

OPERATOR METHODS IN ENGINEERING: COMPUTATION AND VERIFICATION

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ABSTRACT

Linear operators like the Koopman operator have emerged as a powerful means to analyzing nonlinear dynamical systems. Among its key features is the ability to characterize complex dynamics via eigenfunctions, which can offer insightful decompositions even for highly nonlinear systems. However, the accurate and reliable computation of these eigenfunctions remains a significant challenge, particularly in the context of engineering applications where stability, convergence, and interpretability are critical.

This minisymposium will focus on recent developments in the verified and robust computation of operator eigenfunctions, with special emphasis on emerging techniques. We seek to bring together researchers from the fields of computational mathematics, dynamical systems, and engineering to explore how these computational tools can be made both mathematically rigorous and practically useful.

The scope of the minisymposium includes, but is not limited to:

- theoretical foundations of (Koopman) operator theory and spectral analysis;
- numerical methods for computing operator spectra and eigenfunctions, with an emphasis on accuracy, stability, and verification;
- integration of operator-based methods with finite element or other simulation frameworks;
- applications to engineering systems, e.g. use of operator methods in control and optimization problems in engineering.