ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering

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Call for Papers

Special Collection on Extreme Damage Mechanics for Lifecycle Fatigue Resilience of Infrastructure Systems

Aims & Scope

This Special Collection aims to gather prestigious contributions presenting the state-of-the-art breakthroughs on extreme damage mechanicsfor the lifecycle fatigue resilience of infrastructure systems. Since the 19th century, when the use of steels in civil engineering began to increase, it has been recognized that structural components and systems subjected to repetitive load cycles may fail in service life. This type of failure is well known as "fatigue" due to the formation and propagation of crack damages caused by repeated stress or strain fluctuations. It has been estimated that nearly 90% of the failures can be attributed to fatigue. For instance, bridges and wind turbines subjected to fluctuating live loads may be damaged due to high cycle fatigue. On the other hand, low cycle fatigue is usually characterized by large amplitude and low-frequency plastic strains such as seismic actions on skyscrapers. Depending on uncertainties of the loading reversal, amplitude/intensity, and occurrence frequency in lifecycle, we should generally couple the probability methodology with computational damage mechanics for risk assessment of large-scale infrastructure systems.

Furthermore, for the goal of "emission peak and carbon neutrality", there is a demand to develop resilient,sustainable, and long lifecycle infrastructure. To this aim, novel mathematical and computational approaches based on the probability theory, damage and fracture mechanics are needed in the broad topics of lifecycle fatigue assessment of steel and composite structural systems. This challenging aim might today be able to realize with the implementation of valuable data availability, uncertainty quantification, and artificial intelligence technologies.

Topic Areas

- Novel models of damage mechanics, fracture mechanics, and fatigue laws for assessing lifecycle performance of steel structures, like bridges, wind turbines, and so forth;
- Advanced uncertainty quantification based on Bayesian model updating framework;
- Epistemic uncertainty of fatigue loading protocolsin the time domain,such as nonstationary amplitudes, strain rate, and frequency characteristics;

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- Fatigue life estimation under combined LCF and HCF protocols;
- Lifecycle resilience of fatigue and extreme events, like earthquakes and strong winds;
- Large-scale fatigue experiment on steel components and structural systems;
- Computational methods for describing the failure mechanism of the whole fatigue process, including crack incubation, initiation, propagation, and closure;
- Local damage detection technologies;
- Health monitoring system for damage detection.

Publication Target Dates (US format: month/date/year)

1. Paper Submission Deadline: October 31, 2022
2. Initial Review Completed: January 31, 2023
3. Special Issue Publication Date: May 31, 2023

Standard Submission Instructions

Papers should be submitted electronically to the Journal at https://www.editorialmanager.com/jrnrueng/default1.aspx. If you already have an account, log in as author and select Submit Paper at the bottom of the page. If you do not have an account, select Submissions and follow the steps. In either case, at the Paper Submittal page, select ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering and then select the special issue Special Collection on Extreme Damage Mechanics for Lifecycle Fatigue Resilience of Infrastructure Systems. Papers received after the deadline or papers not selected for inclusion in the Special Issue may be accepted for publication in a regular issue.

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