

## Uncertainty quantification: selected approaches

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Our engineering structures, systems and infrastructure are characterized by a rapidly growing complexity. This complexity and their environment are associated with uncertainties to a greater extent than ever before. In order to cope with this challenge, potent concepts and approaches for uncertainty quantification including analytical and numerical techniques are developed. The overall goal of these developments is a realistic and efficient treatment of uncertainties in engineering analyses in a comprehensive manner in order to derive optimal decisions.

In this context we discuss selected emerging concepts and approaches in three directions. First, new pathways in advanced stochastic modeling are considered to capture the physics of the underlying problem in conjunction with efficient approximate representations and solution methodologies. Second, advancements in generalized uncertainty modeling and selected concepts with new features for coping with limited and vague information are presented. Third, selected potent Monte Carlo techniques and new directions for numerically efficient simulation are discussed.