



ARTISTE2025

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Special Session Title:

Probabilistic Digital Twins in Structural Health Monitoring

Organizers

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Abstract

In the past decade, the digital twin paradigm has emerged across various scientific fields, enabling diagnostic and predictive capabilities that surpass those achievable with traditional computational models. A digital twin is defined as a virtual representation that replicates specific attributes of a natural or engineered system or process. This digital representation continuously mirrors its physical counterpart by assimilating sensor data and refining its predictive capabilities. Through this continuous updating, digital twins can simulate what-if scenarios, supporting control actions or predictive decision-making aimed at maximizing value.

This session aims to gather contributions highlighting the impact of digital twins for structural health monitoring, control in structural engineering, and predictive maintenance of engineering systems. Contents of interest include, but are not limited to, the following topics:

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- Uncertainty quantification and propagation in digital twins.
- Simulation and computational efficiency.
- Adaptivity.
- Decision support.
- Data assimilation for parameter and state estimation.
- Hybrid physics-data approaches.
- Surrogate modeling.



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