



Engineering Mechanics Institute Conference

Atlanta, Georgia | June 6-9, 2023



SHORT COURSE on Bayesian Model Updating and Uncertainty Quantification: Theory, Computational Tools, and Applications

Babak Moaveni, Professor, Civil and Environmental Engineering, Tufts University

8:30am – 12:30pm, Tuesday June 6, 2023 (Instructional Center 109)
4 personal development hours (PDH)

Course Outline:

- Bayesian uncertainty quantification and propagation in structural dynamics simulations
- Bayesian computational tools (Asymptotic approximations and Sampling techniques)
- Optimal Sensor Placement
- Case studies (Dowling Hall Footbridge, 10-story RC building, 2-story RC building, Offshore Wind Turbine)

Who Should Attend:

Engineers, researchers and graduate students who deal with model validation as well as uncertainty quantification and propagation in structural dynamics simulations using sensor measurements.

Description: In simulations of complex physical systems, uncertainties arise from imperfections in the mathematical models introduced to represent the systems and their interactions with the environment. Such uncertainties lead to significant uncertainties in the predictions using simulations. Since such predictions form the basis for making decisions, the knowledge of these uncertainties is very important. The course will present Bayesian inference and batch Bayesian model updating framework, the associated computational tools, and selected applications, along with the main challenges for quantifying and propagating uncertainties in complex structural dynamic simulations.

Dr. Moaveni is a Professor at the Department of Civil and Environmental Engineering at Tufts University. Dr. Moaveni's main research interests include vibration-based system and damage identification of civil structures; Bayesian inference and model updating; and uncertainty quantification and propagation in structural dynamics. He has co-authored several papers on related topics. He chaired the ASCE technical committees "Structural Health Monitoring and Control", and "Methods of Monitoring Structural Performance" and currently serves as associate editor for journals "Structural Health Monitoring", "ASCE Journal of Structural Engineering", and "Frontiers in Built Environment – Sensors".