

RECENT ADVANCES IN NONLINEAR MODEL REDUCTION FOR MECHANICS PROBLEMS

4000 COMPUTATIONAL APPLIED MATHEMATICS

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ABSTRACT

This minisymposium focusses on the recent developments in computational methods and tools for mathematically rigorous model reduction for nonlinear mechanics problems. In contrast to projection-based reduced-order models that are generally incapable of capturing nonlinear behaviour and require case-by-case validations against the full system simulations, this symposium aims to uncover computational methods that reliably approximate the essential nonlinear features in a high-dimensional dynamical system. The recent theory of Spectral Submanifolds [1], for instance, has facilitated exact nonlinear model reduction of high-dimensional mechanical systems and reliable forced response computation under predefined mathematical assumptions. To this end, we solicit talks that propose rigorous model reduction methods (data-driven and/or analytic) to various fields of computational mechanics such as mechanical structures, fluid dynamics, fluid-structure interaction and other multi-disciplinary applications.

REFERENCES

1. Haller, G., & Ponsioen, S. (2016). Nonlinear normal modes and spectral submanifolds: existence, uniqueness and use in model reduction. *Nonlinear Dynamics*, 86(3), 1493–1534.