# REDUCED ORDER MODELS, SURROGATES AND FAST SOLVERS

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## ABSTRACT

In the past years, the development of numerical methods that reduce the computational cost of simulations has attracted a lot of attention in the field of computational science and engineering. By exploiting the nature of the underlying problem to be solved, the numerical resources required for the simulation can be drastically reduced. Generally, fast simulation strategies integrate knowledge to enhance or accelerate classical modelling and simulation methods. For instance, reduced order models exploit a priori simulation data or knowledge of the underlying physical system and are powerful tools in the case of parameterized problems in a many-query context, such as in uncertainty quantification, optimization, inverse and multi-scale problems. Another possible application includes the construction of digital twins relying on real-time simulations. In this context, reduced order models may be combined with data-driven techniques.

The goal of this minisymposium is to facilitate interdisciplinary exchange of ideas and fruitful interactions on fast numerical methods and algorithms. We encourage contributions from both methodological developments and a broad spectrum of applications. Possible topics of interest include:

- Parametric reduced order modelling techniques
- Data-driven reduced order models for complex systems
- Substructuring and domain decomposition, multigrid methods and fast solvers
- Coupling of high-fidelity and reduced order models
- Adaptation of reduced order models based on scarce data and sampling strategies
- Applications in optimization, uncertainty quantification and inverse problems
- Multiscale modelling using machine learning and model-order reduction methods
- Hybrid modelling combining physics-based knowledge with data-driven techniques