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ROBUST AND RELIABILITY-BASED DESIGN OPTIMIZATION UNDER UNCERTAINTY

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ABSTRACT

Uncertainties play a central role in many engineering systems and physical phenomena. In particular, the structural design problem may be subject to aleatory and/or epistemic uncertainties such as environmental conditions, boundary conditions, material properties, computational errors, incomplete knowledge, etc. Quantifying and reducing the impact of these uncertainties on responses of interest has become an active field of research over the past few years leading to different approaches to structural optimization: robust, fuzzy, reliability-based and risk-averse optimization. In the most general format, the proposed Mini-Symposium targets the latest advances in structural optimization under uncertainty and uncertainty quantification in computational mechanics. This mini-symposium aims at bringing together researchers, academics and practicing engineers concerned with the various forms of structural optimization in presence of uncertainties. From the methodology point of view, the Mini-Symposium welcome the following (not exhaustive) list of techniques:

1. Robust, Risk averse and Reliability-based design optimization;
2. Uncertainty quantification in high-dimensional spaces;
3. Surrogate models for uncertainty quantification and structural optimization;
4. Large-scale stochastic finite element applications;
5. Multiscale methods involving uncertainties;
6. Uncertainty quantification using probability theory, Bayesian theory, interval models, fuzzy set theory, etc.;
7. Structural health monitoring, system identification and damage detection;
8. System reliability analysis, design and risk assessment;
9. HPC for stochastic analysis.