

2026 10th International Conference on RELIABILITY ENGINEERING

Hangzhou, China July 19-21, 2026

<http://icre.org/>

Special Session 9

Physics-Informed Digital Twin for Reliability Assessment of Nuclear and Renewable Energy Systems

Goal >>>>

Against the global drive for sustainable energy transition and intelligent reliability engineering, nuclear and renewable energy systems demand high-fidelity, real-time, and physically consistent reliability assessment to ensure safety, resilience, and efficient operation. Traditional reliability methods face bottlenecks in handling multi-physics coupling, uncertainty propagation, and sparse noisy data in complex energy systems. Physics-informed digital twin (PIDT) integrates first-principle physical laws, real-time monitoring data, and data-driven models to construct high-confidence virtual replicas, enabling online state awareness, remaining useful life prediction, fault early warning, and risk-informed decision-making for nuclear reactors, wind farms, solar systems, and other critical energy facilities. This special session aims to gather global scholars and engineers to exchange frontier theories, key technologies, and industrial applications of PIDT in reliability engineering, promote the integration of physical modeling, digital twin, and intelligent algorithms, and support the safe, reliable, and sustainable development of next-generation energy systems.

Topics >>>>

Topics of interest include, but are not limited to:

- Physics-Informed Modeling and Digital Twin Construction for Nuclear and Renewable Energy Systems
- Remaining Useful Life Prediction and Reliability Assessment Enhanced by Digital Twins
- Uncertainty Quantification and Propagation in Physics-Informed Digital Twins
- Risk-Informed Decision-Making and Maintenance Optimization
- Sensor fusion, online monitoring, and early fault warning based on physics-informed learning and digital twin technologies
- Industrial Applications and Case Studies
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Chair(s) >>>>



Xiaolei Pan, Shanghai University of Electric Power, China

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.zmmeeting.org/submission/icre2026>

More details about submission, please visit at: <https://www.icre.org/sub.html>

Conference Program >>>>

July 19, 2026 | CONFERENCE + SHORT COURSE
July 20, 2026 | TECHNICAL EXCELLENCE & TRIBUTE
July 21, 2026 | INNOVATION & FUTURE OUTLOOK
July 12-25, 2026 | Young Scholar Symposium + 2026 Beihang International Summer School

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

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特别专题 9

基于物理信息的数字孪生在核电与可再生能源系统可靠性评估中的应用

专题目标 >>>>

面向全球能源可持续转型与可靠性工程智能化发展趋势，核电与可再生能源系统亟需高保真、实时化、物理一致的可靠性评估方法，以保障系统安全、韧性与高效运行。传统可靠性手段在应对复杂能源系统的多物理场耦合、不确定性传播、稀疏噪声数据等难题时存在明显瓶颈。基于物理信息的数字孪生（PIDT）融合第一性原理物理规律、实时监测数据与数据驱动模型，构建高置信度虚拟映射，可实现核反应堆、风电场、光伏系统等关键能源装备的在线状态感知、剩余寿命预测、故障早期预警与风险决策优化。本专题旨在汇聚全球学者与工程专家，交流物理信息数字孪生在可靠性领域的前沿理论、关键技术与工程实践，推动物理建模、数字孪生与智能算法深度融合，支撑新一代能源系统的安全、可靠与可持续发展。

专题主题 >>>>

征稿主题包括但不限于：

- 核电与可再生能源系统的物理建模与孪生构建
- 数字孪生驱动的剩余寿命预测与可靠性评估
- 基于物理信息的数字孪生中的不确定性量化与传播
- 风险决策与维修优化
- 基于物理信息学习与数字孪生技术的传感器融合、在线监测与早期故障预警
- 工业应用与案例研究
- ...

专题主席 >>>>



潘晓磊，上海电力大学，中国

会议出版 >>>>

会议收录的文章将出版在会议论文集集中出版，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新果。
 - 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、研究方法及其研究成果。
 - 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12-25日-青年学者论坛 + 2026北航国际暑期学校

会议地址 >>>>

杭州市北京航空航天大学国际创新研究院（北京航空航天大学国际创新学院）
地址：杭州市余杭区瓶窑镇双红桥街166号

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