

5th Conference on Sustainable Energy Supply and Energy Storage Systems (NEIS 2017)

Hamburg, Germany
21 - 22 September 2017

ISBN: 978-1-7138-0798-8

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2017) by VDE VERLAG GMBH
All rights reserved.

Printed with permission by Curran Associates, Inc. (2020)

For permission requests, please contact VDE VERLAG GMBH
at the address below.

VDE VERLAG GMBH
Bismarckstr. 33
P.O.B. 12 01 43
10625 Berlin, Germany

Phone: +49 30 34 80 01 - 0
Fax: +49 30 34 80 01 - 9088

kundenservice@vde-verlag.de

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

Table of Contents

Keynote

Control Challenges in Power Systems Dominated by Converter Interfaced Generation and Transmission Technologies	15
--	----

Oral Presentations

Session 1: „Grid Operation and Micro Grid Control

Session Chair: Prof. Dr.-Ing. Volker Staudt

1. Variants of Decentralized Voltage and Reactive Power Control of Wind Farms	P 1C
2. Stability of Fast Q(U) Voltage Droop Control of Wind Parks in High Voltage Distribution Grids.	P 1C
3. Mathematical Modeling and Evaluation of a Microgrid Demonstrator in Island Mode	39
4. Power System Restoration and Operation of Island Grids with Frequency Dependent Active	45

Session 2: Grid and Plant Protection

Session Chair: Prof. Dr.-Ing. Christian Becker

1. A Combined Electronic Overvoltage and Overcurrent Protection Concept	53
2. Influence of Virtual Impedance on Short Circuit Performance of Virtual Synchronous Machines in the 9-Bus System	59
3. Advanced Modelling of Equivalent Networks Considering Full-Size Converters in Short-Circuit Current Calculations According to IEC 60909-0:2016	P 1C
4. Detailed discussion of HVDC-Transmission system fault mitigation by MMC based converter stations	72

Session 3: Optimization of Grid Operation

Session Chair: Dr.-Ing. Mirco Alpen

1. Applying Synthetic Distribution Grids for Sensitivity Studies of Grid Expansion Reduction by Curtailment Schemes	81
2. Comparing Local and Wide Area Control Topologies for Oscillation Damping in Electrical Power Systems Using Kinetic Energy of Wind Power Plants	P 1C
3. Model predictive load compensation in distribution grids	94

Session 4: Power Quality

Session Chair: Dr.-Ing. Ivana Mladenovic

1. Impact of Dependence on State Identification Results in Distribution Grids Using Copula Theory	101
2. Development of an Antiserial Super Cascode for the Determination of the Grid Impedance on the Medium-Voltage Level	108
3. Study on the total harmonic distortion of a 5-MW wind turbine with modular multilevel converter and development of a demonstrator	114

Session 5: Energy Storage Systems

Session Chair: Prof. Dr.-Ing. Holger Göbel

1. Economic Optimization of Self-consumption of Generated PV-energy by using Energy Storage Systems and the Influence on Energy Supply Costs	121
2. Estimation of Liquid Metal Battery Parameters of Thevenin Circuit Model Using Levenberg-Marquardt Algorithm	127
3. Maximizing Solar Home Battery Systems' Contribution to the Energy Transition of the Power System	133

Session 6: Planning of Distribution Grids

Session Chair: Dr.-Ing. Klaus-Dieter Dettmann

1. Electric Grid Planning under Consideration of Uncertainties in Load and Supply Using Parametric Sensitivity Analysis	143
2. From forecast to solution – evaluating innovative approaches to uncertain future grid challenges ..	148
3. Evaluation of Reactive Power Management Strategies and Grid Loss Characteristics based on Generic Distribution Grid Models	154

Poster Presentations

Session 1:

1. Battery Energy Storage Systems - Usable Capacity Regarding Constant Battery Power Values and Associated Minimum Charge and Discharge Durations	163
2. Development of a Decentralized Small Battery Energy Storage Network to Compensate for Schedule Deviations	P 1C
3. Economical energy supply of business parks	175
4. Heat supply based on Solar Energy in Tajikistan	P 1C
5. Physical Simulation of a 17 Level Cascaded H-Bridge Inverter on System-Level Using Average Models and Comparison to the Circuit-Level	P 1C
6. Selection of Representative Electrical Grid Structures and Renewable Generation Units for Harmonic Emission Measurement	P 1C
7. Simulating and Testing Heat Pumps' Contribution to Demand Response in Germany	P 1C
8. Smart Charging Management System of Plugged-in EVs for Optimal Operation of Future Power Systems	P 1C

Session 2:

1. A new Look-up Table-Direct Power Control Strategy for Three-Level NPC Rectifier Using Predictive DPC	P 1C
2. An Algorithm for the Temporary Acquisition of Control over Third Party Assets in Active Network Management	P 1C
3. Contribution of a biomass-driven PtG Concept to Congestion Management in the German Power Transmission Grid	P 1C
4. Development of a Virtual Power Plant to Control Distributed Energy Resources for Future Smart Grid	P 1C

5. Dynamic AC-side active and reactive power management of an MMC-based system in case of DC-side short circuit	P 1C
6. Harmonic Stability and Interaction in HVDC Dominated Power Systems	P 1C
7. Primary Control Reserve and Self-Sufficiency Provision with Central Battery Energy Storage System	248
8. Problems with voltage stability due to long-distance transmission of hydropower in the Tajik extra-high voltage grid	P 1C
9. Voltage regulation on distribution grid level with different operation strategies based on a community energy storage system	P 1C

Session 3:

1. A Sampling Time Analysis of Smart Meter Measurement Data for Photovoltaic Generation	263
2. Comparison of Conversion Efficiencies and Energy Yields of Micro-Inverters for Photovoltaic Modules	P 1C
3. Distribution systems as a local support in emergencies	P 1C
4. Harmonic Impedance Measurement of Low-Voltage Consumers with Non-Linear Characteristics ...	P 1C
5. Improved integration of Renewable Energies through comprehensive consideration of GIS-based Data in Grid-Planning of Low-Voltage Grids	P 1C
6. Investigation of the Performance of Nodal and Zonal ENTSO-E Transmission System Models in the Context of Large-Scale Integration of Renewables	289
7. Methodology to generate MV and LV reference network models (RNMs) from public data	296
8. Optimal placement and operation strategies of phase shifting transformers based on heuristic algorithms	P 1C
9. Predictive Direct Torque Control Strategy for Surface-Mounted Permanent-Magnet Synchronous Generators	307

Energy-Slam

1. Modeling the influence of installed battery energy storage systems on the German frequency containment reserve market	315
--	-----