Model Order Reduction for Higher Order Systems

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The advancement of linearization of matrix polynomials in recent years has led to a wealth of new approaches which have not yet been pursued in the context of model order reduction of higher order systems. Thus, in this talk we will discuss first ideas for model order reduction of higher order system
$A_k x(k)(t)+A_{(k-1)} x(k-1)(t)+\ldots+A_2 \ddot{x}(t)+A_1 \dot{x}(t)+A_0 x(t)= Bu(t)$ where A_j are n-x-n real matrices for j = 1, …, n, x(t) is a real vector of length n, B is a real n-x-m matrix and u(t) is a real vector of length m. In particular, we will be interested in linearizations which allow for a structure-preserving model order reduction based on Krylov subspace methods. Ideally, we can not only recover a higher order system of smaller dimension, but, in case the matrices $A_j$have some structure (such as being symmetric or skew-symmetric), then the corresponding reduced order matrices should have the same structure.