

Special Session XIV

Special Session Basic Information:

专栏题目 Session Title	中文：多元灵活资源驱动的新型电力系统智能决策与协同优化 英文：Intelligent Decision-Making and Coordinated Optimization for New Power Systems with Diverse Flexible Resources
专栏介绍和征稿主题 Introduction and topics	
中文：随着新能源大规模接入及终端用电电气化加速发展，新能源汽车、工业柔性负荷、虚拟储能等多元灵活资源广泛接入新型电力系统，为提升系统调节能力与新能源消纳水平提供了重要支撑。然而，不同灵活资源在时空分布、响应特性及运行约束等方面存在显著差异，其与电网、交通网及工业用能系统的深度耦合，使系统运行呈现高维非线性、多主体互动和强不确定性等特征，对资源精准建模、协同调控与优化决策提出了新的挑战。人工智能、先进优化与数字孪生等技术的发展，为挖掘多元灵活资源调节潜力、实现跨域协同与智能决策提供了新路径。本专题聚焦多元灵活资源驱动的新型电力系统智能决策与协同优化，重点探讨多元资源建模与潜力评估、多源信息驱动的智能决策、跨网络协同调控及复杂不确定性下的优化运行，为新型电力系统安全、高效、低碳和智能运行提供理论与技术支撑。 主题包括但不限于： ● 新能源高比例接入下智能电网的复杂建模、感知预测与智能决策 ● 交通-电力融合系统的多网耦合建模、协同运行与智能优化 ● 电动汽车及虚拟储能资源的聚合建模、灵活调控与协同优化 ● 工业需求响应与柔性负荷的智能感知、潜力评估及优化调控 ● 多源不确定性下智能电网的鲁棒决策、韧性提升与安全运行 ● 人工智能与先进优化技术在新型电力系统规划、运行及控制中的应用 英文：With the large-scale integration of renewable energy and the accelerating electrification of end-use sectors, diverse flexible resources, including new energy vehicles, industrial flexible loads, and virtual energy storage, are being increasingly integrated into new power systems, providing essential flexibility to enhance system regulation capability and renewable energy accommodation. However, these flexible resources differ significantly in their spatiotemporal distributions, response characteristics, and operational constraints. Their deep interactions with power grids, transportation networks, and industrial energy systems introduce high-dimensional nonlinearities, multi-agent interactions, and significant uncertainties, posing new challenges to accurate resource modeling, coordinated control, and optimal decision-making. Advances in artificial intelligence, advanced optimization, and digital twin technologies provide new approaches to unlocking the flexibility potential of diverse resources and enabling cross-domain coordination and intelligent decision-making. This Special Issue focuses on Intelligent Decision-Making and Coordinated Optimization of New Power Systems Driven by Diverse Flexible Resources, with particular emphasis on modeling and flexibility potential assessment of diverse resources, multi-source information-driven intelligent decision-making, cross-network coordinated control, and optimal operation under complex uncertainties. It aims to provide theoretical foundations and enabling technologies for the secure, efficient, low-carbon, and intelligent operation of new power systems. Topics of interest include, but are not limited to: ● Complex modeling, situational awareness, forecasting, and intelligent decision-making for smart grids with high penetration of renewable energy ● Multi-network coupling modeling, coordinated operation, and intelligent optimization of integrated transportation-power systems ● Aggregation modeling, flexible control, and coordinated optimization of electric vehicles and virtual en	

ergy storage resources

- Intelligent sensing, flexibility potential assessment, and optimal control of industrial demand response and flexible loads
- Robust decision-making, resilience enhancement, and secure operation of smart grids under multiple sources of uncertainty
- Applications of artificial intelligence and advanced optimization techniques to the planning, operation, and control of future power systems

Special Session Chair(s):

	姓名 Name	乔文杰 Wenjie Qiao
	称谓 Prefix	讲师 Lecturer
	部门 Department	计算机与通信工程学院 School of Computer and Communication Engineering
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Organizer's Brief Biography

中文：乔文杰，IEEE PES 中国卫星技术委员会综合能源系统技术委员会秘书。于 2024 年在东北大学（沈阳）获得控制科学与工程博士学位。目前为清华大学电机系访问学者，并担任东北大学秦皇岛分校计算机与通信工程学院讲师。研究方向包括交通-电力系统协同运行与控制以及综合能源系统低碳运行等。在 IEEE TASE, IEEE TTE, IEEE TIA, IEEE TVT, Applied Energy 等期刊发表学术论文 10 余篇，拥有 3 项以上授权发明专利。主持及参与包括国家自然科学基金、河北省自然科学基金在内的各类科研项目 5 项。曾荣获东北大学卓越博士称号、IEEE PES 中国卫星技术委员会优秀志愿者奖等荣誉。此外，长期担任 IEEE TASE, IEEE TTE, Applied Energy 等国际权威学术期刊审稿人。

英文：Wenjie Qiao serves as Secretary of the Integrated Energy Systems Technical Committee of the IEEE PES China Satellite Technical Committee. He received his Ph.D. degree in Control Science and Engineering from Northeastern University, Shenyang, China, in 2024. He is currently a visiting scholar with the Department of Electrical Engineering, Tsinghua University, and a Lecturer with the School of Computer and Communication Engineering, Northeastern University at Qinhuangdao. His research interests include coordinated operation and control of integrated transportation-power systems and low-carbon operation of integrated energy systems. He has published more than 10 academic papers in journals including IEEE Transactions on Automation Science and Engineering (IEEE TASE), IEEE Transactions on Transportation Electrification (IEEE TTE), IEEE Transactions on Industry Applications (IEEE TIA), IEEE Transactions on Vehicular Technology (IEEE TVT), and Applied Energy, and holds more than three granted invention patents. He has led or participated in five research projects, including projects funded by the National Natural Science Foundation of China and the Natural Science Foundation of Hebei Province. He has received several honors and awards, including the Outstanding Doctoral Graduate Award from Northeastern University and the Outstanding Volunteer Award from the IEEE PES China Satellite Technical Committee. In addition, he has served as a reviewer for leading international journals, including IEEE TASE, IEEE TTE, and Applied Energy.

	姓名 Name	张萌 Meng Zhang
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Organizer's Brief Biography

中文：张萌，教授，国家重点研发计划首席科学家，青年长江学者，西安交通大学青年拔尖人才 A 类/王宽诚青年学者。博士毕业于浙江大学控制科学与工程学院，获陕西高校科学技术研究优秀成果奖一等奖、中国自动化学会科技进步一等奖、中国自动化学会自然科学一等奖、吴文俊人工智能优秀青年奖、华为昇思 - 中国人工智能学会学术基金优秀项目奖等荣誉。在 Automatica 长文、IEEE TAC 长文、IEEE TIFS 等期刊会议发表论文 90 余篇，主持国家重点研发计划、国家自然科学基金联合重点项目、国防科技创新特区项目、企业课题等 20 余项。担任 IEEE TASE、IEEE TCYB 等期刊副编及 IEEE IECON、ICIRCE 等国际会议论坛主席。研究方向包括电力系统优化控制与安全、非线性系统控制、移动机器人等。

英文：Zhang Meng, Professor, Chief Scientist of the National Key R&D Program of China, Young Yangtze River Scholar, and Young Top-notch Talent / K.C. Wong Young Scholar of Xi'an Jiaotong University. He received his Doctoral degree from the College of Control Science and Engineering, Zhejiang University. His awards include the First Prize of Excellent Scientific and Technological Research Achievements in Shaanxi Universities, the First Prize for Science and Technology Progress of the Chinese Association of Automation, the First Prize for Natural Science of the Chinese Association of Automation, the Wu Wenjun Outstanding Young Scholar Award in Artificial Intelligence, and the Huawei MindSpore-Chinese Association for Artificial Intelligence Academic Fund Excellent Project Award. He has published more than 90 papers in journals and conferences including full-length articles in Automatica, IEEE TAC and IEEE TIFS. He has led over 20 research projects such as the National Key R&D Program of China, the Joint Key Project of the National Natural Science Foundation of China, the National Defense Science and Technology Innovation Special Zone Project, and industrial research grants. He serves as an Associate Editor for journals including IEEE TASE and IEEE TCYB, and Forum Chair for international conferences such as IEEE IECON and ICIRCE. His research interests cover optimal control and security of power systems, nonlinear system control, and mobile robots.

	姓名 Name	张慧峰 Huifeng Zhang
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中文：张慧峰，南京邮电大学教授/博士生导师，IEEE/CAA 高级会员，主要从事信息物理电力系统的安全能量管理方面的研究工作，以第一作者或唯一通讯作者身份在《IEEE Transactions on Power Systems》、《IEEE Transactions on Smart Grid》等 IEEE 汇刊和能源控制领域权威期刊上发表学术论文六十余篇（SCI 收录 40 余篇），在 Springer 上出版英文专著 1 项，授权发明专利 23 项，主持国家省部市级科研项目 8 项（其中国家自然科学基金面上项目 2 项）；获包括江苏省科学技术奖一等奖、中国自动化学会技术发明一等奖在内的科技奖励 10 项。目前担任国际学术期刊《IEEE Transactions on Industrial Informatics》（影响因子 12.3）编委、以及《Complex System Modeling and Simulation》等 8 个期刊编委/青年编委。任 2023、2024 年亚洲人工智能技术大会分会主席、中国仿真学会智能仿真优化与调度专委会常务委员、中国自动化学会能源互联网专委会委员、IEEE PES 中国区智能电网分会理事和 IEEE CIS member。

英文：Huifeng Zhang is a Professor and Ph.D. Supervisor at Nanjing University of Posts and Telecommunications, and a Senior Member of IEEE and CAA. His research interests focus on secure energy management of cyber-physical power systems. He has published more than 60 papers in leading journals, including IEEE Transactions on Power Systems and IEEE Transactions on Smart Grid, over 40 of which are indexed by SCI. He has published one English monograph with Springer, holds 23 authorized invention patents, and has led eight research projects, including two General Program projects funded by the National Natural Science Foundation of China.

He has received 10 scientific and technological awards, including the First Prize of the Jiangsu Provincial Science and Technology Award and the First Prize of the Technical Invention Award of the Chinese Association of Automation. He currently serves as an editorial board member of IEEE Transactions on Industrial Informatics and as an editorial board

member of several international journals. He has also served as a Session Chair of the Asian Conference on Artificial Intelligence Technology (ACAIT) in 2023 and 2024, and holds academic service positions in the China Simulation Federation, Chinese Association of Automation, IEEE PES, and IEEE CIS.

	姓名 Name	卢仁智 Renzhi Lu
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中文：卢仁智，华中科技大学副教授，博士生导师，入选 2022 年度中国科协青年人才托举工程，主要从事复杂系统安全学习理论及应用（深度强化学习与无人系统调控博弈和工业制造能源优化）。主持国基金面上、青年项目等多项，以项目骨干身份参与国基金重点、JKW 重点和科技部科技创新 2030 项目等多项。以第一作者发表中科院一区 SCI 论文多篇，包括 Nature Communications、Research(Science 合作期刊)、IEEE TPAMI、IEEE TIE、IEEE TSG、IEEE TH、IEEE TNNLS 等，ESI 高被引论文 3 篇。担任国际期刊 IEEE Transactions on Consumer Electronics、IEEE Computational Intelligence Letters Associate Editor，国内期刊 Research、The Innovation Informatics、Journal of Artificial and Automation 青年编委，控制工程客座编委，IEEE IECON 2023 特约编委，IEEE INDIN 2025 Program Chair。

英文：Renzhi Lu received the B.E. degree in electronic information engineering from the School of Information Science and Engineering, Wuhan University of Science and Technology, Wuhan, China, in 2014, and the Ph.D. degree in electronic systems engineering from the Department of Electronic Systems Engineering, Hanyang University, Ansan, South Korea, in 2019. He is currently an Associate Professor with the School of Artificial Intelligence and Automation, Huazhong University of Science and Technology, Wuhan, where he was a Lecturer from 2019 to 2021. His research interests include learning, optimization, and control with applications to smart manufacturing, smart grid, and unmanned systems.

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中文：吴成昊，博士，东北电力大学讲师，主要从事电力市场、输配协同、电力系统灵活性研究。在 IEEE Transactions、Applied Energy 等刊物发表 SCI/EI 论文 10 余篇，作为项目骨干参与国家重点研发项目、国家自然科学基金项目、吉林省自然科学基金项目、国网和南网科技项目等 10 余项。

英文：Chenghao Wu, Ph.D., is a Lecturer at Northeast Electric Power University. His research interests include transmission and distribution coordinated power systems, power markets, and system flexibility. He has published more than 10 SCI/EI-indexed papers. As a key project member, he has participated in 10 research projects, including the National Key R&D Program of China, projects funded by the National Natural Science Foundation of China and the Natural Science Foundation of Jilin Province, as well as science and technology projects of State Grid Corporation of China and China Southern Power Grid.

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Organizer's Brief Biography	
中文：博士，东北大学（秦皇岛）计算机与通信工程学院讲师，硕士生导师，清华大学电机系访问学者。主要从事电力、综合能源系统协调规划与优化运行。主持各类课题 5 项，参与智能电网国家科技重大专项、国家重点研发计划项目、电网公司科技项目多项，发表 SCI/EI 论文 10 余篇。 英文：PhD, Lecturer and Master's Supervisor at the School of Computer and Communication Engineering, Northeastern University at Qinhuangdao. Visiting Scholar in the Department of Electrical Engineering, Tsinghua University. Her research focuses on coordinated planning and optimal operation of power systems and integrated energy systems. She has presided over 5 research projects and participated in multiple projects including the National Science and Technology Major Project for Smart Grid, National Key R&D Program, and research projects sponsored by power grid corporations. She has published more than 10 SCI/EI indexed papers.	