14th World Congress on Computational Mechanics (WCCM XIV)
8th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2020)
July 19- 24, 2020, Paris, France

ADVANCES IN MULTIMATERIAL, MULTICRITERIA AND MULTIPHYSICS PROBLEMS FOR THE OPTIMAL DESIGN OF LARGE CIVIL ENGINEERING STRUCTURES

TRACK 1200

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Key words: Distributed computing, Model reduction, Earthquake engineering, Climatic threats (tsunamis, tornadoes, flooding…), High Performance Computation, Randomness and uncertainty, Structural optimization of composite structures, Robust and predictive non linear analysis.

ABSTRACT

Construction of civil engineering structures accounts for more than 5% of global CO2 emissions, 85% of these emissions being related to the use of raw materials (concrete and steel).
Meanwhile, due to extreme weather events and emerging threats, the design of new civil engineering structures needs to account for much more drastic constraints. Yesterday's robust and simplified design methods are no longer efficient. New design strategies incorporating the latest advances in computational mechanics need to be developed. One of the challenges is, on one hand, to carry out large problems (taking into account larger and larger models: from the site to the in-structure equipments in a digital twin philosophy), and on the other hand, to deal with the mutiplicity and complexity of load cases and the need to predict at the very first design the absence of cliff-edge effects by margin prediction (i.e. probabilistic approach encompassing variability and uncertainties) in a performance-based design purpose.

In that context, this mini-symposium is dedicated to the latest advances in the field of computational civil engineering to address the key issues related to multimaterial, multicriteria and multiphysics problems involving large scale FE model under variable and more and more severe environmental constraints.
This mini-symposium aims at gathering contributions on the latest advances in the field of computational modelling and optimization of the performance of large civil engineering structures such as nuclear power plants, dams, bridges, ... It includes high performance computation, model reduction approaches, structural optimization of composite (concrete/steel) structures, robust and predictive nonlinear analysis of concrete and steel structures, uncertainty quantification and propagation in the context of civil engineering (including earthquake engineering) under extreme environments.