08-11-11 Short course on Model Order Reduction

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Presentation
Many applications related to computational optimization, control and design need the rapid, accurate and reliable computation of some output of interest that depends on a set of parameters. These quantities are often provided by a functional applied to the solution of a parameterized partial differential equation (PDE) describing the underlying physics. The use of classical methods such as the finite element method to solve these PDEs under different configurations might become too costly due to the high dimension of the discretization space. The model order reduction (MOR) techniques introduce lower dimensional discretization spaces capturing the parameter dependency and allowing to dramatically reduce the overall cost of the computational procedure.

During the past decades, many research has been devoted to model order reduction. As a result many methods allowing to build lower dimensional discretization spaces have been introduced or rediscovered. Among all of them we highlight three that have provided excellent results in many applications: proper orthogonal decomposition, the reduced basis method and the proper generalized decomposition.

The main aim of this course is to introduce researchers, students and professionals having a prior mathematical training (mathematicians, physicists, engineers) to the three model order reduction techniques cited above.
Intended forResearchers who want to initiate into model order reduction techniques applied to the resolution of parameterized PDEs.