Parallel Model Order Reduction via Matlab Distributed Toolbox

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Model order reduction (MOR) techniques are getting more important in large scale computational tasks like large scale electronic circuit simulations. In this work, we present some experimental studies on multiprocessor systems for rational Krylov methods. These type of methods require huge memory and computational power especially in large scale simulations. Therefore, they are fairly suitable for parallel computing. Computational complexity of the rational Krylov based methods can be given as $O(n^3)$ for dense problems where $n$ is the order of the system. In our first experiment, we parallelized the $H_2$ optimal model reduction method [1]. In our future work, we plan to parallelize some other model order reduction techniques using rational Krylov approach.

All codes were written in Matlab language and for the parallelization we used Matlab’s parallel computing toolbox [2]. Speedup graphics of the parallel code for different system order $n$ is given in Figure 1. Speedup of a parallel algorithm is defined as

$$S_p = \frac{T_1}{T_p}$$

where $T_1$ is the CPU time for one processor and $T_p$ is the CPU time for $P$ processor.

![Speedup graphics](image)

Figure 1: Speedup graphics of the parallel algorithm for different system order $n$.

References
