

Model Order Reduction for Parametric Stationary Problems

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Abstract: There are a variety of system-theoretic methods for model order reduction (MOR) of non-parametric non-stationary systems. For linear time-invariant (LTI) systems, these include, for example, balanced truncation and iterative rational Krylov algorithm. Some of these methods have been already extended to parametric non-stationary systems. In addition, recently an optimal MOR method has been developed for approximating parametric LTI systems where optimality is measured in terms of a least-squares measure both in the frequency and time domain. In this presentation, we discuss adapting these system-theoretic MOR methods to linear parametric stationary systems. In particular we focus on the optimal parametric MOR methods. We show that incorporating the system-theoretic error measures into approximation of non-stationary problems yields more accurate reduced models compared to the traditional tools, such as POD. We also illustrate that the optimization algorithm can be performed purely in a data-driven manner using only the samples of the quantity of interests without access to full-order operators. This is joint work with Serkan Gugercin.