

Special Session Proposal

Special Session Basic Information:

专栏题目 Session Title	中文：智能配电网态势感知 英文：Intelligent Distribution Network Situational Awareness
专栏介绍和征稿主题 Introduction and topics	
中文： 专栏介绍 随着能源结构转型和新型电力系统的建设，智能配电网态势感知已成为保障电网安全运行、提升供电可靠性的核心技术之一。态势感知通过多模态数据融合、实时监测与智能预测，帮助电网实现从“被动响应”到“主动防御”的转变，尤其在应对高比例新能源接入、用户需求多样化、电力数据爆炸式增长等挑战中展现出关键作用。 本专栏聚焦智能配电网态势感知的前沿理论与工程实践，涵盖技术框架设计、数据驱动建模、预测算法优化、系统集成与应用等方向。专栏旨在推动态势感知技术在配电网故障诊断、用户服务优化、分布式能源协同等场景的深度学习，为学术界和工业界搭建交流平台，助力实现“双碳”目标下的电网智能化与低碳化转型。	
征稿主题 1. 态势感知技术框架与数据融合 <ul style="list-style-type: none">●多源异构数据（如智能电表、PMU、物联网终端）的采集与融合方法●基于 5G 通信、边缘计算的数据实时传输与处理技术●大数据与人工智能驱动的态势感知模型构建（如随机森林算法、深度学习） 2. 态势理解与预测技术 <ul style="list-style-type: none">●配电网运行状态诊断与风险评估（如电压波动、失电风险预警）●用户停电敏感度分析与投诉预测模型●新能源高渗透场景下的负荷预测与分布式能源协同调度 3. 系统开发与可视化工程实践 <ul style="list-style-type: none">●态势感知可视化建模与人机交互设计●智能终端（如传感器、无人机巡检）与主站协同的在线监测系统开发●故障快速定位与自愈控制技术（如带电作业“零感知”检修模式） 4. 挑战与创新方向 <ul style="list-style-type: none">●高冗余数据处理压力与算法优化●网络连通性故障诊断与装置规约调试（如 SNMP 协议配置、版本兼容性）●态势感知系统在极端天气、网络攻击等场景下的鲁棒性研究 5. 政策与标准化 <ul style="list-style-type: none">●智能配电网态势感知技术标准与评价体系●国内外典型案例分析（如电缆数字化改造、虚拟电厂集成）	
英文： Introduction With the transformation of energy structures and the development of new power systems, situational awareness in smart distribution grids has become a core technology for ensuring grid security and enhancing power supply reliability. By integrating multi-modal data fusion, real-time monitoring, and intelligent prediction, situational awareness enables power grids to shift from "passive response" to "active defense." It plays a pivotal role in addressing challenges such as	

high-penetration renewable energy integration, diversified user demands, and explosive growth of power data.

This special column focuses on cutting-edge theories and engineering practices in situational awareness for smart distribution grids, covering technical frameworks, data-driven modeling, predictive algorithm optimization, system integration, and applications. It aims to advance the application of situational awareness technologies in fault diagnosis, user service optimization, distributed energy coordination, and other scenarios. By bridging academia and industry, this column will support the intelligent and low-carbon transformation of power systems under the "dual-carbon" goals.

Topics

1. Technical Frameworks and Data Fusion
 - Acquisition and fusion methods for multi-source heterogeneous data (e.g., smart meters, PMUs, IoT terminals)
 - Real-time data transmission and processing via 5G communication and edge computing
 - AI- and big data-driven situational awareness models (e.g., random forest, deep learning)
2. State Understanding and Prediction
 - Distribution grid state diagnostics and risk assessment (e.g., voltage fluctuation, outage risk warning)
 - User outage sensitivity analysis and complaint prediction models
 - Load forecasting and distributed energy coordination under high renewable energy penetration
3. System Development and Visualization
 - Visualization modeling and human-machine interaction design for situational awareness
 - Online monitoring systems integrating smart terminals (e.g., sensors, UAVs) and control centers
 - Fast fault location and self-healing control (e.g., "zero-perception" live-line maintenance)
4. Challenges and Innovations
 - Algorithm optimization for high-redundancy data processing
 - Network connectivity diagnostics and protocol debugging (e.g., SNMP configuration, version compatibility)
 - Robustness of situational awareness systems under extreme weather or cyberattacks
5. Policy and Standardization
 - Technical standards and evaluation frameworks for smart grid situational awareness
 - Global case studies (e.g., digital cable retrofitting, virtual power plant integration)

Special Session Chair(s):

照片	姓名 Name	
	称谓 Prefix	
	部门 Department	
	单位 Organization	
	城市/地区 City/Region	

Organizer's Brief Biography

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