2026 10th
International Conference on
RELIABILITY ENGINEERING

Hangzhou, China   July 19-21, 2026

ICRE
RELIABILITY ENGINEERING

Special Session 2

Multiphysics Modeling, Uncertainty Quantification, and Intelligent Health Management for Highly Reliable Components and Systems

Goal »»»

With the advancement of modern industry towards high-end and intelligent development, highly reliable components and systems have become the cornerstone of national strategic and critical infrastructure fields such as aerospace, energy and power, rail transportation, and national defense. Their performance and lifespan face severe challenges from multiple uncertainties, including complex multiphysics coupling, manufacturing tolerances, material degradation, time-varying loads, and environmental disturbances. Traditional strategies based on single-physics fields, deterministic assumptions, and fixed-period maintenance encounter significant bottlenecks in accurately characterizing failure mechanisms, quantifying lifecycle risks, and achieving proactive health management. In recent years, interdisciplinary approaches integrating multiphysics modeling and simulation, uncertainty quantification theory, and data-driven artificial intelligence have provided revolutionary pathways to address these challenges. By constructing digital twins for components and systems that integrate physical mechanisms and uncertainties, the cross-scale correlation from microscopic failure to system-level performance degradation can be deeply revealed. Employing advanced uncertainty quantification techniques enables probabilistic and accurate assessment of reliability boundaries and remaining useful life distribution. Furthermore, combining intelligent algorithms such as machine learning and deep learning empowers real-time condition perception, early fault diagnosis, and autonomous optimization of predictive maintenance decisions, thereby achieving comprehensive improvement in reliability, safety, and cost-effectiveness throughout the entire chain of design, manufacturing, operation, and maintenance. This Special Session aims to gather cutting-edge research and innovative practices from academia and industry in related areas. It focuses on leveraging key technologies such as multiphysics modeling, uncertainty quantification, and intelligent health management to systematically address the core challenges in the reliability design, assessment, prediction, and operational management of highly reliable components and systems. The session seeks to promote the deep integration of methodological innovation and engineering application in this field.

Topics »»»

Topics of interest include, but are not limited to:

- Multiphyics Coupling Modeling and Simulation Verification for Highly Reliable Components and Systems
- Characterization of Uncertainty Sources, Propagation Analysis, and Sensitivity Studies
- Reliability Robust Design and Multi-objective Optimization
- Research on Failure Mechanisms, Diagnostic Algorithms, and Remaining Useful Life Prediction Techniques
- Digital Twin-Driven or Data-Fusion Intelligent Health Management Frameworks and Systems
- Relevant Advanced Experimental Methods and Significant Engineering Application Cases
- ….

Chairs »»»

Wenying Yang,
Harbin Institute of Technology, China

Zhen Chen,
Shanghai Jiao Tong University, China

Lanxiang Liu,
Harbin Institute of Technology, China

Weijun Xu,
Politecnico di Milano, Italy

Publication »»»

We provide a good opportunity by presenting your updated research knowledge and also by publishing it in the conference proceedings. submitted paper will be peer reviewed by conference committees, and accepted papers will be included into conference proceedings which will be indexed by SCOPUS and Ei compendex.

Submission »»»

1. Full paper (presentation and publication)
- The paper must be written in English.
- All submissions will undergo a peer-review process by the conference committee.
- The paper should be at least FIVE pages including all figures, tables, and references.
- The paper should be submitted as a PDF document in .pdf format.
- submitted paper must be unpublished.
- Accepted papers will be invited for oral presentation or poster presentation and will be included in the conference proceedings.
2. Abstract (presentation only)
- Abstracts will be considered for presentation (oral/poster) only without publication.
- The abstract must be written in English.
- Abstracts should be no more than 300 words and clearly outline the title, purpose, methods, and outcomes of the research or practice being described.
- All submissions will undergo a peer-review process by the conference committee.

* Welcome to submit the paper or abstract by Electronic submission system: https://www.zmeeting.org/submission/icre2026
More details about submission, please visit at: https://www.icre.org/sub.html

Conference Program »»»

July 19, 2026 ǀ CONFERENCE + SHORT COURSE
July 20, 2026 ǀ TECHNICAL EXCELLENCE & TRIBUTE
July 21, 2026 ǀ INNOVATION & FUTURE OUTLOOK
July 17-22, 2026 ǀ PHD SCHOOL PROGRAM

Conference Venue »»»

Conference Venue:
Hangzhou International Innovation Institute of Beihang University
Address:
No. 166, Shuanghongqiao Street, Pingyao Town, Yuhang District, Hangzhou City

Hangzhou, China

Hangzhou, a renowned Jiangnan city blending millennia of heritage and poetic scenery, boasts three world cultural heritage sites. west Lake ripples with romance; Liangzhu Ruins hold ancient wisdom; the Grand canal carries folk vibes. Timeless song Dynasty elegance meets trendy fun, and delicious local cuisine delights the taste buds. A perfect mix of classic and modern, it awaits visitors from all over the world.

Important Dates »»»

Submission Deadline: April 10, 2026
Notification Deadline: May 5, 2026
Camera-ready Date: May 20, 2026

Sponsors   LASAR³   Co-sponsors

杭州市北京航空航天大学国际创新研究院
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HANGZHOU INTERNATIONAL INNOVATION INSTITUTE OF BEIHANG UNIVERSITY

哈尔滨工业大学
HARBIN INSTITUTE OF TECHNOLOGY

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web: http://www.icre.org

特别专题 2

高可靠元器件及系统多物理场建模、不确定性量化与智能健康管理

专题目标 »»»

随着现代工业向高端化、智能化迈进，高可靠元器件及系统已成为航空航天、能源电力、轨道交通和国防安全等国家战略与关键基础设施领域的核心基石。其性能与寿命受到复杂多物理场耦合、制造公差、材料退化、时变负载与环境扰动等多重不确定性的严峻挑战。传统的基于单一物理场、确定性假设及固定周期维护的策略，在精准表征失效机理、量化全生命周期风险以及实现前瞻性健康管理方面面临显著瓶颈。

近年来，融合多物理场建模仿真、不确定性量化理论与数据驱动人工智能的跨学科方法，为破解上述难题提供了革命性途径。通过构建集成物理机理与不确定性的元器件及系统数字孪生，能够深入揭示从微观失效到系统级性能退化的跨尺度关联规律。运用先进的不确定性量化技术，可实现对可靠性边界、剩余寿命分布的概率化精准评估。进一步结合机器学习、深度学习等智能算法，能够赋能状态的实时感知、故障的早期诊断与预测性维护决策的自主优化，从而在设计、制造、运维全链条实现可靠性、安全性与经济性的综合提升。

本专题旨在汇聚学术界与产业界在相关方向的前沿探索与创新实践，聚焦于利用多物理场建模、不确定性量化与智能健康管理等关键技术，系统解决高可靠元器件及系统在可靠性设计、评估、预测与运维管理中的核心挑战，推动该领域方法创新与工程应用的深度融合。

专题主题 »»»

征稿主题包括但不限于：
- 高可靠元器件及系统的多物理场耦合建模与仿真验证
- 不确定性来源表征、传播分析与灵敏度研究
- 可靠性稳健性设计与多目标优化
- 故障机理研究、诊断算法与剩余寿命预测技术
- 数字孪生驱动或数据融合的智能健康管理框架与系统
- 相关先进实验方法与重大工程应用案例
- ······

专题主席 »»»

杨文英，哈尔滨工业大学，中国

陈震，上海交通大学，中国

刘兰香，哈尔滨工业大学，中国

徐玮骏，米兰理工大学，意大利

会议出版 »»»

会议收录的文章将出版在会议论文集中出版，并提交EI Compendex, Scopus等其他检索机构审核检索。

投稿方式 »»»

1). 上传文章到电子投稿系统：https://www.zmeeting.org/submission/icre2026
2). 或发送文章至会议邮箱：icre_conf@outlook.com

提示：
1. 全文投稿（含报告与出版）
- 稿件须以英文撰写。
- 所有投稿均由会议委员会进行同行评审。
- 稿件篇幅不少于 5 页，包含所有图表及参考文献。
- 稿件须以 PDF 格式提交。
- 投稿稿件须为未发表的原创成果。
- 录用稿件将受邀进行口头报告或海报展示，并收录至会议论文集。
2. 摘要投稿（仅作报告）
- 摘要仅用于申请报告资格（口头报告 / 海报展示），不纳入出版范围。
- 摘要须以英文撰写。
- 摘要字数不超过 300 词，须清晰阐明所涉研究或实践的标题、研究目的、研究方法及研究成果。
- 所有投稿均由会议委员会进行同行评审。
- 详细信息请见——https://icre.org/sub.html

会议日程 »»»

2026年7月19日- 签到注册
2026年7月20日- 开幕式+主旨报告+作者报告
2026年7月21日- 开幕式+主旨报告+作者报告
2026年7月19-21日- 博士研究生项目

会议地址 »»»

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中国杭州

杭州，一座融千年文脉与诗画风光的江南名城，三大世界文化遗产勾勒其独特魅力。西湖碧波漾诗意，良渚遗址藏远古智慧，大运河流淌南北烟火。宋韵风雅浸润红墙古社，新潮玩法解锁别样体验，鲜醇杭帮菜抚慰味蕾。古典与现代交织，漫步街巷皆是惊喜，正静待八方游客前来探寻。

重要日期 »»»

投稿截止日期：2026年4月10日
审稿通知日期：2026年5月05日
注册截止日期：2026年5月20日

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