Special Session XIV

Special Session Basic Information:

专栏题目 **Session Title**	复杂退化系统的可靠性建模与智能维修优化 Reliability Modeling and Intelligent Maintenance Optimization for Complex Degrading Systems

专栏介绍和征稿主题
Introduction and topics

随着现代工程系统朝着大型化和多部件化方向发展，设备在复杂运行环境中普遍受到内部退化与外部随机冲击的交织影响。针对这类复杂系统，如何准确量化评估其可靠性，并在多部件相关性下制定高效的动态维修决策，是当前可靠性工程领域的关键挑战。本专题旨在汇集该领域的最新研究成果，探讨复杂系统的退化演化规律、基于状态监测的维修策略、备件库存管理，以及部件级重配置优化等前沿议题。

征稿主题包括但不限于：

1. 复杂多部件系统的退化建模与可靠性量化评估
2. 考虑内部退化与外部随机冲击竞争失效的机制研究
3. 视情维修（CBM）与备件库存资源的联合优化
4. 多部件系统内部的部件重配置与替换策略
5. 基于多智能体深度强化学习的复杂系统动态维修决策
6. 数据驱动的设备健康状态监测与剩余寿命预测

As modern engineering systems trend towards large-scale and multi-component structures, equipment in complex operating environments is widely subjected to the intertwined effects of internal degradation and external random shocks. For such complex systems, accurately quantifying reliability and developing efficient dynamic maintenance decisions considering multi-component dependencies are key challenges in reliability engineering. This special session aims to gather the latest research findings in this field, exploring degradation evolution, condition-based maintenance strategies, spare parts inventory management, and component-level reallocation optimization.

Topics of interest include, but are not limited to:

1. Degradation modeling and quantitative reliability assessment of complex multi-component systems
2. Competing failure mechanisms considering internal degradation and external random shocks
3. Joint optimization of condition-based maintenance (CBM) and spare parts inventory
4. Component reallocation and replacement strategies within multi-component systems
5. Dynamic maintenance decision-making for complex systems based on multi-agent deep reinforcement learning
6. Data-driven equipment health condition monitoring and remaining useful life prediction

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付玉强博士是北京科技大学数理学院副教授。他的研究兴趣包括数学建模、可靠性系统设计与优化、可靠性统计以及重要性测度。

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