## **Table of Contents**

K	eynote	
11	cynote	
	ontrol Challenges in Power Systems Dominated by Converter Interfaced Generation and ransmission Technologies	15
o	ral Presentations	
	ession 1: "Grid Operation and Micro Grid Control ession Chair: Prof. DrIng. Volker Staudt	
1.	Variants of Decentralized Voltage and Reactive Power Control of Wind Farms	25
2.	Stability of Fast Q(U) Voltage Droop Control of Wind Parks in High Voltage Distribution Grids	32
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
	ession 2: Grid and Plant Protection ession Chair: Prof. DrIng. 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	66
4.	Detailed discussion of HVDC-Transmission system fault mitigation by MMC based converter stations	72
	ession 3: Optimization of Grid Operation ession Chair: DrIng. 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	87
3.	Model predictive load compensation in distribution grids	94
	ession 4: Power Quality ession Chair: DrIng. Ivana Mladenovic	
1.	Impact of Dependence on State Identification Results in Distribution Grids Using Copula Theory	01
2.	Development of an Antiserial Super Cascode for the Determination of the Grid Impedance on the Medium-Voltage Level	08

3. Study on the total harmonic distortion of a 5-MW wind turbine with modular multilevel converter

Session 5: Energy Storage Systems Session Chair: Prof. DrIng. 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		
	ession 6: Planning of Distribution Grids ession Chair: DrIng. 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		
P	oster Presentations			
Se	ession 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	169		
3.	Economical energy supply of business parks	175		
4.	Heat supply based on Solar Energy in Tajikistan	181		
5.	Physical Simulation of a 17 Level Cascaded H-Bridge Inverter on System-Level Using Average Models and Comparison to the Circuit-Level	187		
6.	Selection of Representative Electrical Grid Structures and Renewable Generation Units for Harmonic Emission Measurement	193		
7.	Simulating and Testing Heat Pumps' Contribution to Demand Response in Germany	200		
8.	Smart Charging Management System of Plugged-in EVs for Optimal Operation of Future Power Systems	205		
Se	ession 2:			
	A new Look-up Table-Direct Power Control Strategy for Three-Level NPC Rectifier Using Predictive DPC	211		
2.	An Algorithm for the Temporary Acquisition of Control over Third Party Assets in Active Network Management	217		
3.	Contribution of a biomass-driven PtG Concept to Congestion Management in the German Power Transmission Grid	223		
4.	Development of a Virtual Power Plant to Control Distributed Energy Resources for Future	220		

5.	Dynamic AC-side active and reactive power management of an MMC-based system in case of DC-side short circuit	235
6.	Harmonic Stability and Interaction in HVDC Dominated Power Systems	242
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	255
9.	Voltage regulation on distribution grid level with different operation strategies based on a community energy storage system	259
Se	ession 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	268
3.	Distribution systems as a local support in emergencies	273
4.	$Harmonic\ Impedance\ Measurement\ of\ Low-Voltage\ Consumers\ with\ Non-Linear\ Characteristics\ .\ .$	. 279
5.	Improved integration of Renewable Energies through comprehensive consideration of GIS-based Data in Grid-Planning of Low-Voltage Grids	284
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 $\ \ldots \ \ldots$	296
8.	Optimal placement and operation strategies of phase shifting transformers based on heuristic algorithms	302
9.	Predictive Direct Torque Control Strategy for Surface-Mounted Permanent-Magnet Synchronous Generators	. 307
E	nergy-Slam	
1.	Modeling the influence of installed battery energy storage systems on the German frequency containment reserve market	315
Li	st of Authors	323