**Operator inference for non-intrusive model reduction of non-polynomial nonlinear systems**

Boris Kramer, University of California San Diego

We present a data-driven non-intrusive model reduction method that learns low-dimensional models of dynamical systems with non-polynomial nonlinear terms that are spatially local and that are given in analytic form. The proposed approach requires only the non-polynomial terms in analytic form and learns the rest of the dynamics from snapshots computed with a potentially black-box full-model solver. The linear and polynomially nonlinear dynamics are learned by solving a linear least-squares problem where the analytically given non-polynomial terms are incorporated in the right-hand side of the least-squares problem. The resulting ROM thus contains learned polynomial operators together with the analytic form of the non-polynomial nonlinearity. The proposed method is demonstrated on several test problems which provides evidence that the proposed approach learns reduced models that achieve comparable accuracy as state-of-the-art intrusive model reduction methods that require full knowledge of the governing equations.