

Special Session III

Special Session Basic Information:

专栏题目

Session Title

中文：电能质量与优质供电

英文：Power Quality and High-quality Power Supply

专栏介绍和征稿主题

Introduction and topics

中文：随着新能源大规模并网与新型电力系统的加速构建，电能质量与优质供电已成为保障能源安全、支撑产业升级的坚实基础。在“双碳”目标驱动下，高比例可再生能源的波动性、间歇性与非线性特性使得电网频率波动、电压及谐波扰动问题频发，而数字化、智能化用电场景的普及进一步放大了高质量供电需求。当前，电网公司通过定制化电能质量治理装备、储能补偿、需求响应等手段，实现电能质量优化提升，有效缓解了新能源并网对电能质量的冲击。然而，大规模新型源荷分散接入、随机波动，传统点对点治理效果不佳，电能质量动态感知、新能源接入承载能力评估、多类型灵活资源电能质量协同调控难度大，仍制约着电网高质量供电目标的实现。为深化产业变革，推动新质生产力发展，本专栏聚焦电能质量优化提升的技术创新，汇聚跨领域研究成果，为构建安全、高效、绿色的新型电力系统提供理论和技术支持。主题包括但不限于：


- 新型电力系统电能质量仿真与优化技术
- 大规模新能源接入下的电能质量感知与量测技术
- 电能质量动态监测与智能预警关键技术研究
- 分布式新能源集群与区域电网柔性互联下的电能质量协同管控技术
- 灵活资源协同参与电网电能质量控制技术
- 基于人工智能与大数据驱动的电网电能质量优化提升技术
- 分布式新能源与储能接入规划技术
- 大规模分布新能源接入电网承载能力评估技术

英文：With the large-scale integration of new energy into the grid and the accelerated construction of a new power system, power quality and high-quality power supply have become a solid foundation for ensuring energy security and supporting industrial upgrading. Driven by the "dual carbon" goals, the volatility, intermittency, and nonlinear characteristics of a high proportion of renewable energy sources have led to frequent issues such as grid frequency fluctuations, voltage, and harmonic disturbances. Moreover, the popularization of digital and intelligent electricity consumption scenarios has further amplified the demand for high-quality power supply. Currently, power grid companies are achieving the optimization and improvement of power quality through means such as customized power quality management equipment, energy storage compensation, and demand response, effectively alleviating the impact of new energy grid connection on power quality. However, the decentralized access and random fluctuations of a large number of new sources and loads, as well as the poor governance effect of the traditional point-to-point approach, pose significant challenges in dynamic power quality perception, assessment of the carrying capacity for new energy access, and coordinated control of power quality by multiple types of flexible resources. These factors still restrict the realization of the goal of high-quality power supply in the power grid. In order to deepen industrial transformation and promote the development of new productive forces, this column focuses on the technological innovation of power quality optimization and improvement, gathers cross-disciplinary research achievements, and provides theoretical and technical support for the construction of a safe, efficient, and green new power system. The topics include but are not limited as below:

- Simulation and optimization technologies for power quality in new power systems
- Power quality sensing and measurement technologies under the large-scale integration of new energy sources

- Research on key technologies for dynamic power quality monitoring and intelligent early warning
- Coordinated management and control technologies for power quality under the flexible interconnection between distributed new energy clusters and regional power grids
- Technologies for the coordinated participation of flexible resources in power quality control of the power grid
- Technologies for the optimization and improvement of power quality in the power grid driven by artificial intelligence and big data
- Access planning technologies for distributed new energy sources and energy storage
- Assessment technologies for the carrying capacity of the power grid under the large-scale distributed access of new energy sources

Special Session Chair(s):

	姓名 Name	Ying Wang
	称谓 Prefix	Prof
	部门 Department	College of Electrical Engineering
	单位 Organization	Sichuan University
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Organizer's Brief Biography

中文:汪颖, 四川大学电气工程学院, 教授、教育部青年长江学者、四川省自然科学基金创新研究群体负责人、省级高校重点实验室主任。长期从事电能质量与优质供电研究, 近年主持国家重点研发计划课题、子课题各 1 项, 国家自然科学基金项目 3 项(联合基金重点/面上/青年)。授权中国、美国发明专利 54 件, 其中 5 件受让实施许可(成果转化 300 万元)。获省级科技进步奖 5 项, 其中四川省科技进步奖一等奖 1 项(排 1); 行业及学会科技进步奖 10 项, 其中中国电机工程学会电力科学技术进步奖一等奖 1 项(排 1), 中电联电力科技创新奖一等奖 3 项(排 1/排 3/排 8); 中国发明协会发明创业奖项目奖金奖 2 项(排 1/排 3)。获评中国电机工程学会电力优秀科技工作者、中国电机工程学会“电力之光”科学传播专家等。牵头制定电能质量领域最核心国家标准《电能质量术语》(报批稿)(排 1), 作为电能质量领域最根本纲领和地基, 支撑全国电能质量管理、治理工作和行业发展; 主笔电能质量国际标准 IEEE Std. 2938-2023(排 2)、IEC TR 63222-100: 2023(排 8)等 2 项; 主笔电能质量国家标准 GB/T 39227-2020(排 2)等共 7 项、行业标准 DL/T 2475.1-2022(排 3)等 6 项。担任 IEEE P2938 副主席、IEEE P3453 副主席等。《中国电机工程学报》、《供用电》等期刊电能质量主题专刊客座主编 4 次。

英文:Wang Ying, a professor at the School of Electrical Engineering, Sichuan University, is a Young Changjiang Scholar of the Ministry of Education, the leader of the Innovative Research Group of the Sichuan Provincial Natural Science Foundation, and the director of a provincial key laboratory in universities. She has long been engaged in the research of power quality and high - quality power supply. In recent years, she has presided over 1 project and 1 sub - project of the National Key Research and Development Program, and 3 projects of the National Natural Science Foundation of China (Key Joint Fund/General Program/Youth Program). She has been authorized 54 Chinese and American invention patents, among which 5 have been transferred for implementation licenses (with transfer of research results value of 3 million yuan). She has won 5 provincial - level scientific and technological progress awards, including 1 first - class award of the Sichuan Provincial Scientific and Technological Progress Award (ranked 1st). She has also won 10 industry and society scientific and technological progress awards, including 1 first - class award of the Power Science and Technology Progress Award of the Chinese Society for Electrical Engineering (ranked 1st), 3 first - class awards of the Electric Power Science and Technology Innovation Award of the China Electricity Council (ranked 1st/ranked 3rd/ranked 8th), and 2 gold awards of the Invention Entrepreneurship Award of the China Invention Association (ranked 1st/ranked 3rd). She has been rated as an outstanding scientific and technological worker in the power field by the Chinese Society for Electrical Engineering, and a "Power of Electricity" science communication expert of the Chinese Society for Electrical Engineering. She took the lead in formulating the most core national standard in the power quality field, "Power Quality - Terms" (draft for approval) (ranked 1st). As the

fundamental program and foundation in the power quality field, it supports the national power quality management, treatment work, and industry development. She was the main writer of 2 international standards in the power quality field, IEEE Std. 2938 - 2023 (ranked 2nd) and IEC TR 63222 - 100: 2023 (ranked 8th), 7 national standards including GB/T 39227 - 2020 (ranked 2nd), and 6 industry standards including DL/T 2475.1 - 2022 (ranked 3rd). She serves as the vice - chair of IEEE P2938 and IEEE P3453. She has been the guest editor - in - chief of special issues on power quality in journals such as "Proceedings of the CSEE" and "Power Supply & Utilization" for 4 times.