Efficient Balancing Based MOR for Large Sparse Second Order Systems

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Behavioural modeling of many structural analyis processes in engineering applications lead to very large second order systems. The underlying mathematical models often arise as (semi-)discretized partial differential equations and thus consist of sparse matrices. Still for the simulation, especially when controlers need to be designed and evaluated, even the sparse models are to expensive in terms of computational demands. Therefore a central topic is to provide a reduced order model(ROM) for the construction and parameterization of a practicable controller for the application. Here we will concentrate on balancing based reduction techniques to compute the ROM. Our main focus will be on presenting a way to efficiently compute the ROM exploiting the sparsity and second order structure of the semi-discretized model, rather than presenting a new reduction technique.

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