Proposed mini-symposium WCCM-ECCOMAS 2020 "Structural design and maintenance optimization under uncertainty"

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Currently, uncertainty quantification takes a considered part in the research activities in mechanical modeling and in several fields of applied science. Mechanical model predictions are based on the knowledge of the mechanical parameters and materials properties, the applied loads, and the initial and boundary conditions. Nevertheless, this knowledge remains imperfect because it is affected by uncertainties. Uncertainty quantification aims to study the influence of the uncertain parameters of the prediction models on structural performance.

A common framework for modeling uncertain parameters is within probabilistic approaches, leading to a probabilistic characterization of the structural response. Alternatives include non-probabilistic approaches or interval methods.

Structural design optimization is frequently applied for effective design cost reduction of engineering systems. Maintenance optimization aims at finding the best inspection/repair action policies to maximize the investment and minimize the expected total cost. Both of these decision-making tools seek increasingly to consider uncertainties in structural performance.

The goal of this mini-symposium is to provide an opportunity for researchers to present recent work and exchange ideas on new methods for maintenance optimization and structural design optimization under uncertainty, as well as the use of metamodels to reduce the associated computational costs. A round table will close this mini-symposium with the different participants. We welcome contributions on the following topics:

Reliability based design.
Design structural optimization.
Bio-inspired structural optimization.
Maintenance optimization.
Prognosis and structural health monitoring.
Uncertainty quantification, probabilistic modelling and analysis.
Risk based design and maintenance optimization.
Risk-informed decision making.
Robust and performance-based optimization under uncertainty.
Non-probabilistic approaches-based design and maintenance optimization.
Surrogate models for uncertainty quantification and robust design optimization.