



MAGDEBURG LECTURES ON OPTIMIZATION AND CONTROL

A data-driven modeling framework for dynamical systems

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Time & Place

The presentation on July 18, 2017 will be given in the Lukasklausur › (Schleiufer 1, 39104 Magdeburg) (<http://ifatwww.et.uni-magdeburg.de/syst/maloc/seminars/Standort%20Lukas%20Klausur.pdf>) and starts at 5.00 p.m. (Großer Saal).

Abstract: We present a data-driven non-intrusive modeling approach for large-scale dynamical systems with linear state dependence. Traditionally, reduced models are constructed in an intrusive projection-based framework, where the operators of the full model are required either explicitly in an assembled form or implicitly through a routine that returns the action of the operators on a vector. Our non-intrusive approach constructs reduced models directly from trajectories of the inputs and outputs of the full model, without requiring the full-model operators. These trajectories are generated by running a simulation of the full model; the method then infers frequency-response data from these simulated time-domain trajectories and uses the data-driven Loewner and Vector Fitting frameworks to derive a reduced model. Only a single time-domain simulation is required to derive a reduced model with the new data-driven non-intrusive approach. We demonstrate the proposed methodology on various benchmark examples and test its robustness in the case of noisy measurements.