

Editorial



Reliability Science and Engineering: a catalyst for engineering innovation

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1. Introduction

Today, with the rapid development of science and technology, complex systems such as engineering equipment systems, electronic systems, quantum systems, intelligent systems, life systems and emerging systems serve as the core engines driving social progress and industrial upgrading. Their reliability is directly related to national security, social stability, economic development, and healthy lives, and is an important indicator for measuring the technological maturity and competitiveness of a country or industry. On the other hand, as systems become increasingly complex in composition and operate under harsher service environments, the reliability of complex systems faces greater challenges and higher requirements.

Reliability science and engineering involve probability theory, statistics, failure physics, life prediction, etc, and intersect with fields such as mechanical manufacturing, material science, and artificial intelligence, giving rise to cutting-edge technologies such as multi-disciplinary degradation mechanisms in complex environments, digital twins, and intelligent fault diagnosis and prediction methods, breaking through the boundaries of traditional technologies. The development of reliability technology acts as a catalyst for scientific and technological innovation and plays a crucial role in promoting the transformation and upgrading of the manufacturing industry towards high-quality development. As a responsible major manufacturing country, China, together with other countries around the world, is constantly leading the world towards high-quality development through technological innovation. Therefore, the Institute of Systems Engineering of China Academy of Engineering Physics, the University of Electronic Science and Technology of China, Hunan University, and the Beijing Institute of Structure and Environment Engineering jointly founded the Journal of Reliability Science and Engineering (JRSE). The aim is to create an international academic platform that publishes original research results related to complex system reliability science and engineering, which is helpful for promoting the development of complex system reliability theory and technology.

2. Scopes of JRSE

JRSE is an international journal, dedicated to publishing the latest and high-level research achievements related to the reliability of engineering equipment systems, electronic information systems, quantum systems, intelligent systems, life systems and emerging systems (hereinafter referred to as 'complex systems'). Especially, JRSE focuses on the latest research results of complex systems in



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extreme environments, which includes the interdisciplinary integration of mathematics, physics, chemistry, artificial intelligence as well as engineering application practice and management, etc. This journal focuses on the following six major directions, including **Reliability Theory and Methods, Physics of Failure and Degradation, Reliability Testing and Simulation, Prognostics and Health Management, Reliability Engineering Applications, and Emerging Topics in Reliability-Related Fields**. Moreover, JRSE particularly focuses on the latest research results of complex systems in extreme environments, which includes the interdisciplinary integration of mathematics, physics, chemistry, artificial intelligence as well as engineering application practice and management, etc. We publish academic articles in the forefront of reliability science and engineering, including research paper, topical review, perspectives, comments, and other types. Submitted manuscripts must be original, representing the latest research findings, and not previously published in other media including journals, proceedings and books.

3. Subjects of interest

3.1. Reliability theory and methods

The latest research achievements in the fields of (complex) system reliability theory, reliability statistics, reliability mathematics, reliability design for structures and systems, uncertainty quantification, software reliability, and system resilience.

3.2. Physics of failure and degradation

Multi-factor degradation mechanisms, accelerated degradation mechanisms, random degradation mechanisms, fatigue nonlinear cumulative damage mechanisms, shock and the physics of multi-level correlated failure of complex systems under complex environments.

3.3. Reliability testing and simulation

Cutting-edge theories and methods of reliability testing and simulation, virtual testing, equivalent simulation theory and reproduction of complex comprehensive environments, advanced theory and technology for functional performance testing, theory, model, and technology of accelerated testing for reliability, the latest research achievements in the field of reliability testing verification and evaluation technology for integration of simulation and testing.

3.4. Prognostics and health management

Integration and application of autonomous fault diagnosis and prediction technology, hybrid intelligent diagnosis and prediction technology, digital twin and PHM technology (such as model integration and management, data collection and transmission, data governance, etc), data processing and multi-source information fusion, and intelligent fault diagnosis and prediction methods (such as PHM based on reinforcement learning, deep learning, transfer learning and other intelligent methods).

3.5. Reliability engineering applications

Application of reliability theories in engineering equipment systems, electronic information systems, quantum systems, intelligent systems, life systems, and emerging systems.

3.6. Emerging topics in reliability-related fields

Artificial intelligence, multi-dimensional data fusion, digital twins, cloud computing, and the Internet of Things, as well as their integration with reliability of systems, sub-systems, and components.

4. Article types

JRSE welcomes submissions of the following article types for publication in Regular Issues:

- **Topical Review:** articles that present the background and overview of a particular field, as well as the current state of the art.
- **Paper:** articles of unlimited length that report original research of outstanding quality, and that make a significant advance in the field.
- **Perspective:** articles that are written from a personal standpoint and opinion of an eminent author on a particular topic, as invited by the Editorial Board.
- **Comment:** comments or criticism on work previously published in the journal, usually published with an associated Reply.
- **Reply:** an invited response usually from the authors whose work is criticized in the associated Comment
- **News and Views:** articles that inform non-specialist readers about new scientific advances, as reported in recently published papers in JRSE and elsewhere.

Submitted manuscripts must be original, representing the latest research findings, and must be not previously published in other journals. The collaboration between JRSE and the institute of physics ensures the rapid publication and circulation of high-quality scientific articles worldwide, and provides open access (OA) to the audience.

Note: If the submitted paper has appeared in arXiv, please indicate the arXiv number at the first page of paper.

5. Why should you publish your work in JRSE

- **Focusing on the cutting-edge field of reliability:** JRSE focuses on the research frontiers of fundamental theories and methodologies related to the science of complex system reliability. JRSE also emphasizes the integration of frontier theories in reliability with emerging technologies, as well as the combination of frontier theories with engineering applications.
- **Gold OA without an APC:** Your paper will be published as Gold OA, providing you and the scientific community with immediate access to articles without the payment of a subscription fee or license. All the costs of publishing the journal are covered by the journal Editorial Office, ensuring maximum accessibility at no cost to you.
- **Fast publication:** JRSE uses a fast review process within 5 weeks, ensuring that authors' latest research findings can be promptly accessed by peer experts. Additionally, JRSE adopts a continuous publication model, which guarantees that accepted manuscripts are published online within 48 h, along with the assignment of a DOI number, enabling immediate citation.
- **Prestigious international Editorial Board:** The Editor-in-Chief is Professor Chang-Pu Sun, a theoretical physicist and an academician of both the Chinese Academy of Sciences and the Academy of Sciences for the Developing World. The Co-Editor-in-Chiefs are 11 internationally renowned experts in the field of reliability, including Carlos Guedes Soares, Hong-Zhong Huang, Min Xie, Mingjian Zuo, Loon Ching Tang, Enrico Zio, Dong Ho Park, Yaochu Jin, Chao Jiang, Qiang Wan, and Xiaohui Wang. The editorial board has over 100 members,

including 16 academicians and experts in the field of reliability. The editorial board is composed of world-renowned researchers in the field of reliability from 18 countries and regions. As leading experts, the Editorial Board members will identify the scientific and technological highlights and research frontiers related to the reliability of complex systems. They will ensure the highest quality and standards of the accepted articles through means such as inviting high-quality manuscripts, strictly controlling the quality of peer-review, and screening for plagiarism.

- **Strong promotion capabilities:** JRSE will leverage new media social platforms such as X and Facebook to enhance the promotion and dissemination of journal articles. Additionally, JRSE uses Physics World to showcase outstanding papers. JRSE also provides personalized promotion and marketing services.
- **Widespread influence of the publishing platform:** IOPP boasts over 5000 subscribers globally, with 1209 subscribers in China alone, encompassing a diverse range of organizations such as enterprises, universities, and research institutions, ensuring extensive reach for journal promotion.
- **Value-added Services:** JRSE offers value-added services such as Google AdWords to authors, increasing the chances of their articles being read quickly on relevant platforms. JRSE provides language polishing services for authors, especially those from non-native English-speaking countries, to reduce the time and effort spent on the language of their papers.

6. Concluding remarks

The launch and development of JRSE will significantly promote the continuous innovation and development of the science of complex system reliability. At the same time, it will facilitate the application of the latest scientific theories of reliability in the engineering practice of complex systems, providing theoretical guidance for improving the reliability of complex systems. As an enthusiastic reader, a high-level author, and a rigorous reviewer of JRSE, you will, together with us, witness the robust growth of the JRSE and jointly promote the development of reliability theories and the application of reliability engineering technologies.



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