Special Session IV

Special Session Basic Information:

专栏题目 Session Title	中文：基于模型的电子器件与系统可靠性：前沿方法与应用 英文：Model-Based Reliability of Electronic Devices and Systems: Advanced Methods and Applications
专栏介绍和征稿主题 **Introduction and topics**	

中文：作为航空航天、新能源和智能制造等关键领域的基石，现代电子器件与系统因其日益增加的复杂性以及在严苛、动态工况下的运行，正面临着前所未有的可靠性挑战，而传统可靠性方法对此常常力不从心。为了实现从"被动应对失效"到"主动进行可靠性设计"的转变，建立一种基于模型的、对性能退化的深层理解至关重要。本专题旨在探索基于模型的可靠性工程前沿，重点关注从"分析"到"评价"的全链条技术。我们诚邀以下方向的投稿：(1) 利用失效物理（PoF）或数据驱动的电子元器件退化建模方法；(2) 面向健康指标、采用先进算法的故障诊断与预测技术；(3) 融合元器件退化信息的系统级可靠性评价与预计方法。本专题旨在促进学术合作，分享基于模型的电子器件与系统可靠性分析方向的前沿研究成果，促进相关成果的工程应用。

相关主题包括但不限于：
- 失效物理建模
- 电子器件与系统退化与可靠性
- 故障诊断与健康管理
- 动态工况下的可靠性
- 用于可靠性与健康管理的数字孪生
- 可靠性分析中的先进统计与人工智能方法

Brief description: Modern electronic devices and systems, serving as the cornerstone for critical sectors such as aerospace, new energy, and smart manufacturing, are facing unprecedented reliability challenges. These challenges stem from their increasing complexity and operation under harsh, dynamic conditions, where traditional reliability methods are often proving insufficient. To drive the paradigm shift from a "reactive response to failure" to a "proactive reliability-by-design" approach, it is crucial to establish a model-based methodology grounded in a deep understanding of degradation. This Special Session aims to explore the frontiers of model-based reliability engineering, with a particular focus on the entire technological chain from "analysis" to "evaluation". We invite high-quality submissions in the following areas: (1) Degradation modeling methods for electronic devices, leveraging either Physics-of-Failure or data-driven approaches; (2) Advanced algorithm-driven fault diagnosis and prognosis targeting health indicators; (3) System-level reliability analysis that integrate devices degradation information.

This Special Session aims to encourage academic collaboration, share cutting-edge research findings in model-based reliability for electronic devices and systems, and facilitate the application of these advancements in practical engineering.

Related topics: Some topics that are relevant may include, but are not limited to:
- Physics-of-Failure (PoF) Modeling
- Degradation and Reliability of Electronic Devices and Systems
- Fault Diagnosis and Health Management
- Reliability under Dynamic Operating Conditions
- Digital Twin for Reliability and Health Management

● Advanced Statistical and AI Methods for Reliability Analysis

Special Session Chair(s):

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Organizer's Brief Biography

中文：陈岑，哈尔滨工业大学电气学院副教授，电器与电子可靠性研究所所长助理，中国系统工程学会系统可靠性工程分委会委员。2019 年博士毕业于哈尔滨工业大学电气工程专业，曾于 2017 年 9 月至 2018 年 10 月在美国马里兰大学 CALCE 中联合培养。主要研究方向为电子系统可靠性预计、故障诊断与健康管理。

英文：Cen Chen is currently an Associate Professor with the Department of Electrical Engineering, Harbin Institute of Technology, and the assistant director of the Reliability Institute for Electric Apparatus and Electronics. He is also the SESC Systems Reliability Engineering Technical Committee Member. He received his doctoral degree in electrical engineering in 2019 from Harbin Institute of Technology. He was a visiting scholar with the CALCE Center, University of Maryland, College Park, from Sep. 2017 to Oct. 2018. His research interests include reliability prediction, fault diagnosis and prognosis for electronic devices and systems。
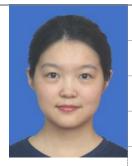
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Organizer's Brief Biography

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英文：Qisen Sun is currently a tenure-track Associate Professor with the Department of Electrical Engineering, Harbin Institute of Technology. He received dual Ph.D. degrees in 2025 from a joint program between Harbin Institute of Technology and City University of Hong Kong. He received the B.S. and M.S. degrees in electrical engineering from the Harbin Institute of Technology, Harbin, China, in 2019 and 2021, respectively. His research interests include statistical engineering, degradation path dependence, and reliability prediction for electronic devices and systems.

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Organizer's Brief Biography

中文：杜雪娇，哈尔滨工程大学航天与建筑工程学院副教授，航天工程系副主任。2018 年获得吉林大学机械工程博士学位，2017 年曾为维也纳科技大学机械工程信息学和虚拟产品开发研究小组的全奖交换生，2018 年于美国马里兰大学 CALCE 联合培养。主要研究方向为复杂机电系统的故障诊断和健康管理。

英文：Xuejiao Du is currently an Associate Professor with the college of aerospace and civil engineering, Harbin Engineering University, and the deputy director of the aerospace engineering department. She received the PhD degree in Mechanical Engineering from Jilin University, China, in 2018. She was an exchange student at the Mechanical Engineering Informatics and Virtual Product Development Research Group from the Vienna University of Technology (TU Wien) in 2017. She was also a visiting scholar with the Center for Advanced Life Cycle Engineering, University of Maryland, USA, in 2018. Her main research focuses on fault diagnostics, prognostics and health management of complex electromechanical systems.