

EMERGING TRENDS IN MODEL REDUCTION FOR NONLINEAR MECHANICS PROBLEMS

500 COMPUTATIONAL APPLIED MATHEMATICS

1700 NUMERICAL METHODS AND ALGORITHMS IN SCIENCE AND
ENGINEERING

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ABSTRACT

The physical processes of interest to contemporary science and engineering are growing ever more complex. As a result, their governing equations are becoming high-dimensional or even partially unknown. For the efficient analysis, prediction, design, uncertainty quantification and control of these processes, reduced-order models capturing the core of the underlying physical phenomena are a must.

This minisymposium focuses on the recent developments in computational methods and tools for rigorous model reduction for nonlinear computational mechanics problems. In addition to the advances in classic projection-based reduced-order models, this symposium aims to highlight modern reduction methods that leverage dynamical systems theory of invariant manifolds for equation-driven reduced-order modelling on the one hand, and dynamics/mechanics-informed machine learning methods for data-driven model reduction on the other hand. The speakers at this minisymposium will show applications of data-driven as well as equation-driven model reduction methods in various fields of nonlinear computational mechanics such as structural dynamics, fluid mechanics, fluid-structure interaction, micro-electromechanical systems, soft robots among others.