

# Special Session XVII

## Special Session Basic Information:

### 专栏题目 Session Title

中文：人工智能在高比例新能源配用电系统优化控制中的应用  
英文：Application of Artificial Intelligence in Optimization Control of High Proportion New Energy Power Distribution System

### 专栏介绍和征稿主题 Introduction and topics

专栏介绍：

中文：随着风电、光伏等新能源在电力结构中的比重持续提升，配用电系统正经历从传统单向供电向高比例新能源接入的深刻变革。这一转变在推动能源清洁化的同时，也带来了稳定性、电能质量与系统控制复杂性的新挑战。人工智能技术凭借其强大的数据处理、模式识别与自主决策能力，正成为破解这些难题、实现配用电系统智能化跃升的关键驱动力。本论坛将聚焦人工智能在高比例新能源配用电系统优化控制中的应用这一核心方向，包括通过强化学习与多智能体（Agent）等技术，协同分布式电源、储能和负荷进行优化控制、显著提升新能源消纳能力；利用AI等技术优化设计变流器控制策略，增强高比例新能源配用电系统在孤岛或并网模式下的控制性能；通过数据驱动等技术治理新能源间歇性和波动性引发的电压偏差、谐波等问题。未来，通过AI、数字孪生与控制等技术的深度融合，可以充分释放分布式资源的调节潜力，有效支撑高比例新能源配用电系统的优化控制与稳定运行。因此，诚邀全球学者与业界专家共同探讨AI如何赋能优化控制，推动高比例新能源配用电系统向更智能、更高效方向发展。

英文：With the continuous increase in the proportion of new energy such as wind power and photovoltaics in the power structure, the distribution system is undergoing a profound transformation from traditional one-way power supply to high proportion new energy integration. This transformation, while promoting clean energy, also brings new challenges in terms of stability, power quality, and system control complexity. Artificial intelligence technology, with its powerful data processing, pattern recognition, and autonomous decision-making capabilities, is becoming a key driving force for solving these problems and achieving the intelligent leap of power distribution systems. This forum will focus on the core direction of the application of artificial intelligence in the optimization control of high proportion new energy distribution systems. Through technologies such as reinforcement learning and multi-agent systems, distributed power sources, energy storage, and loads will be coordinated for optimization control, significantly improving the new energy consumption capacity; Using AI and other technologies to optimize the design of inverter control strategies and enhance the control performance of high proportion new energy distribution systems in islanding or grid connected modes; To address voltage deviation, harmonics, and other issues caused by the intermittency and volatility of new energy through data-driven technologies. In the future, through the deep integration of technologies such as AI, digital twins, and control, the regulatory potential of distributed resources can be fully unleashed, effectively supporting the optimization control and stable operation of high proportion new energy distribution and power systems. Therefore, we sincerely invite scholars and industry experts from around the world to explore how AI can empower and optimize control, and promote the development of high proportion new energy distribution and power systems towards a more intelligent and efficient direction.

征稿主题（包含但不限于）

中文：

1. 高比例可再生能源配用电系统电能质量协同控制与人工智能技术
2. 分布式能源微网/微网群智能构网控制技术
3. 人工智能在新能源配用电系统稳定性分析中的应用
4. 人工智能在新能源配用电系统协同控制中的应用
5. 分布式能源优化控制与设备/系统性能提升方法

英文：

1. Power Quality Control and Artificial Intelligence Technology for High Proportion New Energy Power Distribution

## System

2. Distributed Energy Resources Microgrid/Microgrid Group Intelligent Grid-forming Control Technology
3. Application of Artificial Intelligence in Stability Analysis of New Energy Power Distribution System
4. Application of Artificial Intelligence in Collaborative Control of New Energy Power Distribution System
5. Optimization Control of Distributed Energy Resources and Methods for Improving Equipment/System Performance

## Special Session Chair(s):

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## Organizer's Brief Biography

中文：邓卫，男，研究员，博士生导师，中国电工技术学会交直流供配电技术及装备专委会委员兼副秘书长。主要从事分布式可再生能源、微电网、交直流混联配电等领域的系统设计、稳定控制以及优化运行相关研究工作，主持国家重点研发计划项目 1 项、课题 1 项；主持国家自然科学基金青年/面上/联合重点项目等 3 项，相关成果在《IEEE Transactions on Industrial Electronics》、《IEEE Transactions on Power Systems》等国内外高质量刊物发表 SCI\EI 论文 150 余篇，授权国家发明专利 40 余项，并获得中国仿真学会技术发明一等奖、中国机械工业科学技术进步一等奖、中国电力科技创新一等奖、北京市科学技术进步一等奖等荣誉奖励。

英文：Wei Deng, male, Professor and Doctoral Supervisor of the Institute of Electrical Engineering, Chinese Academy of Sciences. He is the member/deputy secretary-general of the AC/DC Power Distribution Technology and Equipment Committee, from the Chinese Electrotechnical Society. His research interests include system design, stable control, and optimized operation in the fields of distributed renewable energy, microgrids, and AC/DC hybrid distribution. he has directed the national key research and development plan project, and three National Natural Science Foundation of China, and published more than 150 SCI/EI papers in high-quality journals such as *IEEE Transactions on Industrial Electronics* and *IEEE Transactions on Power Systems*. he has been granted more than 40 national invention patents and won honors such as the First Prize for Technical Invention of the China Simulation Federation, the First Prize for Scientific and Technological Progress of the Chinese Machinery Industry, the First Prize for Scientific and Technological Innovation of the China Electricity Council, and the First Prize for Scientific and Technological Progress of Beijing.

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## Organizer's Brief Biography

中文：孙凯祺，男，教授、博士生导师。主要研究领域为中压柔直互联规划与运行控制、可再生能源并网控制。近年来，主持国家自然科学基金重点项目课题、国家自然科学基金青年基金、国家重点研发计划子课题、国家重大专项子课题等国家级项目/课题 4 项，山东省自然科学基金 2 项。以第一/通讯作者在 IEEE Trans. Power Syst. 等学科国际顶级期刊发表 SCI 期刊论文 36 篇（4 篇入选 ESI 高被引论文），第一发明人授权国家发明专利 11 项，软著 3 项，第二作者出版中文专著一部，参编英文著作两部，参与 IEC 国际标准 1 项，以第 1 完成人获得中国电力企业联合会电力创新一等奖、工信部能源电子产业创新大赛三等奖、日内瓦国际发明展银奖。

英文：Kaiqi Sun, male, Professor and Doctoral Supervisor. His research interests primarily lie in medium-voltage VSC-DC interconnection planning and operational control, and grid-integration control of renewable energy. In recent years, he has directed 4 national-level projects or sub-projects, including a key project of the National Natural Science Foundation of China, the Young Scientists Fund of the National Natural Science Foundation of China, a sub-task of the National Key R&D Program of China, and a sub-task of a national major science and technology project, as well as 2 projects supported by the Shandong Provincial Natural Science Foundation. He has published 36 SCI journal papers as the first author or corresponding author in top international journals, 4 of which are ESI Highly Cited Papers. As the first inventor, he has been granted 11 national invention patents and 3 computer software copyrights. He is the second author of one Chinese monograph, has participated in the compilation of two English monographs, and contributed to the formulation of one IEC international standard. As the first completer, he has received the First Prize of Electric Power Innovation awarded by the China Electricity Council, the Third Prize of the Energy Electronics Industry Innovation Competition by the Ministry of Industry and Information Technology, and the Silver Medal at the Geneva International Exhibition of Inventions.



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英文：Zhenxiong Wang received the B.S. and Ph.D. degrees in electrical engineering from Xi'an Jiaotong University, Xi'an, China, in 2014 and 2021, respectively. He is currently an Associate Professor with Xi'an Jiaotong University. His research interests include inverter control in microgrid and power quality.