On ADI Approximate Balanced Truncation

T. Reis[1]

[1]Universität Hamburg, timo.reis@uni-hamburg.de

Balanced truncation is one of the most popular model reduction methods for input-output-systems governed by ordinary differential equations. This technique relies on the determination of the observability and controllability Gramian matrices and provides an error bound in the H_∞ norm. For this method, a variety of efficient numerical methods have been developed in the past couple of years. In particular, the ADI iteration for determining the Gramians has become very popular since it allows to determine balanced realizations of large-scale systems.
Since ADI iteration provides approximative solutions, it is natural to wonder the effect of this approximation in the overall model reduction process. This is subject the talk, where we aim to present a backward error analysis: We first show that ADI approximate balanced truncation in theory consists of exact balanced truncation of a certain artificial system, which is obtained from the original system via an L^2-orthogonal projection of the impulse response. Numerical consequences will be presented.