CALL FOR PAPERS

IEEE Transactions on Industry Applications

Special Issue on

Convergence of Data-driven and Physics-based Approaches in Power System Analysis, Optimization, and Control

Physics-based methods have been used for analysis, optimization and control of power systems for decades, but recent increasing penetration of renewable energy sources, such as wind and solar, leads to a paradigm shift in power system's dynamics and operation. Data-driven and machine learning methods have attracted significant interests in addressing the increased scale, complexity and uncertainties of power systems. However, pure data-driven methods may face issues due to data quality, robustness and interpretability, and fusing physical models and data-driven approaches can leverage advantages of both. This special issue aims to disseminate the knowledge in convergence of data-driven and physics-based approaches for analyzing, optimizing and controlling future power systems, which will assist a smooth transition from today's power systems to next-generation smart grids.

The guest editorial board solicits original research papers with novel contributions in convergence of data-driven and physics-based approaches for analyzing, optimizing and controlling future power systems. Topics of interest include, but are not limited to

- Data-driven optimization for power systems under uncertainty
- Merging data and physics for digital twins of power systems
- Modeling and simulation of power systems based on hybrid physics and data-driven approaches
- Embedding physics and knowledge into data analytics with limited PMU, μPMU and meter data for security assessment and behavioral awareness
- Combined machine learning-based and first-principle-based techniques for load modeling and system model identification
- Convergence of learning-based and physics-based control for power system operation
- Data-driven resilient control for power systems in responding to cyber/physical attacks
- Distributed controls of power electronics devices in microgrids and networked microgrids
- New control architecture and technology considering physics and availability of more data for renewable-dominant power systems
- Data-driven approaches for demand response under exogenous and/or endogenous uncertainties

Timeline and Important Dates

▪ Sept. 1, 2023: Call for papers announcement
▪ Mar. 1, 2024: Deadline for extended abstract submission
▪ Apr. 1, 2024: Notification to invite full paper submissions
▪ May 1, 2024: Deadline for full paper submission for review in ScholarOne
▪ Nov. 15, 2024: Notification of final decision
▪ Dec. 15, 2024: Deadline for submission of Final Files in ScholarOne
▪ Mar. 1, 2025: Publication on the IAS Transactions.

Submission Guidelines

Authors must submit an extended abstract (2-page, free format of A4 or US letter, font size of 11 pts, PDF version) to Prof. Qifeng Li (qifeng.li@ucf.edu). Authors with accepted abstracts will receive a formal invitation with detailed instructions for submission of the complete manuscript to the IAS ScholarOne Manuscripts site. Refer to http://www.ias.org for general information about electronic submission through ScholarOne Manuscripts. Manuscripts submitted for this Special Issue will be reviewed separately and will be handled by the guest editorial board identified below.

Guest Editorial Board

- Qifeng Li — University of Central Florida (US)
- Marija Ilic — Massachusetts Institute of Technology (US)
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