2022 International Conference on Smart Grid Synchronized Measurements and Analytics (SGSMA 2022)

Split, Croatia
24 – 26 May 2022

IEEE Catalog Number: CFP22O77-POD
ISBN: 978-1-6654-9824-1

Copyright © 2022 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: CFP22O77-POD
ISBN (Print-On-Demand): 978-1-6654-9824-1
ISBN (Online): 978-1-6654-9823-4

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

TABLE OF CONTENTS

Technical Solutions for Automation of Distribution Networks Based on SPM Technology 1
Sergey A. Piskunov, Alexey V. Mokeev, Aleksandr I. Popov, Dmitrij N. Ulyanov, Andrey V. Rodionov

Examples of Processing Low-Frequency Oscillations in Russia and Ways to Improve the Analysis 7
Aleksandr I. Popov, Dmitry M. Dubinin, Alexey V. Mokeev, Kirill P. Butin, Andrey V. Rodionov, Sergey A. Piskunov

Transfer Learning for Event-Type Differentiation on Power Systems 13
Haoran Li, Zhihao Ma, Yang Weng, Evangelos Farantatos

Tracking Power Systems Events: PMU, Reporting Rate, Interpolation 19
Guglielmo Frigo, Paolo Attilio Pegoraro, Sergio Toscani

Metrological Significance and Reliability of On-Line Performance Metrics in PMU-Based WLS State Estimation 25
Guglielmo Frigo, Federico Grasso Toro

Characterization of a Low Power Instrument Transformer with Digital Output in Low-Inertia Power Systems 31
Guglielmo Frigo, Marco Agustoni

Optimizing D-PMU Deployment for Distribution System State Estimation 37
Themistoklis C. Xygkis, George N. Korres

Analytical Approach to Phasor-Based Line Parameter Estimation Verified Through Real PMU Data 45
Evgeniy Satsuk, Andrey Zhukov, Dmitriy Dubinin, Igor Ivanov, Andrey Murzin

Synchrophasor-Based Fault Location with Class M Fault Capture and Built-In Line Parameter Estimation 51
Andrey Yablokov, Igor Ivanov, Filipp Kulikov, Andrey Tychkin, Anton Panaschatenko, Andrey Zhukov, Dmitriy Dubinin

Monitoring of the Dynamics of Changes in the Kinetic Energy of Power Plants to Improve the Reliability of Power System Control 57
Andrey Zhukov, Evgeny Satsuk, Dmitriy Dubinin, Vladimir Vasilev

Dynamic Performance Comparison and Prediction Based on Distribution-Level Phasor Measurement Units 63
Yuru Wu, He Yin, Yilu Liu, Shengyou Gao

Investigation of PMU Limitations in Monitoring Fast Dynamics Through Real-Time Hardware-In-The-Loop Experiments 70
Hossein Hooshyar, Aboutaleb Haddadi, Evangelos Farantatos, Mahendra Patel

Real-Time Coherency Identification Using a Window-Size-Based Recursive Typicality Data Analysis 75
Lucas Lugnani, Daniel Dotta, Mario R. A. Paternina, Joe Chow

Experimental Evaluation and Systematic-Error Reduction of Frequency Estimation Using the Zero-Crossing Technique for Dynamic Power Grids 81
Ellen Förstner, Richard Jumar, Orhan Delil Tanrikulu, Heiko Maaß, Uwe Kühnapfel, Veit Hagenmeyer

Non-Homogeneous Sampling Rate Wide Area Backup Protection Using Synchrophasors and IED Data 87
J. J. Chavez, N. Veera Kumar, M. Popov, P. Palensky, Sadegh Azizi, Enrique Melgoza, Vladimir Terzija

Roadmap for Distribution Synchronized Measurements 93
Rich Hunt, Sean Kantra, Damir Novosel, Julio Romero Aguero, Daniel W. Dietmeyer, Tariq Rahman

A Practical Model for Optimal PMU Placement 99
Mohammadreza Maddipour Farrokhifard, Gang Zheng, Manu Parashar, Vijay Sukhavasi

Non-Gaussianity in Frequency Distribution: FNET/GridEye's Observation of Worldwide Grids 105
Chujie Zeng, Wei Qiu, Weikang Wang, Kaiqi Sun, Chang Chen, Yilu Liu

A Hardware in the Loop Testbed for Adaptive Protection of Non-Inteconnected Island Systems with High RES Penetration 111
George Gkiokas, Dimitrios Lagos, George Korres, Nikos D. Hatziargyriou

Slipstream: High-Performance Lossless Compression for Streaming Synchronized Waveform Monitoring Data 118
Steven Blair, Jason Costello

A Python-Based Ringdown Analysis Toolbox for Electromechanical Modes Identification 124
R. D. Reyes, J. A. De La O, M. R. A. Paternina, J. H. Chow, A. Zamora, J. Ortiz

Real-Time Execution of Linear Ringdown Analysis Methods for Identifying Dominant Modes 131
F. E. Reyes, M. G. Juarez, A. Zamora, J. Ortiz, J. C. Silva, M. R. A. Paternina, C. Toledo-Santos

Using Synchrophasor Status Word as Data Quality Indicator: What to Expect in the Field? 137
Zheyuan Cheng, Yi Hu, Zoran Obradovic, Mladen Kezunovic

Enhanced PMU-Based Wide Area Measurement System with Integrated Power Quality and Fault Analysis 143
Paolo Castello, Carlo Muscas, Paolo Attilio Pegoraro, Davide Sitzia, Sara Sulis, Giorgio Maria Giannuzzi, Martina Pede, Camilla Maiolini, Pietro Pau, Fabio Bassi, Claudio Coluzzi

Step Change Detection for Improved ROCOF Evaluation of Power System Waveforms 149
Alexandra Karpilow, Mario Paolone, Asja Derviškadic, Guglielmo Frigo

Machine Learning Using a Simple Feature for Detecting Multiple Types of Events from PMU Data 156
Tatjana Dokic, Rashid Baembitov, Ameen Abdel Hai, Zheyuan Cheng, Yi Hu, Mladen Kezunovic, Zoran Obradovic

Physics-Conditioned Generative Adversarial Networks for State Estimation in Active Power Distribution Systems with Low Observability 162
Mohasinina Kamal, Wenting Li, Deepjyoti Deka, Hamed Mohsenian-Rad

Centralised System for Overfrequency Real-Time Dynamic Settings for Generators 168
Tadeja Babnik, Bojan Mahkovec, Srdan Subotic

Wide-Area Event Identification in Power Systems: A Review of the State-Of-The-Art 173
Mohammad Rezaei Jegarluei, Jesus Sanchez Cortes, Sadegh Azizi, Vladimir Terzija

A Software Toolchain for Real-Time Testing of Synchrophasor Algorithms in MATLAB 180
Lalit Kumar, Shehab Ahmed, Luigi Vanfretti, Nand Kishor

Confidence Metrics for Regional Forced Oscillation Source Localization 186
Jim Follum, Joseph H. Eto

A Reconfigurable Synchrophasor Synchronization Gateway & Controller Architecture for DERs 192
Prottay M. Adhikari, Luigi Vanfretti, Chetan Mishra, Kevin. D. Jones

Iterative Quadrature Demodulation for Harmonic Synchrophasor Estimation..... 198
Dahlia Saba, Miles Rusch, Alexandra Von Meier, David M. Laverty

Big Data Platform for Real-Time Oscillatory Stability Predictive Assessment Using Recurrent Neural Networks and WAProtector's Records 204
Jaime Cepeda, Ignacio Gomez, Fabian Calero, Angel Vaca

A Dynamic Wideband Multi-Component Phasor Estimator Using Matrix Theory..... 210
Dongfang Zhao, Fuping Wang, Shisong Li, Wei Zhao, Songling Huang

Load Frequency Response in the Chilean Power System..... 216
Juan Quiroz, Carlos Fuentes, Hector Chavez

Author Index