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ADVANCED NUMERICAL DESIGN WITH POLYMORPHIC UNCERTAIN DATA

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ABSTRACT

Advanced engineering solutions are characterized by inherent robustness and flexibility as essential features for a faultless life of structures and systems under uncertain and changing conditions. An implementation of these features in a structure or system requires a comprehensive consideration of uncertainty in the model parameters and loads as well as other types of intrinsic and epistemic uncertainties.
Numerical design of structures/systems should be robust with respect to uncertainties inherently present in resistance of materials, boundary conditions e.g. environmental and man-imposed loads, physical and numerical models. This requires in turn the availability of a reliable numerical analysis, assessment and prediction of the lifecycle of a structure/system taking into explicitly into account the effect of the unavoidable uncertainties.
Challenges in this context involve, for example, limited information, human factors, subjectivity and experience, linguistic assessments, imprecise measurements, dubious information, unclear physics, etc. Due to the polymorphic nature and characteristic of the available information both probabilistic and set-theoretical approaches are relevant for solutions.
This mini-symposium aims at bringing together researchers, academics and practicing engineers concerned with the various forms of advanced engineering designs. Recent developments of numerical methods in the field of engineering design which include a comprehensive consideration of uncertainty and associated efficient analysis techniques, such as advanced Monte Carlo simulation, meta-model approximations, and High Performance Computing strategies are explicitly invited. These may involve probabilistic including Bayesian approaches, interval methods, Fuzzy methods, imprecise probabilities and further concepts.
The contributions may address specific technical or mathematical details, conceptual developments and solution strategies, individual solutions, and may also provide overviews and comparative studies. Particular attention should be paid to practical applicability in engineering.