

# **Control, Optimisation, Uncertainty Quantification, and Reduced Order Models for Coupled Problems**

Hermann G. Matthies, TU Braunschweig, Germany

Roger Ohayon, CNAM, France

K.C. Park, University of Colorado Boulder, USA

Coupled problems arise often through the simultaneous simulation of large scale computational models, where each single subsystem may already be so computationally expensive that reduced order models (ROMs) have to be used in the calculation. The coupling increases the need for reduced order models.

This is especially true when not only a single coupled simulation as envisaged, but when the coupled model is to be used to perform more demanding tasks. This can be the design or verification of control strategies, or the optimisation of the whole system, or uncertainty quantification (UQ) and possibly Bayesian identification. All of these tasks typically will require many simulation runs, and this heightens the demand for efficient simulation strategies, and ROMs may be part of this. The session is focused on exploring the interplay between control, optimisation, UQ, and ROMs for the subsystems and the whole coupled problem. Formulation, conceptual strategies, and 'partitioned methods' will be considered.