

WAAE 2026 Track 12 Description

Basic Information:

专栏题目
Title

中文：航天航空的疲劳、断裂和结构完整性
英文：Fatigue, Fracture, and Structural Integrity in Aerospace Engineering

专栏介绍和征稿主题
Introduction and topics

中文：随着先进航空航天装备向高速化、轻量化、长寿命、高可靠性和极端环境服役方向不断发展，结构疲劳、断裂与完整性问题已成为影响飞行器安全性与服役寿命的关键因素。飞机、航天器、高超声速飞行器及航空发动机等关键结构在复杂载荷谱、热-力-环境耦合作用以及多源不确定性条件下长期服役，容易产生疲劳裂纹、损伤累积、材料退化以及结构失效等问题。特别是在复杂服役环境与极端工况下，结构损伤演化机理、裂纹扩展行为及剩余寿命预测面临巨大挑战。

近年来，随着先进材料、智能传感、无损检测、数字孪生、大数据与人工智能技术的快速发展，航空航天结构完整性分析正由传统经验驱动向多学科、多尺度、数据融合与智能化方向发展。围绕疲劳损伤机理、断裂行为、结构完整性评估、寿命预测、健康监测与可靠性分析开展系统研究，对于保障航空航天装备的安全运行、延寿设计与适航认证具有重要意义。

本专栏旨在汇聚航空航天疲劳、断裂与结构完整性领域的最新研究成果与工程应用进展，促进相关理论、方法与工程实践的学术交流。欢迎国内外相关领域专家学者投稿。

针对以上内容，主要征稿主题包括：

1. 航空航天结构疲劳与断裂力学
2. 疲劳裂纹萌生、扩展与损伤演化机理
3. 损伤容限设计与结构完整性评估
4. 航空发动机与关键部件疲劳寿命分析
5. 复杂载荷谱与随机载荷疲劳分析
6. 极端环境与多场耦合条件下结构失效行为
7. 高超声速飞行器热结构疲劳与断裂问题
8. 复合材料与先进材料疲劳断裂行为
9. 结构寿命预测与剩余寿命评估方法
10. 无损检测、结构健康监测与损伤识别
11. 基于数据驱动与人工智能的疲劳评估方法
12. 贝叶斯方法、可靠性分析与不确定性量化
13. 多尺度、多物理场与数值模拟方法
14. 适航要求、维修策略与工程应用案例

英文：

With the continuous development of advanced aerospace systems toward high-speed, lightweight, long-life, high-reliability, and extreme-environment applications, fatigue, fracture, and structural integrity issues have become critical factors affecting the safety and service life of aerospace structures. Key components in aircraft, spacecraft, hypersonic vehicles, and aero-engines are subjected to complex load spectra, thermo-mechanical-environmental coupling effects, and multiple sources of uncertainty during long-term operation, which may lead to fatigue crack initiation, damage accumulation, material degradation, and structural failure. Particularly under complex service environments and extreme operating conditions, significant challenges remain in understanding damage evolution mechanisms, crack propagation behavior, and residual life prediction.

In recent years, with the rapid advancement of advanced materials, smart sensing technologies, nondestructive testing, digital twins, big data, and artificial intelligence, aerospace structural integrity analysis has evolved from traditional experience-based approaches toward multidisciplinary, multiscale, data-fusion, and intelligent methodologies. Systematic studies on fatigue

damage mechanisms, fracture behavior, structural integrity assessment, life prediction, structural health monitoring, and reliability analysis are of great significance for ensuring the safe operation, life extension, and airworthiness certification of aerospace systems.

This special session aims to bring together the latest research achievements and engineering applications in fatigue, fracture, and structural integrity for aerospace engineering, promoting academic exchange on related theories, methodologies, and engineering practices. Researchers and engineers from related fields are warmly invited to submit their contributions.

The main topics for submission include:

- a) Fatigue and Fracture Mechanics of Aerospace Structures
- b) Fatigue Crack Initiation, Propagation, and Damage Evolution Mechanisms
- c) Damage Tolerance Design and Structural Integrity Assessment
- d) Fatigue Life Analysis of Aero-Engines And Critical Components
- e) Complex Load Spectra and Random Fatigue Analysis
- f) Structural failure behaviors under extreme environments and Multiphysics coupling
- g) Thermal fatigue and fracture problems in hypersonic vehicles
- h) Fatigue and fracture behavior of composites and advanced materials
- i) Structural life prediction and residual life assessment methods
- j) Nondestructive testing, structural health monitoring, and damage identification
- k) Bayesian methods, reliability analysis, and uncertainty quantification
- l) Digital twin and intelligent maintenance technologies for structural integrity
- m) Multiscale, Multiphysics, and numerical simulation methods
- n) Airworthiness requirements, maintenance strategies, and engineering applications

Track Chair(s):

	姓名	张猛创
	Name	Mengchuang Zhang
	称谓	副教授
	Prefix	Associate Professor
	部门	民航学院
	Department	Civil Aviation College
	单位	西北工业大学
	Organization	Northwestern Polytechnical University
	城市/地区	西安/陕西
	City/Region	Xi'an/Shaanxi
	邮箱	张猛创
	Email	Mengchuang Zhang

Organizer’s Brief Biography

中文：张猛创，西北工业大学副教授，硕士生导师，都灵理工大学访问学者，主持国家自然科学基金一项，省部级课题两项，围绕结构多学科优化设计和可靠性设计方向展开研究，在航空发动机以及航天航空结构关键部位的多学科优化和可靠性领域取得了一定的应用。发表论文 20 余篇，专利 5 项，软件著作权 6 项，参与编写了专著 3 项，担任多本期刊审稿人与客座编辑。

英文：Zhang Mengchuang, Associate Professor at Northwestern Polytechnical University, Master's supervisor, visiting scholar at Polytechnic University of Turin, has presided over one project funded by the National Natural Science Foundation and two provincial and ministerial-level projects. His research focuses on multidisciplinary structural optimization design and reliability design, achieving certain applications in multidisciplinary optimization and reliability in key parts of aero-engines and aerospace structures. He has published more than 20 papers, holds 5 patents, 6 software copyrights, has contributed to 3 monographs, and serves as a reviewer and guest editor for multiple journals.

	姓名 Name	詹志新 Zhixin Zhan
	称谓 Prefix	副教授 Associate Professor
	部门 Department	航空科学与工程学院 School of Aeronautic Science and Engineering
	单位 Organization	北京航空航天大学 Beihang University
	城市/地区 City/Region	北京 Beijing
	邮箱 Email	zzzhan@buaa.edu.cn

Organizer's Brief Biography

中文：詹志新，北京航空航天大学航空科学与工程学院副教授、博士生导师，入选北航青年拔尖人才支持计划。主要研究方向为飞行器结构疲劳与损伤力学、寿命预测、机器学习/数据驱动方法。近年来在《International Journal of Fatigue》、《International Journal of Mechanical Sciences》、《Engineering Fracture Mechanics》、《Fatigue & Fracture of Engineering Materials & Structures》等疲劳、损伤与断裂领域的著名期刊，以一作/通讯身份发表 SCI 论文 30 余篇，SCI 引用 2000 余次，1 篇入选 ESI 高被引论文，1 篇受邀长篇综述。主持国家自然科学基金、航空科学基金、非线性力学国家重点实验室开放基金、以及多项科研院所研究课题。担任《固体力学学报》、《计算力学学报》、《应用力学学报》等期刊青年编委。

英文： Zhixin Zhan is an Associate Professor and doctoral supervisor at the School of Aeronautic Science and Engineering, Beihang University, and has been selected for Beihang University's Young Top-Notch Talent Support Program. His main research interests include fatigue and damage mechanics of aircraft structures, life prediction, and machine learning/data-driven methods. In recent years, he has published more than 30 SCI-indexed papers as first author or corresponding author in leading journals in the fields of fatigue, damage, and fracture, including International Journal of Fatigue, International Journal of Mechanical Sciences, Engineering Fracture Mechanics, and Fatigue & Fracture of Engineering Materials & Structures. His work has received over 2,000 SCI citations; one paper has been selected as an ESI Highly Cited Paper, and one invited long review article has been published. He has led projects funded by the National Natural Science Foundation of China, the Aeronautical Science Foundation of China, the Open Fund of the State Key Laboratory of Nonlinear Mechanics, as well as multiple research projects commissioned by research institutes. He serves as a young editorial board member of journals including Chinese Journal of Solid Mechanics, Chinese Journal of Computational Mechanics, and Chinese Journal of Applied Mechanics.