Special Session 23: Multi-Agent Optimization and Game Theory in Power Markets: Theory and Applications

Session Organizer：

Lefeng Cheng, Guangzhou University (chenglefeng@gzhu.edu.cn)

Members:
Wentian Lu, Guangzhou University, luwentian@gzhu.edu.cn;
Guiyun Liu, Guangzhou University, liugy@gzhu.edu.cnBrief Description of the
Session Thematic:

With the accelerated global energy transition and rapid development of smart grid technologies, power markets and integrated energy systems are becoming increasingly complex and diversified. The interactions and competition among multiple agents (e.g., generators, consumers, operators, regulatory bodies) form the core mechanisms of power market operations. In this context, game theory, particularly evolutionary game theory, has emerged as a powerful tool for analyzing multi-agent interactions, optimizing decision-making, and strategizing. Simultaneously, the rapid advancement of artificial intelligence (AI) technologies, including machine learning, has demonstrated tremendous potential and broad applicability in smart grids and power markets.

This special session aims to gather the latest research contributions on multi-agent optimization and game theory, with a special focus on their applications in power markets, smart grids, and integrated energy systems. We also welcome innovative studies that leverage machine learning and other AI techniques to provide theoretical and technical support to academia and industry.

Topics and Keywords:

We invite original research papers and review articles on the following topics (but not limited to):

1. **Applications of Game Theory in Power Markets**

Evolutionary game theory and strategy analysis in power markets
Multi-agent interactions and game modeling
Bidding strategies and optimization in energy markets
Pricing mechanisms and strategy design in power markets

2. **Optimization and Decision-Making in Smart Grids and Integrated Energy Systems**

Multi-agent coordination and game analysis in smart grids
Optimization strategies and game-theoretic decision-making in integrated energy systems
Multi-agent system optimization in microgrids
Game models in distributed energy management

3. **Applications of Machine Learning and AI in Power Systems**

Machine learning-based forecasting and optimization in power markets
Applications of reinforcement learning in smart grids
Deep learning and load forecasting in power systems
AI-driven scheduling and optimization in energy systems

4. Interdisciplinary Research

Methodological innovations combining game theory and machine learning
AI-assisted game model analysis
Data-driven optimization in complex power systems
Intelligent decision support systems in the energy sector

Keywords

Evolutionary Game Theory
Multi-Agent Optimization
Power Markets
Smart Grids
Integrated Energy Systems
Machine Learning
Artificial Intelligence
Deep Learning
Reinforcement Learning
Energy Economics
Distributed Energy Management
Microgrids
Pricing Mechanisms
Strategy Analysis
Data-Driven Optimization