Safe and stable operation and intelligent management and control of energy and chemical systems

CALL FOR PAPERS

With the advancement of the “dual-carbon” goals and the acceleration of the energy transition, energy and chemical systems are becoming increasingly complex and are being deployed in increasingly complex scenarios, such as the integrated utilization of fossil fuels and zero-carbon fuels. Researchers are increasingly using process systems engineering (PSE) and intelligent technologies to address practical challenges with high uncertainty, such as hybrid modeling, anomaly diagnosis, and self-healing optimization. Combining intelligent technologies with energy and chemical process systems offers many advantages, including joint training of dynamic parameters, cross-scale root cause tracing, and safety–energy efficiency co-optimization. This has made adaptive hybrid modeling, interpretable intelligent diagnosis, and mechanism-enhanced reinforcement learning as research hotspots. Therefore, intelligent technologies play a crucial role in enhancing the safe and stable operation capability of energy and chemical systems, endowing them with adaptive and intelligent decision-making capabilities, and advancing their engineering applications.

This special session aims to facilitate the exchange and discussion of important research results, technical advances, and conceptual innovations in the field of safe and stable operation and intelligent management and control of energy and chemical systems, in the context of the integrated utilization of fossil fuels and zero-carbon fuels. We invite submissions of high-quality papers related to these frontier topics, including but not limited to the following:

❉ Joint training of dynamic parameters and adaptive hybrid modeling for the integrated utilization of fossil fuels and zero-carbon fuels
❉ Non-stationary condition perception, online learning, and transfer learning
❉ Applications of physics-informed neural networks in energy and chemical process modeling
❉ Cross-scale quantification of anomaly propagation paths based on complex networks and causal inference
❉ Inversion methods, hybrid model superstructure synthesis, and intelligent diagnosis
❉ Mechanism-enhanced reinforcement learning and safety-constrained optimization
❉ Adversarial training, sparse rewards, and fast self-healing control
❉ Safety early warning, fault diagnosis, and predictive maintenance for energy and chemical systems
❉ Applications of artificial intelligence in safety management and control of energy and chemical processes

If you would like to know more about the topic, please contact Prof. Wende Tian by email: tianwd@qust.edu.cn