



# Novel methodologies for Bayesian updating with hybrid uncertainties



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## Abstract

Bayesian model updating has shown remarkable capabilities and adaptability across various domains over recent years. However, when models involve hybrid uncertainties, the complexity of the problem significantly increases due to the stochastic nature of the outputs rather than deterministic. This introduces new challenges, both theoretical and numerical, in the model updating process. In this talk, we explore recent developments from the Institute of Risk and Reliability that address these challenges. Specifically, we discuss the integration of Approximate Bayesian Computation using the Bhattacharyya distance, the application of staircase random variables, and the use of transport maps. These innovative methods enhance the process of Bayesian updating by effectively handling hybrid uncertainties, offering improved generalization capabilities and numerical efficiency. Our findings contribute to advancing the reliability and applicability of Bayesian model updating in complex, uncertain environments.

## About the Speaker

Dr. Matteo Broggi is a group leader of uncertainty quantification at the Institute for Risk and Reliability, Leibniz University Hannover. His research includes Monte Carlo methods; Bayesian model updating; non-probabilistic methods; structural health monitoring; reliability of complex systems; risk-based decision making. The talk will introduce some Bayesian updating methodology based on the recent research at the institute.