ROBUST, PERFORMANCE-BASED AND RELIABILITY-BASED OPTIMIZATION UNDER UNCERTAINTY

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ABSTRACT

Structural design should be robust with respect to uncertainties inherently present in resistance of structural materials, environmental and man-imposed loads, boundary conditions, physical, mathematical and numerical models, and generally to different types of intrinsic and epistemic uncertainties. Structural performance and reliability should be robust against unexpected fluctuations or changes in problem parameters. Proper decision making in presence of uncertainties is fundamental to avoid severe or fatal consequences and/or costly posteriori changes over the built structure. These issues have led to the recent development of different approaches to structural optimization: robust, fuzzy, performance-based, reliability-based and risk-based optimizations. This mini-symposium aims at bringing together researchers, academics and practicing engineers concerned with the various forms of structural optimization in presence of uncertainties. Contributions addressing both theoretical developments and practical applications, in the following topics, are invited:

1. Robust structural optimization;
2. Performance-based optimization;
3. Reliability-based structural optimization: stationary and dynamic problems;
4. Risk management and optimization;
5. Modeling of extreme or rare events;
6. Decision-making in presence of uncertainties;
7. Modeling of uncertainty with probability theory, Bayesian theory, imprecise probabilities including evidence theory, interval models, fuzzy set theory, information gap theory, etc.
8. Structural health monitoring, system identification and damage detection.
9. Development and application of surrogate models for uncertainty quantification and structural optimization.