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Data-Driven Learning of Reduced-Order Dynamics for a Parametrized Shallow Water Equation

Thursday, July 30, 2020 1:00 PM (1 hour)

A non-intrusive data-driven model order reduction method is introduced that learns low-dimensional dynamical models for a parametrized non-traditional shallow water equation (NTSWE). The reduced-order model is learnt by setting an appropriate least-squares optimization problem in a low-dimen-sional subspace. Computational challenges that particularly arise from the optimization problem, such as ill-conditioning are discussed. The non-intrusive model order reduction framework is extended to a parametric case using the parameter dependency at the level of the partial differential equation. The efficiency of the proposed non-intrusive method is illustrated to construct reduced-order models for NTSWE and compared with an intrusive method, proper orthogonal decomposition with Galerkin projection. Furthermore, the predictability of both models outside the range of the training data is discussed.

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