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Call for Papers

Special Collection on Advances in Data-Driven Risk-Based Performance Assessment of Structures and Infrastructure Systems



Aims & Scope

Structures and infrastructure systems are under the threat of extreme hazards, e.g., earthquake, hurricane, tsunami, blast, etc., which may cause damage and even failure of the structures and systems. To quantify the risk level and ensure structural safety, it is of great importance to develop reliable performance assessment methods. Traditional mechanics-based methods are capable but face a number of challenges vis-a-vis computational efficiency in analyzing complex structures and large-scale infrastructure problems as well as high-dimensional uncertainty quantification, among others. In recent years, with the rapid development of Big Data and Artificial Intelligence, data-driven approaches have opened new avenues in the fields of performance assessment and risk analysis leading to a recent surge in research efforts along this frontier. Data-driven approaches use advanced algorithms like machine learning to mine the inner relation of different sources of data and are proven to be efficient and robust, especially when handling large-scale and/or high-dimensional problems.

This Special Collection is focused on recent advances in data-driven risk-based performance assessment of structures and infrastructure systems. This topic is motivated by the discussion with the ASCE Technical Council on Life-Cycle Performance, Safety, Reliability and Risk of Structural Systems, Task Group 3 (TG3): Risk Assessment of Structural Infrastructure Facilities and Risk-Based Decision Making. We hope that this discussion will continue in this special collection.

Topics of interest include but are not limited to:

- Data-driven computational mechanics for risk assessment
- Surrogate modeling using machine learning techniques
- Rapid prediction techniques of damage and failure using different sources of data
- Advanced uncertainty quantification methods
- Efficient probabilistic analysis methods for large-scale and high-dimensional problems
- Methods for efficient reliability and risk assessment
- Life-cycle reliability and risk analysis of structure and infrastructures
- Assessment of the Value of Information in Structural Health Monitoring (SHM) systems
- Life-cycle sustainability of smart structures and infrastructure systems
- Structural and community resilience under extreme events

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While analyzing benchmark problems in some of these topics may be necessary to assess the performance of the proposed techniques against state-of-the-art methods, papers of this collection need to investigate real structure and infrastructure problems with key complexities properly represented.

Submission Timeline

- Submission deadline for papers: October 15, 2021
- Submission deadline for first round of reviews: January 15, 2022
- Submission deadline for revised papers: February 15, 2022
- Submission deadline for final decisions: April 1, 2022
- Final proofs: May 1, 2022

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