

# Special Session V

## Special Session Basic Information:

### 专栏题目 Session Title

中文：电子器件与系统基于模型的可靠性创新：方法、模型与应用  
英文：Innovations in Model-Based Reliability for Electronic Devices and Systems:  
Methods, Models, and Applications

### 专栏介绍和征稿主题 Introduction and topics

中文：作为航空航天、新能源与智能制造等战略领域的核心支撑，现代电子器件与系统正面临前所未有的可靠性挑战。随着系统复杂度持续攀升，加之服役工况日趋严酷和动态，传统的“事后处理”式可靠性方法已难以有效应对复杂的退化行为。为了推动可靠性理念向“主动设计”转型，亟需发展以退化机理为驱动、以模型为核心的可靠性工程方法。本专题聚焦于基于模型的可靠性前沿研究，涵盖从退化建模、故障诊断到系统级可靠性评估的完整技术链条。我们诚挚征集以下方向的高水平论文：（1）基于失效物理或数据驱动的电子元器件退化建模方法；（2）结合健康指标的智能故障诊断与寿命预测技术；（3）融合元器件退化信息的系统级可靠性评估与分析方法。本专题旨在促进学术交流，分享基于模型的可靠性研究最新进展，并推动相关成果在工程实践中的转化应用。

相关主题包括但不限于：

- 失效物理建模
- 电子器件、系统的退化与可靠性建模
- 严苛/动态工况下的可靠性
- 故障预测与健康管理（PHM）
- 面向可靠性与健康管理的数字孪生
- 基于人工智能/机器学习的可靠性分析
- 系统级可靠性方法的工程应用


英文：Brief description: Electronic devices and systems underpin critical infrastructures in aerospace, new energy, and intelligent manufacturing. As these technologies grow in complexity and are deployed in increasingly severe and dynamic environments, their reliability becomes both more vital and more challenging to ensure. Traditional reliability practices, often rooted in reactive failure analysis, are no longer sufficient to address the multifaceted degradation mechanisms at play. To drive the paradigm shift toward proactive reliability design, it is imperative to develop model-centric reliability engineering methods driven by a deep understanding of degradation mechanisms. This special session highlights cutting-edge research in model-based reliability engineering, emphasizing the integrated workflow from degradation characterization to system-level assessment. We seek original contributions covering, but not limited to, the following areas: (1) Physics-of-failure and data-driven methodologies for modeling degradation in electronic components; (2) Intelligent algorithms for fault diagnosis and remaining useful life prediction using health indicators; (3) Frameworks for system reliability evaluation that incorporate component-level degradation information.

The session aims to stimulate interdisciplinary dialogue, disseminate novel findings, and accelerate the transition of advanced reliability methods into industrial practice.

**Related topics:** Some topics that are relevant may include, but are not limited to:

- Physics-of-Failure (PoF) Modeling
- Degradation and Reliability Modeling for Electronic Devices and Systems
- Reliability under Harsh/Dynamic Operating Conditions
- Prognostics and Health Management
- Digital Twin for Reliability and Health Management
- AI/Machine Learning for Reliability Analysis
- Engineering Applications of System-Level Reliability Methods

### Special Session Chair(s):

	姓名 Name	陈岑
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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、故障诊断与健康管埋。

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

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.



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### Organizer's Brief Biography

中文：林义刚·温州大学电气与电子工程学院讲师·2020 年博士毕业于哈尔滨工业大学电气工程专业·西安交通大学在站博士后·主要研究方向为电气装备可靠性预计、故障诊断·高可靠电器产品设计与优化等。

英文：**Yigang Lin** is currently a Lecturer with the College of Electrical and Electronic Engineering, Wenzhou University, and a Postdoctoral Fellow with Xi'an Jiaotong University. He received his doctoral degree in electrical engineering in 2020 from Harbin Institute of Technology. His research interests include reliability prediction and fault diagnosis for electrical equipment, design and optimization of high-reliability electrical products, etc..