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

Guest Editors:
Masaru Kitahara, Assistant Professor, Department of Civil Engineering, The University of Tokyo
Sifeng Bi, Lecturer, Department of Mechanical and Aerospace Engineering, University of Strathclyde
Matteo Broggi, Deputy Head, Institute for Risk and Reliability, Leibniz University Hannover
Takayuki Shuku, Associate Professor, Architecture, Civil Engineering and Environmental Management Program, Okayama University

Call for Papers

Special Collection on Non-Deterministic Model Updating and Structural Health Monitoring for Existing Structures

Aims & Scope

This Special Collection (SC) aims to gather contributions presenting the state-of-the-art on uncertainty analysis in model updating and structural health monitoring (SHM) for existing structures. Over the past few decades, civil infrastructures have been aging in many countries, and more and more infrastructures are being assessed as structurally deficient. Such structural deficiencies in key infrastructures come with massive consequences such as structural failures and even human deaths. The development of a framework for the safe operation and maintenance of infrastructures is thus required. To this end, SHM has attracted increasing attention in recent years, aiming at condition assessment and service life monitoring of existing structures, often on the basis of structural vibration data. SHM strategies can be mainly classified into two categories, i.e., model-based and data-driven methods. Model-based SHM employs physics-based models in combination with inverse analysis techniques to infer a set of model parameters, such that the best possible fit is gained between model outputs and measurements. This approach is generally referred to as model updating. Data-driven SHM, on the other hand, only exploits the monitoring data without use of physics-based models to infer structural condition. This approach is often rooted in signal processing, pattern recognition or machine learning techniques. Regardless of whether model-based or data-driven approach is used, uncertainties are practically inevitable in both the measuring and modeling processes due to very limited number of sensors, variation in environmental and operational conditions, simplification and approximation of complex physical behavior, and so on. Uncertainties may cause large deviations in model updating and SHM results and thus need to be appropriately dealt with by non-deterministic approaches, i.e., either probabilistic or non-probabilistic approaches. Considering the above issues, this SC reports the latest advances and challenges related to uncertainty analysis in model updating and SHM, encompassing not only the theoretical and computational aspects but also the practical and application aspects, especially for large-scale civil infrastructures. The concept of model updating and health monitoring have been widely accepted and used in many different fields such as geotechnical engineering, and the scope of this SC is not limited to structural engineering.

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Topic Areas

Relevant topics may include but not limited to:

1. Bayesian model updating and interval model updating;
2. Probabilistic and non-probabilistic approaches in data-driven SHM;
3. Bayesian model identification and nonlinear system identification;
4. Model updating and SHM applications in existing structures;
5. Data-driven subsurface modeling and site characterization.

Proposed Timeline

- January 31, 2023: Call for papers
- August 31, 2023: Deadline for full paper submission
- November 30, 2023: Notification of review results
- May 31, 2024: Expected publication

Standard Submission Instructions

Manuscripts should be submitted under Non-deterministic model updating and structural health monitoring for existing structures Special Collection SC059A at https://editorialmanager.com/jrnrueng/default.aspx.

If you accept the invitation, please send an abstract to the GE at first. Once the abstract is approved by the GE, a manuscript submission will be requested.

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