

Special Session IX

Special Session Basic Information:

专栏题目 Session Title

中文：面向新型电力系统的源-网-荷-储-氢协同运行与规划关键技术
英文：Key Technologies for Collaborative Operation and Planning of Source-network-load-storage in New-Type Power Systems

专栏介绍和征稿主题 Introduction and topics

中文：

新型电力系统的转型推动了可再生能源技术的显著进步，加速了包括储能、电动汽车、氢能在内的多种新型主体在电力系统中的深度融合。这一变革迫切需要重新审视源-网-荷-储各类资源的协同运行与一体化规划方式。分布式能源资源、虚拟电厂以及创新型储能解决方案的兴起，给电网的运行与规划带来了新的挑战。为应对这些挑战，需要发展先进的建模技术，提出高效的运行和规划策略，以释放系统灵活性，增强系统韧性，促进可再生能源在新型电力系统中的大规模接入。因此，本专题旨在为该领域的最新研究成果提供一个交流与展示的平台，特别关注人工智能与运筹优化在源-网-荷-储协同运行与规划中的融合应用，以及电动汽车和氢能等新型要素的集成与管理。

征文范围：

1. 人工智能在源-网-荷-储协同中的应用
基于人工智能的预测、控制与决策方法
融合机器学习与优化算法的能源系统运行策略
深度强化学习等技术在多能系统中的应用
2. 电动汽车与氢能的集成与管理
车网互动技术及其在电力系统中的应用
车-桩-路-网协同运行与优化调度策略
氢能在新型电力系统中的集成与应用
3. 数字化与智能化技术在新型电力系统中的应用
大数据分析云计算在电力系统中的应用
边缘计算与物联网技术在源-网-荷-储协同中的作用
智能传感与监测技术在电力系统运行中的应用
4. 新型主体的协同运行与规划策略
智能微电网的自治运行与协同控制技术
分布式能源资源的聚合与优化调度策略
面向新型电力系统的韧性评估与增强策略
5. 源-网-荷-储一体化建模与优化方法
多时间尺度下的源-网-荷-储协同建模与调度策略
基于图计算、数字孪生等技术的系统建模与仿真平台
考虑源荷不确定性的源-网-荷-储协同优化运行方法

英文：

The transition towards a new-type power system has driven significant advancements in renewable energy technologies and the integration of various new entities into power systems, including energy storage, and advanced load management. This shift calls for a reimagining of how to collaboratively operate and plan those source-network-load-storage resources. The rise of distributed energy resources, virtual power plants, and innovative storage solutions presents unique challenges in coordination, reliability, and optimization. Addressing these challenges requires the development of advanced modeling techniques, and operational and planning strategies to unlock system-wide flexibility, enhance resilience, and facilitate the large-scale adoption of renewable energy in

new-type power systems. For this reason, this topic intends to provide a platform to share the latest findings on this subject (either research or review articles).

Special Session Chair(s):

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Organizer's Brief Biography

中文： 蔺晨晖，IEEE Senior Member，清华大学电机系助理研究员、硕士生导师，入选中国科协青年人才托举工程，获 2023 年北京市科技进步一等奖（2/15）、中电联特等奖（3/15）、日内瓦发明展金奖（2 次），国家科技重大专项课题负责人。担任 IEEE 能源互联网协调委员会技术程序主席、IEEE P2048.501 工作组秘书、中国电工技术学会主动配电网及分布式电源专委会委员，SCI 期刊《IET Renewable Power Generation》等 5 本期刊编委，多个国际会议分会主席与召集人。发表学术论文 50 篇，申请发明专利 70 余项，获中国科协优秀科技论文、领跑者 F5000 论文等多个论文奖。

英文：

Chenhui Lin is an assistant professor with the department of Electrical Engineering at Tsinghua University. He received the B.S. and Ph.D. degrees in electrical engineering from Tsinghua University, in 2015 and 2020, respectively. He was a visiting Ph.D. Student with the Illinois Institute of Technology, Chicago, IL, USA, in 2019. He is currently a Research Assistant Professor with the Department of Electrical Engineering, Tsinghua University. His research focuses on the renewable power system operation and the application of machine learning in power systems.

He was a recipient of the Young Elite Scientists Sponsorship Program by China Association for Science and Technology. He serves as the Technical Program Chair of IEEE PES Energy Internet Coordination Committee. He has published over 40 academic papers with over 1200 citations. He has led or participated in more than 30 scientific and technological projects, including the National Natural Science Foundation of China's Youth Fund and sub-projects of the National Key Research and Development Program. He has developed a high-proportion renewable energy power grid energy management system, active distribution network operation and cluster control system and equipment, which have been widely used in multiple provincial power grids of China.

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Organizer's Brief Biography

中文：

王琪，博士后研究员，2019年本科毕业于哈尔滨工业大学电气学院，2024年博士毕业于清华大学电机系。研究方向为面向大规模新能源接入的电力系统运行调控与高效优化算法。现任《Protection and Control of Modern Power Systems》SCI期刊青年编委，并在多本SCI/EI期刊组织专栏，同时担任IEEE Transactions、Elsevier旗下期刊及数学优化期刊的审稿人。在IEEE Transactions on Power Systems / Smart Grid、Applied Energy等SCI期刊发表论文十余篇，授权发明专利7项。曾获学会优秀博士学位论文奖，以及多项IEEE国际学术会议最佳论文奖与最佳报告奖。

英文：

Qi Wang received the B.S. degree in 2019 from the School of Electrical Engineering and Automation at Harbin Institute of Technology, and the Ph.D. degree in 2024 from the Department of Electrical Engineering at Tsinghua University. He is currently a Postdoc Fellow at the Hong Kong Polytechnic University. His research interests focus on efficient algorithms empowered by optimization and AI for the operation and control of energy systems. Dr. Wang serves as a Youth Editorial Board Member of Protection and Control of Modern Power Systems. He was awarded the Outstanding Doctoral Dissertation Award in 2024.



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Organizer's Brief Biography

中文：吴晨雨，河海大学副教授，经江苏省高层次和急需紧缺人才高级职称考核认定委员会考核认定为江苏省正高级研究员。获2022年度江苏省科学技术一等奖，2023年电力建设科学技术进步奖。总计发表论文30余篇，其中以第一作者发表中科院一区文章十余篇，主持国家自然科学基金2项，中国博士后特别资助项目1项。任《中国电力》、《电力建设》、《电力科学与技术学报》青年编委，《Energies》、《Processes》客座编辑和专题咨询组专家。

研究方向 1：分布式优化理论+微分博弈，在电网运行、电力市场设计和多能系统（规划+调度）中的应用；

研究方向 2：最优控制理论+鲁棒控制+逆向工程，在分布式多机协同优化运行和电力系统频率控制中的应用。

英文：Chenyu Wu is an Associate Professor at Hohai University and has been recognized as a Full Senior Researcher in Jiangsu Province through the assessment by the Provincial High-Level and Urgently Needed Talent Professional Title Evaluation Committee. He has received several prestigious awards, including the First Prize of Jiangsu Provincial Science and Technology Award (2022), the Electric Power Construction Science and Technology Progress Award (2023). He has authored over 30 research papers, among which more than 10 are first-authored publications in Chinese Academy of Sciences (CAS) Category 1 journals. He has secured key research grants as the principal investigator, including two projects from the National Natural Science Foundation of China (NSFC) and one from the China Postdoctoral Science Foundation Special Funding Program. He serves as a Youth Editorial Board Member for several leading Chinese power engineering journals, such as China Electric Power, Electric Power Construction, and Journal of Electric Power Science and Technology. Internationally, he contributes as a Guest Editor for Energies and Processes, and as a member of their Topic Advisory Panel. Research Directions:

Distributed Optimization Theory + Differential Game: Applied to power grid operation, electricity market design, and integrated energy systems (planning and scheduling).

Optimal Control Theory + Robust Control + Inverse Modeling: Applied to distributed multi-agent cooperative optimization and power system frequency control.