

2016 Electric Power Quality and Supply Reliability (PQ 2016)

**Tallinn, Estonia
29-31 August 2016**



**IEEE Catalog Number: CFP1652E-POD
ISBN: 978-1-5090-1565-8**

**Copyright © 2016 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 publication is a representation of what appears in the IEEE Digital Libraries. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP1652E-POD
ISBN (Print-On-Demand):	978-1-5090-1565-8
ISBN (Online):	978-1-5090-1564-1

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

CONTENTS

Special Seminar Presentation: Have Physicists and Electrical Engineers Given Up Too Soon Their Attempts to Decipher the Nature of Electricity	
J. Järvik	N/A
Mathematical Model for Real-Time Assessment of Contributions of Disturbing Sources to Power Quality Level at a Point of Common Coupling	
Y. Sayenko, M. Sukhonos, D. Kalyuzhniy, V. Bolgov	29
Identification of Asymmetry in Power System: Different Case Studies	
M. H. Shawon, S. Barczentewicz, J. Kowalski	37
Active Compensation of Voltage Dips, Deviations and Distortions in Electrical Networks With Highly Variable Loads and Long Lines	
Y. A. Sychev, A. A. Belsky, D. I. Ivanchenko	41
Estimation the Severity of Voltage Dips With Respect to LVRT Requirements	
N. Essl, H. Renner	N/A
The Influence of Manufacturing Conditions on Performance Characteristics of Covered Conductor Insulation	
Y. Solovyev, A. Potapov, A. Nazarychev	N/A
Experience in Enhancing the Reliability of Operation of Power Cable Lines in St. Petersburg	
V. M. Barinov, D. V. Kieseewetter	55
MV Cable Temperature Characteristics in Dependence of Load Current, Ambient Environment and Temperature. Determination of the Critical Environment	
J. Blums, M. Budahs, J. Cernovs, I. Gornevs, V. Jurkans.....	59
Sadales tikls AS Five Most Used MV Cable Type Permissible Loading Possibilities at a Critical Environment in Dependence of Conductor Temperature	
J. Blums, M. Budahs, J. Cernovs, I. Gornevs, V. Jurkans, R. Elmanis-Helmanis	65
Transient Response of Grounding Systems Under Impulse Lightning Current	
I. Djamel, F. H. Slaoui, S. Georges	71
Validation of Aggregated Harmonic Current Source Models Based on Different Customer Type Configurations	
A. Bosovic, H. Renner, A. Abart, E. Traxler, J. Meyer, M. Domagk, M. Music	77
Accuracy of Voltage Instrument Transformers for Harmonic Measurements in Elering's 330-kV-Transmission Network	
J. Meyer, R. Stiegler, J. Kilter	85
Hybrid Power Active Filter – Effectiveness of Passive Filter on the Reduction of Voltage and Current Distortion	
C. S. Azebaze Mboving, Z. Hanzelka	91
Effects of PV Microgeneration on Rural LV Network Voltage Quality – Harmonics and Unbalance	
S. Hürmeydan, A. Rosin, T. Vinnal	97
Analysis of Power Network Loading due to Fast Charging of Electric Vehicles on Highways	
F. H. Malik, M. Lehtonen	101

Probabilistic Household Load Model for Unbalance Studies Based on Measurements F. Möller, J. Meyer	107
Modeling of Demand Side Management Scenarios in Apartment Buildings K. Vill, A. Rosin, M. Lehtla	113
Power Quality Improvement of Microgrids by Virtual Synchronous Generator Control J. Liu, Y. Miura, T. Ise	119
Improved Droop Control for Effective Load Sharing and Voltage Regulation in DC Microgrids G. Niyitegeka, J. Choi, Y. Ok	125
Electrical Resonance Instability Study in Traction Systems L. Sainz, L. Monjo, J. J. Mesas, J. Pedra, M. Cheah-Mané	133
Electrical Resonance Instability Study in Wind Power Plants L. Sainz, J. J. Mesas, L. Monjo, J. Pedra, M. Cheah-Mané	139
GA-Based Optimal Droop Control Approach to Improve Voltage Regulation and Equal Power Sharing for Islanded DC Microgrids A. Basati, M. B. Menhaj, A. Fakharian	145
Stability Enhancement by VSC-HVDC With a Supplementary Frequency Control Strategy in Case of System Splits J. Massmann, A. Roehder, B. Fuchs, A. Schnettler	151
Determination Methods for Controller Parameters of Back-to-Back Converters in Electric Power Grids N. Beg, A. Rahmoun, A. Armstorfer, A. Rosin, H. Biechl	157
Long-Term Impact of Technological Development on European Road Transportation Sector's Fuel Mix: Focus on Electric Vehicles E. V. Grushevenko, D. A. Grushevenko, V. A. Kulagin	165
Nordic and Baltic Wind Generation Influence to Estonian Thermal Power Plants Production L. Ulm, I. Palu	171
A User Interface Tool for Ramping Behavior Analysis of Renewable Energy S. Mishra, I. Palu	175
Economical Feasibility of Off-Grid Hybrid Power Supply for Estonian Remote Areas—Part 1: Hybrid Components Sizing V. Bolgov, M. Laanetu	179
Economical Feasibility of Off-Grid Hybrid Power Supply for Estonian Remote Areas—Part 2: Determination of Breakeven Grid Extension Distances V. Bolgov, K. Janson	187
On Possibility of Power Transformer Operational Reliability Increase D. V. Kiesewetter, N. M. Zhuravleva, A. S. Reznik, A. V. Tukacheva, E. G. Smirnova, A. K. Khripunov	193
Review of Loss Calculation Reduction Control Methods of Permanent Magnet Assisted Reluctance Drive S. Melentjev, A. Belahcen, A. Kallaste, A. Rassõlkin, T. Vaimann	199
Speed Control for a Permanent Magnet Synchronous Motor Based on Fuzzy Logic With Reduced Perturbations on the Supply Network E. Lazarescu, F. M. Frigura-Iliasa, P. Andea, M. Frigura-Iliasa	207

Adjusted Electrical Equivalent Circuit Model of Induction Motor With Broken Rotor Bars	
A. Rassõlkin, T. Vaimann, A. Belahcen, A. Kallaste, A. Petrov, I. Plokhov, A. Kotelnikov	213
Review of Thermal Analysis of Permanent Magnet Assisted Synchronous Reluctance Machines	
P. S. Ghahfarokhi, A. Kallaste, A. Belahcen, T. Vaimann, A. Rassõlkin	219
Influence of Choice of Permanent Magnet Electromagnetic Parameters in the Research of Electrical Devices	
B. Ose-Zala, A. Kallaste, T. Vaimann	225
Thermal Analysis of the PM Generator With Outer Rotor for Wind Turbine Application	
O. Kudrjavitsev, A. Kilk, T. Vaimann	229
Energy-Efficient Predictive Control of Centrifugal Multi-Pump Stations	
V. Vodovozov, T. Lehtla, I. Bakman, Z. Raud, L. Gevorkov	233
Oil Wellbore Electrical Heating Station With Wind-Driven Power Unit	
A. A. Belsky, V. S. Dobush, D. I. Ivanchenko	239
Influence of 380 kV AC Systems on the Maintenance Conditions of the HVDC System in a Hybrid AC/DC Overhead Line	
I. Konotop, A. Novitskiy, D. Westermann	243
Fuzzy Inference Algorithms for Power Equipment State Assessment	
A. I. Khalyasmaa, S. A. Dmitriev	249
Communication Architecture for Monitoring of HVDC System Based on IEC 61850	
B. H. Zaidi, S. H. Hong, D. Kwon	255
Identification of Design Scheme Parameters of Electric Network Using WAMS Data	
K. Tokhtibakiev, S. Shokolakova, N. Arystanov, N. Nurtaza, K. Shubekova, A. Saukhimov	263
Power Quality Assessment System for a 220 kV/110 kV High Voltage Power Station	
N. Iacobici-Luca, F. M. Frigura-Iliasa, D. Vatau, P. Andea	267
Vacuum Breaker Simulation for Switching Overvoltage Study	
D. I. Ivanchenko, N. G. Novozhylov	273
On-Line Generation and Arming of System Protection Schemes	
A. S. Pedersen, M. Blanke, J. G. Møller, H. Jóhannsson	277
Distance Protection for HVDC Transmission Lines Based on MMC Modulation Strategy	
P. Tünnerhoff, C. Petino, M. Battiato, A. Schnettler	283
Wireless Sensors Based Network for the Measurement of Sags and Other Power Quality Disturbances	
L. Podestà, G. Sforza	N/A
Measurement of Power System Phase Differences By Means of GPS Timing	
G. L. Kusic, W. E. McGahey, M. Lehtonen	297
Conditions for Effective Ground Fault Suppression in Distribution Networks With Capacitive Current Compensation	
A. I. Shirkovets, A. V. Telegin, D. V. Kochura	301
New Method for Calculation of the Harmonics in the Residual Earthfault Current in Isolated and Compensated Networks	
U. Schmidt, K. Frowein, G. Druml, P. Schegner	309