Special Issue on
Uncertainty Management in Complex Multiphysics Structural Dynamics (SI Number: SI032B)

Description

It is widely recognized that the unavoidable occurrence of uncertainties in both operational experiments and numerical analyses requires efforts to be dedicated to the tasks of model verification, validation, and calibration. Non-deterministic modeling approaches enable the characterization, propagation, and quantification of the inevitable uncertainties, providing predictions over a possible range of outcomes (distributional, interval, fuzzy, etc.) rather than a unique solution with maximum fidelity to a single experiment. Such approaches applied in structural dynamics significantly promote the tendency towards high accuracy and robustness in computer-aided engineering.

However, challenges emerge from modern developments in aerospace, automobile, and mechanical industries, where large-scale and multiphysics systems are designed and employed with very large design spaces, disparate parameter sensitivities, multifarious sources of uncertainties, high calculation burden, etc. The multiphysics systems, such as vibroacoustics, thermoelastics, and fluid-solid coupled systems, present more challenging domains for non-deterministic modeling because of the severe lack of knowledge in the coupling mechanism between multiple media and environments. Further development of current techniques for uncertainty treatment is thus required to enhance the trustworthiness of computational simulations in complex structural dynamics and multiphysics coupling mechanics.

This special issue aims at providing a venue for leading experts, researchers, academics and practicing engineers working in the interdisciplinary area of uncertainty analysis and non-deterministic modelling to present the latest developments in the field and set the state of the art.

Guest Editors

- Sifeng Bi, Leibniz University Hannover
  sifeng.bi@irz.uni-hannover.de
- Michael Beer, Leibniz University Hannover /University of Liverpool / Tongji University
  beer@irz.uni-hannover.de
- Morvan Ouisse, FEMTO-ST Institute
  morvan.ouisse@femto-st.fr
- Scott Cogan, FEMTO-ST Institute
  scott.cogan@univ-fcomte.fr

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Scopes

- Verification and Validation (V&V) of numerical models for mechanical systems
- Uncertainty characterization, propagation, and quantification techniques
- Modelling of coupling mechanisms between multiple media
- Nonsymmetrical experimental modal analysis of coupling systems
- Decoupling of vibroacoustics, thermoelastics, and fluid-solid coupling
- Stochastic finite element analysis of complex mechanical systems
- Stochastic model calibration and validation
- Bayesian model calibration and advanced Monte Carlo simulation
- Sensitivity analysis of uncertain parameters
- Robust model calibration
- Interval and fuzzy model calibration techniques
- Large-scale applications

Important Dates

- ❑ Paper submission deadline: Feb 28, 2019
- ❑ Reviews completed before: Aug 31, 2019
- ❑ Issue Published before: Dec 31, 2019

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