

STRUCTURE-PRESERVING REDUCED COMPLEXITY MODELLING

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In many applications, such as optimisation, uncertainty quantification and inverse problems, it is required to perform repeated simulations of high-dimensional physical systems for different choices of parameters. In order to save computational cost, surrogate models can be constructed by expressing the solution in a low-dimensional basis, obtained from training data. This is referred to as model reduction.

Past investigations have shown that, when performing model reduction of Lagrangian or Hamiltonian systems, it is crucial to preserve the symplectic structure associated with the system in order to ensure long-term numerical stability and restrict error growth.

In this talk, we will review structure-preserving model reduction and machine learning techniques for the construction of reduced bases, hyper-reduction and flow approximation.