Affecting Transient Stability Simulation Possibilities in PSCAD and MODES
	Jan Koudelka, Ivan Gromotovic, Branislav Batora, Petr Toman



	Session B8
	Transient Voltages, Insulation Coordination, Overvoltage Protection I
L43	Simulation of earthing switch behavior and its test verification
	Jiri Valenta, David Simek, Lukas Dostal, Petr Kloc, Frantisek Koudelka, Martin Grycz
162	Electrical strength of the oil-paper insulation system at DC and AC voltage
L62	Iraida Kolcunová, Ján Zbojovský, Marek Pavlík, Bystrík Dolník, Samuel Bucko, Dušan Medveď
L121	Breakdown Behaviour of Oil-Barrier Insulation at Lightning Impulse Voltage
	R. Haller, J. Hornak, P. Trnka, R. Hamar, J. Hlavacek
<mark>L146</mark>	A Relation of the Parameters of Grounding Device with the Level of Over-voltage when a Surge
	Arrester Triggered
	Yuri E. Adamyan, Ivan S. Kolodkin, Sergey I. Krivosheev, Sergey G. Magazinov, <mark>Vasiliy V. Titkov</mark> ,
	Konstantin V. lakushov
	The features of lightning protection of low-voltage system of Air insulated High Voltage
<mark>L147</mark>	Substation by surge protective device
	Pavel Karpov, Anton Kosorukov, Nataliya Kutuzova, Svetlana Pashicheva, <mark>Vasiliy Titkov</mark> , Petr Toman

Session B9 Power Systems Planning and Development I

L52	Turbine Control in Island Operation
	Štefan Korčak, Tomáš Hába, Karel Máslo
L73	Emergency situations in the transmission grid and opportunities for their prevention through the
	intraday electricity market
	Jakub Srom, Zdenek Muller
L90	Clustering of Transmission System Loads Based on Monthly Load Class Energy Consumptions
	Madis Leinakse, Jako Kilter
L143	The KRG GRID Network Comparison Between Two Different Years 2013 and 2019
	Dana Bahram Khudhur, Zdeněk Müller
L152	Critical Infrastructure and the Possibility of Increasing its Resilience in the Context of the Energy
	Sector
	Martin Čerňan, Zdeněk Müller, Josef Tlustý, Jiří Halaška
L153	Methodology of Electricity Supplying of Critical Infrastructure in Crisis Situations
	Martin Čerňan, Zdeněk Müller, Josef Tlustý, Jiří Halaška



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