

Special Session V

Special Session Basic Information:

专栏题目

Session Title

中文：人工智能驱动的电力系统运行安全评估与优化控制

英文：AI-Driven for Secure Operation Assessment and Optimal Control of Power Systems

专栏介绍和征稿主题

Introduction and topics

中文：随着高比例可再生能源接入、系统结构复杂性提升以及运行不确定性增强，现代电力系统正面临前所未有的稳定性与灵活性挑战。人工智能（AI）技术作为新一代智能化手段，为电力系统的安全、经济与高效运行提供了全新的思路和解决方案。本专题旨在探讨人工智能在未来电力系统建模、控制与优化运行中的最新研究进展与工程应用。重点关注基于AI的智能调度与决策、自适应控制与不确定性管理、预测运行、以及AI驱动的电力系统态势感知等方向。通过融合多源异构数据与先进的AI算法，推动电力系统向自学习、自适应与自优化的方向演进。我们诚挚邀请国内外学者和工程技术人员投稿并参与本专题，共同探讨人工智能、数据科学与电力系统工程的深度融合，助力电力系统的数字化与智能化发展。

征稿主题与关键词：


1. 基于人工智能的电力系统智能调度与决策
2. 数字孪生与强化学习在电力系统运行与控制中的应用
3. 面向不确定性的电力系统安全与稳定评估技术
4. 基于机器学习的电力设备故障诊断与预测性运维
5. 面向高比例可再生能源电网的AI赋能能量管理与灵活性协调
6. 面向隐私保护的边缘学习与联邦学习在电力系统中的应用

英文：The rapid evolution of modern power systems—marked by a high penetration of renewable energy, increasingly complex grid structures, and growing operational uncertainties—poses unprecedented challenges to system stability, flexibility, and intelligence. Artificial intelligence (AI) has emerged as a transformative way to address these issues, offering data-driven, model-enhanced, and decision-support solutions that enhance the security and efficiency of power system operations. This special session is dedicated to exploring the latest advances in AI-driven modeling, control, and optimization techniques for power system operation in the context of digitalization and energy transition. Key topics of interest include intelligent dispatching, adaptive control under uncertainty, predictive operation, and AI-enhanced situational awareness. By integrating multi-source heterogeneous data with advanced AI algorithms, researchers and practitioners can collectively advance the development of self-learning, self-adaptive, and self-optimizing power systems. We cordially invite scholars and engineers to present their recent research findings and innovative applications in this field, fostering deeper collaboration across artificial intelligence, data science, and power system engineering.

Topics and Keywords:

1. AI-Driven Intelligent Dispatch and Decision-Making for Power Systems
2. Digital Twin and Reinforcement Learning Applications in Power System Operation and Control
3. Data-Driven Security and Stability Assessment under Uncertainty
4. Machine Learning-Based Fault Diagnosis and Predictive Maintenance of Power Equipment
5. AI-Enabled Energy Management and Flexibility Coordination in Renewable-Dominated Power Grids
6. Edge and Federated Learning for Privacy-Preserving Power System Applications

Special Session Chair(s):

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Organizer's Brief Biography

中文：刘佩，工学博士，硕士生导师，清华大学博士后/助理研究员，现为北京化工大学机电工程学院副教授。主要从事智能电网、基于人工智能的新能源设备故障诊断与寿命预测、能源网络系统控制与优化等领域等研究。近年来，在 Springer 出版专著一部，并在 IEEE Journal on Selected Areas in Communications、IEEE Transactions on Smart Grid、IEEE Transactions on Industrial Informatics、IEEE Internet of Things Journal、IEEE Transactions on Industry Applications、IEEE Transactions on Mobile Computing 等国际期刊发表论文二十余篇。受邀担任国际 SCI 期刊《Protection and Control of Modern Power Systems》副编辑、中文核心期刊《电力信息与通信技术》编委，以及 ECE、CCPQT 等国际会议的程序委员会成员；入选河北省优秀博士学位论文（省优博）。

英文：Pei Liu, female, M.S. supervisor, Postdoctoral Fellow/Assistant Researcher at Tsinghua University, is currently an associate professor at the School of Mechanical and Electrical Engineering, Beijing University of Chemical Technology. Her research mainly focuses on smart grid, new energy equipment fault diagnosis and life prediction based on artificial intelligence, network control and optimization. In recent years, she has published a book in Springer, and published more than twenty papers in IEEE Journal on Selected Areas in Communications, IEEE Transactions on Smart Grid, IEEE Transactions on Industrial Informatics, IEEE Internet of Things Journal, IEEE Transactions on Industry Applications, IEEE Transactions on Mobile Computing and other journals. She has been invited as an editorial board member of the Chinese core journal Power Information and Communication Technology, TPC member of ECE, CCPQT and other international conferences; She was selected as an excellent doctoral dissertation of Hebei Province (Provincial Excellent Doctoral Dissertation).

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Organizer's Brief Biography

中文：张博，男，南京邮电大学校聘副教授，入选中国科协青年科技人才托举工程、江苏省青年科技人才托举工程、河北省优秀博士论文和江苏省科技副总；在 IEEE-TSG 和 IEEE-TSE 等期刊/会议发表论文 60 余篇；已获授权和申请专利 20 余项；发布 2 项团体标准；基于以上成果，获得中国仪器仪表学会-金国藩青年学子奖等多项科研奖励及荣誉；受邀担任国际 SCI 1 区期刊《Protection and Control of Modern Power Systems》青年编委（获 2024 年度优秀编委称号）和客座编辑，以及多次国际会议 Session Chair；担任中国仪器仪表学会高级会员、嵌入式分会理事、中国自动化学会青年工作委员会委员等。

英文：Zhang Bo, male, is an Associate Professor appointed by Nanjing University of Posts and Telecommunications. He has been selected for the China Association for Science and Technology's Young Science and Technology Talent Support Program, the Jiangsu Province Young Science and Technology Talent Support Program, the Hebei Province Outstanding Doctoral Dissertation Award, and the Jiangsu Province Talent Program. He has published over 60 papers in journals/conferences such as IEEE-TSG and IEEE-TSE, holds over 20 authorized and applied patents, and has released 2 group standards. Based on these achievements, he has received multiple research awards and honors, including the China Instrument and Control Society-Jin Guofan Young Scholar Award. He has been invited to serve as a Young Editorial Board Member (awarded the 2024 Outstanding Editorial Board Member title) and Guest Editor for the international SCI Q1 journal Protection and Control of Modern Power Systems, and has chaired multiple sessions at international conferences. He holds positions including Senior Member of the China Instrument and Control Society, Council Member of the Embedded Systems Branch, and Committee Member of the Youth Working Committee of the Chinese Association of Automation.



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Organizer's Brief Biography

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Transactions on Power Systems、IEEE Transactions on Industrial Electronics、IEEE Transactions on Cybernetics、IEEE Transactions on Fuzzy Systems、IEEE Transactions on Systems, Man, and Cybernetics: Systems 等发表 SCI 论文 15 篇，编著专著 1 本；获中国电子学会优秀博士学位论文奖（排 1）、湖北省自然科学二等奖（排 4）、中国仿真学会自然科学二等奖（排 4）等科技奖励，受邀担任《Engineering Reports》期刊副主编以及《中国电力》、《电力系统保护与控制》、《电力科学与技术学报》等期刊青年编委等学术兼职，并获 SIC 期刊《Journal of the Franklin Institute》的“杰出审稿人”荣誉称号；获湖北高校省级一流本科课程（排 4）等教学奖项。

英文：Li Jin, female. She is a Professor in the China University of Geosciences (Wuhan) and receives the CUG Scholar-Young Top-Notch Talents (Category A) Program. She received the B.S. degree in Automation and the Ph.D. degree in Control Science and Engineering from China University of Geosciences, Wuhan, China, in 2016 and 2021, respectively. She was a joint Ph.D. student with the Department of Electrical Engineering and Electronics, University of Liverpool, Liverpool, U.K., from 2018 to 2020. She is currently a Professor in the School of Automation, China University of Geosciences, Wuhan, China. Her current research interests include power system stability analysis and control, networked control system.

She has presided the National Natural Science Foundation of China (General Program and Youth Program), China Postdoctoral Science Foundation, Hubei Provincial Natural Science Foundation, Hubei Province Foundation for Postdoctoral Innovation Research Position. She has also played key roles in the National Natural Science Foundation of China (one Key Program and two General Programs). She has published 15 SCI papers as first or corresponding author in top/authoritative journals of the power-system and control fields, including IEEE Transactions on Power Systems, IEEE Transactions on Industrial Electronics, IEEE Transactions on Cybernetics, IEEE Transactions on Fuzzy Systems, and IEEE Transactions on Systems, Man, and Cybernetics: Systems, and has published one monograph.

On the basis of these researches, she has received the Outstanding Doctoral Dissertation Award of the Chinese Institute of Electronics (Rank 1), Hubei Provincial Natural Science Award, Second Class (Rank 4), Natural Science Award of China Simulation Federation, Second Class, (Rank 4). She serves as Associate Editor of Engineering Reports and as a young editorial-board member of China Electric Power, Power System Protection and Control, and Journal of Electric Power Science and Technology. She was certificated the Outstanding Contribution in Reviewing 《Journal of the Franklin Institute》 (Rank 1). She also received the Provincial First-Class Undergraduate Course in Hubei Universities (Rank 4).



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中文：张宁，安徽大学特聘副教授，工学博士，硕士生导师。主要从事车网互动、人工智能在能源互联网的应用、基于多智能体的分布式控制、综合能源系统等方向研究。主持国家自然科学基金 1 项，省重点研究与开发计划项目 1 项，阳光新能源企业横向课题 2 项，教育部产学研合作协同育人项目 1 项。参与多项国家重点研发计划课题、国家自然科学基金项目、国家电网重大科技项目等。近 5 年来，在 *IEEE Trans. on Smart Grid*、*IEEE Trans. on Industrial Informatics*、*IEEE Trans. on Power System*、中国电机工程学报等国内外知名期刊发表 SCI/EI 论文 20 余篇（中科院一区 8 篇），ESI 高被引论文 2 篇（其中单篇被引破百）。获 2023 年度中国可再生能源学会科学技术奖二等奖，AET 青年科学家奖、2024 年综合智慧能源大会示范科技成果二等奖，EI2024 优秀论文奖，中国电机工程学会能源互联网专委会首届学术年会优秀论文奖，第二十一届长三角电力技术研讨会优秀论文，第十八届电力工业企业节能减排研讨会优秀论文，ICCSIE 2024 最佳报告奖。2 篇论文写入专著，以章节第一作者出版英文著作 1 本，相关理论和技术成果获得多位 IEEE Fellow/院士的正面评价，授权或受理国家发明专利 6 项，美国专利 2 项。担任《广东电力》青年编委、《中国电力》青年编委、《综合智慧能源》青年编委、ICCSIE 2023 会议程序组主席、SPIES 2022 分论坛主席、Sustainable 期刊 Special Issue Leader Editor 等多项学术兼职。

英文：Ning Zhang, Distinguished Associate Professor at Anhui University, holds a Ph.D. in Engineering and serves as a Master's supervisor. His research focuses on vehicle-grid interaction, artificial intelligence applications in energy internet, multi-agent-based distributed control, and integrated energy systems. He has led one National Natural Science Foundation project, one provincial key research and development program, two industry-sponsored projects from Sunshine New Energy, and one Ministry of Education industry-academia collaboration initiative. He has participated in multiple National Key R&D Program projects, National Natural Science Foundation projects, and major State Grid Corporation of China scientific research initiatives. Over the past five years, he has published over 20 SCI/EI papers in renowned international and domestic journals including *IEEE Transactions on Smart Grid*, *IEEE Transactions on Industrial Informatics*, *IEEE Transactions on Power Systems*, and *Transactions of the Chinese Society for Electrical Engineering* (8 papers in Q1 journals of the Chinese Academy of Sciences). Two papers are ESI highly cited papers (one with over 100 citations). He received the Second Prize of the 2023 China Renewable Energy Society Science and Technology Award, AET Young Scientist Award, Second Prize for Exemplary Scientific Achievements at the 2024 Comprehensive Smart Energy Conference, EI 2024 Outstanding Paper Award, Outstanding Paper Award at the First Academic Annual Meeting of the Energy Internet Committee of the Chinese Society for Electrical Engineering, Outstanding Paper at the 21st Yangtze River Delta Power Technology Symposium, Outstanding Paper at the 18th Power Industry Energy Conservation and Emission Reduction Symposium, and Best Presentation Award at ICSSIE 2024. Two papers incorporated into monographs; published one English monograph as first author of a chapter. Relevant theoretical and technological achievements received positive evaluations from multiple IEEE Fellows/Academicians. Authorized or accepted: 6 national invention patents, 2 U.S. patents. Holds multiple academic positions including: Young Editorial Board Member of *Guangdong Electric Power*, Young Editorial Board Member of *China Electric Power*, Young Editorial Board Member of *Integrated Smart Energy*, Program Committee Chair for ICSSIE 2023, Session Chair for SPIES 2022, and Special Issue Leader Editor for *Sustainable* journal.

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Organizer's Brief Biography

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夏侯凯顺，华南理工大学电力学院副教授，硕士生导师，主要从事新能源电力系统与交直流电网的安全与控制研究，已发表 SCI 论文 20 余篇，主持国家自然科学基金、中国电机工程学会“青年人才托举工程”、广东省/广州市基础与应用基础研究、国家重点实验室开放基金等项目，参与国家自然科学基金重点项目、广东省重点领域研发计划项目等研究课题。《Protection and Control of Modern Power Systems》、《电力信息与通信技术》等期刊的青年编辑/编委。

英文：

Kaishun Xiahou is now an Associate Professor at School of Electric Power Engineering, South China University of Technology. His research interests include cyber-physical security and resilient control of power systems with renewable energy. Dr. Xiahou is the principal investigator of young elite scientist sponsorship program by Chinese Society for Electrical Engineering (CSEE), National Natural Science Foundation of China, and Guangdong Basic and Applied Basic Research Foundation. He has published more than 20 SCI papers and he is the young editor of Protection and Control of Modern Power Systems, and Electric Power Information and Communication Technology.


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Engineering & System Safety 等管理、工程交叉领域高水平期刊发表论文 20 篇、授权申请知识产权 6 项，承担国家自然科学基金面上、青年项目。研究成果在国家粮食应急保障系统、贵州电网示范应用。入选北京市科协青年人才托举工程，获得日内瓦国际发明展金奖、中国电工技术学会科技进步二等奖、华人学者管理科学与工程协会最佳管理实践奖。担任首批北京市科协决策咨询专家团青年研究员，北京生产力学会理事、青年工作委员会主任，IEEE PES 智能电网与新技术委员会（中国）韧性(弹性)电网技术分委会理事、中国工程院“1+9”院刊《Frontiers of Engineering Management》特约通讯专家。

英文：Jingsi Huang, female, M.S. supervisor, Postdoctoral Fellow/Associate Researcher at Peking University, is currently an associate professor at the School of Economics and Management, Beijing University of Chemical Technology. Her research mainly focus on infrastructure systems centered around electric energy, the research explores network modeling, optimization scheduling, and resilience enhancement methods driven by the integration of data and mechanisms. The team has published 20 papers spanning management and engineering interdisciplinary fields, such as IEEE Transactions on Sustainable Energy, IEEE Transactions on Industry Applications, iScience, and Reliability Engineering & System Safety, and has applied for 6 intellectual property rights. They have undertaken projects funded by the General Program and Youth Program of the National Natural Science Foundation of China. Their research findings have been applied in the National Grain Emergency Support System and the Guizhou Power Grid demonstration application. The team was selected for the Beijing Association for Science and Technology's Young Talent Support Project, and has won the Gold Award at the Geneva International Invention Exhibition, the Second Prize for Scientific and Technological Progress from the China Electrotechnical Society, and the Best Management Practice Award from the Chinese Association for Management Science and Engineering. They serve as the first batch of young researchers in the decision-making advisory expert group of the Beijing Association for Science and Technology, a director of the Beijing Productivity Society, a director of the Youth Work Committee, a director of the Resilience (Elasticity) Grid Technology Subcommittee of the IEEE PES Smart Grid and New Technology Committee (China), and a special communication expert for the "1+9" journal "Frontiers of Engineering Management" of the Chinese Academy of Engineering.

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Organizer's Brief Biography

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篇，累计被引超过 400 次。

英文：Yuanai Xie, male, Lecturer of South-Central Minzu University, his research interest includes wireless communication resource allocation in Power system, vehicular networks, physical layer security, and GAI-enabled optimization. Currently, he has published more than 30 papers in IEEE Trans. Veh. Technol., IEEE/CAA Journal of Automatica Sinica, etc., and has been positively cited by more than 400 citation.