

Special Session XVI

Special Session Basic Information:

专栏题目 Session Title	中文：城市电力-关键基础设施耦合系统韧性评估与提升 英文：Resilience Assessment and Enhancement of Urban Power Systems Coupled with Critical Infrastructures
专栏介绍和征稿主题 Introduction and topics	
中文： 随着城市能源系统和关键基础设施互联程度不断加深，电力系统已成为支撑供水、通信、交通、算力等城市关键基础设施正常运行的重要基础。与此同时，各类关键基础设施对电力系统运行状态的反馈作用也日益增强，使城市电网逐步呈现多系统耦合、跨域关联和风险交互传播等特征。在极端天气与蓄意攻击等扰动下，电力设备故障可能通过跨系统依赖关系进一步传播，引发重要负荷失供、关键基础设施功能下降甚至跨系统级联失效，对城市电力安全保障和灾害应急恢复提出新的挑战。 本专栏面向城市电力系统与关键基础设施深度耦合背景下的安全与韧性问题，以电力系统安全运行和韧性提升为核心，重点关注电力与供水、通信、交通、算力等基础设施的耦合建模，极端条件下电网故障向其他基础设施的传播及反馈作用，城市电网脆弱性与韧性评估，以及跨系统协同防御、运行和恢复优化等理论、方法与工程应用，旨在推动城市电力系统韧性研究由单一电网向多基础设施协同保障拓展。 征稿主题包括但不限于： 1. 城市电力系统与供水、通信、交通、算力等关键基础设施耦合建模与运行分析； 2. 极端天气与蓄意攻击下城市电网风险建模； 3. 电力故障向关键基础设施传播及跨系统级联失效机理； 4. 考虑关键基础设施依赖关系的城市电网脆弱性评估； 5. 跨系统反馈作用下城市电网运行风险演化与动态安全评估； 6. 面向关键基础设施保障的城市电网关键设备与薄弱环节辨识； 7. 电力-关键基础设施协同防御、应急控制与运行优化； 8. 灾后城市电网与关键基础设施协同抢修及恢复优化； 9. 考虑城市基本功能影响的电力系统韧性评估； 10. 数据-机理融合驱动的城市电网风险推演与韧性提升。 英文： With the increasing interconnection between urban energy systems and critical infrastructures, electric power systems have become fundamental to the reliable operation of water supply, communication, transportation, computing, and other essential urban services. Meanwhile, the growing dependence and feedback from these infrastructures are reshaping urban power systems into highly interconnected systems characterized by cross-domain dependencies and interactive risk propagation. Under disruptive events such as extreme weather and intentional attacks, failures originating in power systems may propagate through interdependent infrastructures, leading to critical load interruptions, degradation of essential urban services, and even cross-infrastructure cascading failures. These emerging challenges require new theories and methodologies for enhancing the resilience of urban power systems from a multi-infrastructure perspective. This Special Session focuses on the security and resilience of urban power systems coupled with critical infrastructures, with power system operation and resilience enhancement as the central theme. It aims to promote research on power-infrastructure coupling models, cross-infrastructure failure propagation and feedback mechanisms,	

vulnerability and resilience assessment of urban power systems, and coordinated protection, operation, and restoration across multiple infrastructures. The session seeks to advance urban power system resilience research from conventional grid-centric analysis toward coordinated resilience of interconnected critical infrastructures.

Topics of interest include, but are not limited to:

1. Modeling and operation of urban power systems coupled with water, communication, transportation, computing, and other critical infrastructures;
2. Risk modeling of urban power systems under extreme weather and intentional attacks;
3. Propagation of power system failures and cross-infrastructure cascading failure mechanisms;
4. Vulnerability assessment of urban power systems considering critical infrastructure dependencies;
5. Dynamic operational risk assessment of urban power systems considering cross-infrastructure feedback;
6. Identification of critical components and vulnerabilities in urban power systems for critical infrastructure support;
7. Coordinated protection, emergency control, and operation of power and critical infrastructure systems;
8. Post-disaster coordinated repair and restoration of urban power and critical infrastructure systems;
9. Power system resilience assessment considering essential urban functions;
10. Data-physics-driven approaches for urban power system risk simulation and resilience enhancement.

Special Session Chair(s):



姓名 Name	万海洋 Haiyang Wan
称谓 Prefix	讲师 Lecturer
部门 Department	电气与电子工程学院 The School of Electrical and Electronic Engineering
单位 Organization	华北电力大学 North China Electric Power University
城市/地区 City/Region	北京 Beijing

Organizer's Brief Biography

中文：万海洋，讲师，本科、博士均就读于华北电力大学电气与电子工程学院电气工程专业，主要研究方向为极端天气下配电网运行安全、电力与城市关键基础设施耦合系统风险评估，近年来主持中央高校基本科研业务费学科交叉创新专项 1 项，作为研究骨干参与智能电网重大专项课题等多项项目。近年来，以第一作者或通信作者在 *IEEE Transactions on Smart Grid* 等权威 SCI/EI 期刊发表论文 10 余篇，担任 *IEEE Transactions on Power Systems*、*IEEE Transactions on Sustainable Energy*、*IEEE Transactions on Power Delivery*、*Reliability Engineering & System Safety* 及《电力系统自动化》等国内外高水平期刊审稿人。

英文：Haiyang Wan is a Lecturer with the School of Electrical and Electronic Engineering at North China Electric Power University, where he received his B.Eng., and Ph.D. degrees in Electrical Engineering. His research interests include the operational security of power distribution systems under extreme weather events and risk assessment of coupled power and urban critical infrastructure systems. He is currently leading an interdisciplinary innovation project supported by the Fundamental Research Funds for the Central Universities and has participated as a key researcher in major research projects related to smart grids. In recent years, he has published more than ten papers as the first or corresponding author in leading SCI- and EI-indexed journals, including *IEEE Transactions on Smart Grid*. He also serves as a reviewer for *IEEE Transactions on Power Systems*, *IEEE Transactions on Sustainable Energy*, *IEEE Transactions on Power Delivery*, *Reliability Engineering & System Safety*, and *Automation of Electric Power Systems*.