

Model Order Reduction via a Balanced Truncation-Interpolation Approach for Gas Networks

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This work deals with the Gramian based model order reduction (MOR) [1, 2] of nonlinear, parametric systems of partial differential-algebraic equations which arise from transient gas network modeling. We present an approach based on a linearization around parametrized static states, linear time-invariant reduction and interpolation. The approximation quality is crucially determined by the choice of the representative network states and the interpolation strategy, but also the underlying spatial discretization and the index of the resulting temporal differential algebraic system play a non-negligible role.

References

- [1] T. Stykel. Gramian-based model reduction for descriptor systems. *Math. Control, Signals, Sys.*, 16(4):297–319, 2004.
- [2] K. Zhou and K. Doyle, J. D. Clover. *Robust and Optimal Control*. Prentice Hall, Upper Saddle River, 1996.