QR2MSE 2024 Special session

Probabilistic modelling of the degradation in structures and systems

Abstract:

In recent years, the aging and deterioration processes of various structures and systems, including civil infrastructure, ships and offshore structures, mechanical systems, and other critical systems, have gained significant attention from experts and researchers due to their significant impact on safety, reliability, and sustainability. Throughout the aging and deterioration process, the influence of various factors such as material aging, corrosion, fatigue, environmental conditions, and operating conditions leads to uncertainty in the degradation process, which makes probabilistic models an effective tool for dealing with uncertainty. Recently, various methods have been proposed to improve the prediction accuracy and ensure the long-term performance of these structures and systems. However, due to the complexity and diversity of degradation mechanisms, it remains challenging to apply probabilistic models to rationally analyze and predict the degradation mechanisms of different structures and systems to make more efficient decision-making in maintenance planning and lifecycle management. In view of this situation, the objective of this special session is to focus on the advancements in theories and methodologies for assessing the deterioration and aging processes in civil infrastructure, ships and offshore structures, mechanical systems, and other critical systems. The scope of this special session is broad as it covers: probabilistic models for corrosion, fatigue, material deterioration, and environmental factors affecting the degradation of systems; advanced techniques such as Bayesian inference, Markov models, and stochastic simulation for enhancing the accuracy and predictability of degradation modeling; other related topics are also welcome.

This special session aims to facilitate knowledge exchange, collaboration, and innovation in this important field. Participants will benefit from the insights and advancements shared by leading experts, making this an invaluable opportunity for researchers, engineers, and professionals in the fields of structural and system reliability.

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