IEEE EI² 2024

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THE 8TH IEEE CONFERENCE ON ENERGY INTERNET AND ENERGY SYSTEM INTEGRATION

NOV. 29 - DEC. 02, 2024 | SHENYANG, CHINA

Conference Web: https://attend.ieee.org/ei2-2024

Panel Session 11

Frequency Security Analysis and Optimization Operation Technology of New Type Power System

INTRODUCTION AND TOPICS

The rapid development of renewable energy worldwide has effectively improved the energy structure and reduced pollution emissions. However, the uncertainty, weak anti-interference ability, and low inertia characteristics of renewable energy also bring new challenges to the operation and control of the power system simultaneously. Hence, it is of great significance to deeply explore the frequency regulation potential of various resources to participate in the coordinated operation and control of the power grid, in order to improve the frequency security and economy of the system. This panel session will highlight the latest advancements in frequency modelling and optimization operation theory and methods for new type power systems. Fully utilize multiple types of frequency regulation resources to implement interactive control and coordinated optimal dispatch, while ensuring frequency sscurity of the power system.

1) Modeling of Frequency Security Characteristics for New Type Power System: Constructing frequency response models, considering different frequency regulation methods of various resources including reneable energy and new-type load, to accurately characterize the frequency dynamics of new type power systems.

2) Analysis of Low-Inertia Characteristics and Security Margin Evaluation of New Type Power System: Focusing on the impact of renewable energy and new-type loads on the inertia of the power system, and quantifying the inertia security margin of the power system from the perspective of frequency.

3) Data-Driven Modeling of Frequency Security in the Appliciution of Power System Optimization Operation: Leveraging the combination data and model to obtain the frequency characteristics of the power system, establishing frequency constraints and incorporating them into the optimization model.

4) Frequency Security-Constrained Optimal Scheduling Method for New Type Power System: Utilizing the the frequency regulation potential of multiple resources within source-network-load-storage links, to ensure the frequency security while achieving economic operation of of power systems.

5) Frequency Security-Oriented Optimization Method for Multi-regional Interconnected Power Grids: Exploring the optimization model and efficient solving algorithm for multi-regiaonl systems with AC/DC interconnection, achieving power mutual assistance and frequency joint regulation.

6) Market Mechanism for Frequency Security of New Type Power System: Designing auxiliary service market mechanisms such as inertia response and primary frequency regulation market to incentivize multiple subjets to participate in system frequency support, improving frequency safety of new type power systems.

PANEL SESSION CHAIRS

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I'm presently a Professor with the Department of Electrical Engineering, Northeast Electric Power University. I have led more than 10 scientific research projects including National Natural Science Foundation of China. I serve as a Youth editorial board member or associate editor of Applied Energy, Protection and Control of Modern Power Systems (PCMP), Power System Protection and Control (in Chinese) and Review Editor of Frontiers in Energy Research. I also serve as guest editor of IET Energy Systems Integration and International Journal of Electrical Power & Energy Systems. I have published more than 60 papers related to market and economics topics. I'm also a reviewer of several IEEE PES transactions including TSG, TSTE and TPWRS.

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I'm presently an associate professor with the Key Laboratory of Smart Grid of Ministry of Education, Department of Electrical Engineering, Tianjin University. My research interests include energy management of multi-energy buildings and their integrations with integrated energy systems, and the energy & flexibility markets solutions. From 2019 to 2022, I was a postdoc researcher with the Centre of Electric Power and Energy, Technical University of Denmark, Denmark. I have published more than 60 papers with over 2000 citations, including 2 ESI top 1% highly cited papers, and led several projects such as the projects of National Natural Science Foundation of China.

PAPER SUBMISSION

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