

Special Session IX

Special Session Basic Information:

专栏题目 Session Title

中文：面向新型电力系统频率稳定的分析与多主体主动支撑关键技术
英文：Analysis and Multi-agent Active Support Key Technologies for Frequency Stability of New Power Systems

专栏介绍和征稿主题 Introduction and topics

中文：全球能源转型正加速推进，高比例可再生能源并网、高比例电力电子设备接入已成为全球电力系统发展的核心趋势。系统等效惯量水平持续下降、频率调控主体多元分散、功率扰动的随机性与波动性显著增强，传统频率稳定分析理论与调控模式已难以适配新型电力系统的安全运行需求。挖掘源-网-荷-储多维度资源的主动支撑能力，构建多主体协同的频率稳定防控体系，是保障电力系统频率安全的核心路径，也是当前国际电力工程领域共同关注的关键技术方向。

本分论坛以“面向新型电力系统频率稳定的分析与多主体主动支撑关键技术”为主题，聚焦频率稳定领域的前沿基础理论、关键技术方法与工程实践应用，旨在为国内外高校、科研机构、电网企业与产业单位搭建高水平学术交流平台，围绕频率稳定分析建模、多主体主动支撑、协同优化控制等核心议题展开深度研讨，分享最新研究成果与工程经验，共同推动新型电力系统频率稳定控制技术的创新发展，助力电力系统安全、高效、低碳运行。征稿主题包括但不限于：

1. 新型电力系统频率动态特性建模与稳定性量化分析；
2. 新能源发电主动惯量支撑与快速调频控制技术；
3. 储能系统多时间尺度频率主动支撑与优化控制；
4. 负荷侧柔性资源参与频率调控的响应机制与协同方法；
5. 交直流混联系统频率交互机理与协同稳定控制；
6. 多主体调频资源的优化配置与市场激励机制；
7. 极端工况与高扰动场景下的频率安全防御技术；
8. 新能源电网的惯量-频率在线评估、防控及工程应用。

英文：Against the backdrop of accelerating global energy transition, high penetration of renewable energy and massive integration of power electronic devices have become core trends in the development of power systems worldwide. The continuous decline of system equivalent inertia, the diversification and decentralization of frequency regulation entities, and the significantly increased randomness and volatility of power disturbances have made traditional frequency stability analysis theories and regulation modes difficult to adapt to the safe operation requirements of modern power systems. Tapping the active support capability of multi-dimensional resources across generation, grid, load and energy storage, and building a multi-agent collaborative frequency stability prevention and control system, is the core path to ensure power system frequency security, and also a key technical direction of common concern in the international power engineering community.

With the theme of *Analysis and Multi-agent Active Support Key Technologies for Frequency Stability of New Power Systems*, this sub-forum focuses on cutting-edge basic theories, key technical methods and engineering practices in the field of frequency stability. It aims to build a high-level academic exchange platform for universities, research institutions, power grid enterprises and industrial units at home and abroad, conduct in-depth discussions on core topics such as frequency stability analysis and modeling, multi-agent active support, and collaborative optimal control, share the latest research achievements and engineering experience, and jointly promote the innovative development of frequency stability control technologies for new power systems, so as to facilitate the safe, efficient and low-carbon operation of power systems. The topics include, but are not limited to:

1. Frequency dynamic characteristic modeling and quantitative stability analysis of new power systems;
2. Active inertia support and fast frequency regulation control technologies for renewable energy generation;
3. Multi-time-scale active frequency support and optimal control of energy storage systems;

4. Response mechanism and collaborative approach of load-side flexible resources in frequency regulation;
5. Frequency interaction mechanism and collaborative stability control of hybrid AC/DC power systems;
6. Optimal allocation and market mechanism of multi-agent frequency regulation resources;
7. Frequency security defense technologies under extreme conditions and large-disturbance scenarios;
8. Online assessment, defense and engineering application of inertia-frequency security in renewable energy-integrated power grids.

Special Session Chair(s):

	姓名	刘先超
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Organizer's Brief Biography

中文：刘先超，博士，讲师，硕士生导师，本硕博毕业于东北电力大学电气工程专业。曾获 CSC 资助前往意大利都灵理工大学博士联合培养，合作导师为 Gianfranco Chicco 教授（IEEE Fellow）与黄涛教授。主要研究方向为电力系统安全稳定分析与控制，以第一作者/通讯作者发表 SCI/EI 期刊论文 8 篇，授权发明专利 3 项，公开发明专利 8 项。主持国家自然科学基金青年基金项目 C 类 1 项，省部级纵向课题 1 项和横向项目 1 项。

英文：Dr. Xianchao Liu is a Lecturer and Master's Supervisor at the Department of Electrical Engineering, Northeast Electric Power University. Dr. Liu received B.Eng., M.Eng. and Ph.D. degrees in Electrical Engineering of Northeast Electric Power University. He completed CSC-funded joint doctoral training at Politecnico di Torino, Italy, with co-supervisors Prof. Gianfranco Chicco (IEEE Fellow) and Prof. Tao Huang. His main research interests focus on security and stability analysis and control of power systems. He has published 8 SCI/EI indexed journal papers as the first or corresponding author, holds 3 granted invention patent, and has 8 published invention patent applications. He is leading a Young Scientists Fund project (Category C) funded by the National Natural Science Foundation of China, a provincial/ministerial project and an industry-funded project.

	姓名	周泓宇
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Organizer's Brief Biography

中文：周泓宇，博士，副教授，主要研究方向为高比例新能源交直流电力系统频率稳定分析与控制。主持国家自然科学基金项目 2 项，以第一/通讯作者在 IEEE TPWRS/TSTE/TPWRD 等权威 SCI/EI 期刊发表论文 22 篇，其中 2 篇 IEEE TPWRS 论文入选 ESI 全球前 1% 热点论文或 1% 高被引论文，作为封面主编在 Springer Nature 出版英文专著 2 部。获中国电工技术学会科技进步一等奖等科技奖励一等奖 3 项，入选中国电工技术学会博士学位论文激励计划、“中国知网高被引学者”等，担任 Protection and Control of Modern Power Systems (SCI 一区 TOP) 青年编委。

英文：Hongyu Zhou, Ph.D., Associate Professor. His main research interests lie in frequency stability analysis and control

of AC-DC power systems with high penetration of renewable energy. He has presided over 2 projects funded by the National Natural Science Foundation of China. As the first or corresponding author, he has published 22 papers in prestigious SCI/EI journals including *IEEE TPWRS*, *IEEE TSTE* and *IEEE TPWRD*. Among them, 2 papers published in *IEEE TPWRS* have been selected as ESI Hot Papers (Top 0.1%) or ESI Highly Cited Papers (Top 1%). He has edited 2 English monographs published by Springer Nature as cover editor. He has won three first-class science and technology awards including the First-Class Prize of Science and Technology Progress Award from the China Electrotechnical Society. He has been selected for programs such as the Doctoral Dissertation Incentive Program of the China Electrotechnical Society and “CNKI Highly-Cited Scholar”. He serves as a Youth Editorial Board Member of *Protection and Control of Modern Power Systems*.

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Organizer's Brief Biography		
中文：姜超，工学博士，讲师，硕士生导师，2024年毕业于东北电力大学，吉林市科学技术学会常务理事。长期从事新型电力系统频率稳定性分析、电力系统及综合能源系统优化运行等领域的研究工作。主持国家自然科学基金青年科学基金项目（C类）1项，参与国家自然科学基金项目、国家重点研发计划项目、省部级项目等6项，国家电网公司科技项目等10余项。相关方向发表SCI/EI期刊论文20余篇，授权专利10余项。担任《Protection and Control of Modern Power Systems》《电力系统保护与控制》期刊青年助理编辑、《综合智慧能源》期刊青年编委。 英文：Chao Jiang received the Ph.D. degree in engineering from Northeast Electric Power University in 2024. He is currently a Lecturer and Master's Supervisor at Northeast Electric Power University and serves as an Executive Council Member of the Jilin City Association for Science and Technology. His research interests include frequency stability analysis of modern power systems and the optimal operation of power and integrated energy systems. He is currently leading a Young Scientists Fund project (Category C) funded by the National Natural Science Foundation of China. He has also participated in six research projects funded by the National Natural Science Foundation of China, the National Key Research and Development Program of China, and provincial- and ministerial-level programs, as well as more than ten science and technology projects sponsored by the State Grid Corporation of China. He has published more than 20 SCI and EI indexed journal papers and holds more than ten granted patents. He currently serves as a Young Associate Editor for 《Protection and Control of Modern Power Systems》, and as a Young Editorial Board Member of 《Integrated Intelligent Energy》.		