APARM Special Session XIII

Special Session Basic Information:

Session Title	Intelligent Fault Diagnosis and Self-Healing for Complex Industrial Systems

Introduction and topics

Modern industrial systems are increasingly large-scale, highly integrated, and autonomous, while being subject to ever more demanding requirements in terms of safety, reliability, efficiency, and sustainability. In complex process industries, faults, disturbances, sensor failures, actuator malfunctions, equipment degradation, and other abnormal operating conditions may spread rapidly across interconnected units, potentially resulting in substantial economic losses, environmental damage, and serious safety hazards. Consequently, intelligent fault diagnosis and self-healing have become essential enabling technologies for the development of next-generation smart chemical plants.

This special session aims to provide a dedicated forum for researchers and practitioners from process systems engineering, control, artificial intelligence, and industrial informatics to present and discuss recent advances in intelligent fault diagnosis, prognosis, decision-making, and autonomous recovery for industrial processes. Particular emphasis will be placed on intelligent methodologies that seamlessly integrate process knowledge with machine learning and AI techniques to achieve early anomaly detection, accurate root-cause analysis, predictive health assessment, and self-healing operation in uncertain, dynamic, and safety-critical environments.

Special Session Chair(s):

Name	Yanfu Wang
Prefix	Dr.
Department	College of Mechanical and Electrical Engineering
Organization	China University of Petroleum (East China)
City/Region	China

Organizer's Brief Biography

Dr. Wang is a Professor in the Department of Safety Engineering at China University of Petroleum. She has long been engaged in research in the fields of safety engineering and risk assessment. Her research interests mainly include fire risk assessment and emergency evacuation for offshore platforms; fire mechanisms, prevention, and control of lithium-battery electric vehicles during maritime transport; fire dynamics and evacuation strategies; fault early warning, risk assessment, and emergency decision-making for intelligent chemical industrial parks; as well as intelligent ship collision-avoidance algorithms and maritime traffic safety engineering.

As Principal Investigator, she has led more than 10 research projects, including the National Natural Science Foundation of China (NSFC) General Program, the NSFC Young Scientists Fund, the Key Research and Development Program of Shandong Province, the Natural Science Foundation of Shandong Province, and projects funded by the European Union's Horizon 2020 Program. She has published more than 60 academic papers and holds more than ten authorized invention patents. Her research achievements have been recognized with the Qingdao Science and Technology Progress Award and the Science and Technology Progress Award of the China Association of Work Safety. She is also a recipient of the Marie Skłodowska-Curie Fellowship and has been honored with the title of Outstanding Young Talent of Qingdao.