Parallelization of a PCG-AMG Solver in Multi-CPU/GPU Environments

Aurel Neic

Karl Franzens Universität Graz, Institute for Mathematics and Scientific Computing
aurel.neic@uni-graz.at

ABSTRACT

We present a parallel conjugate gradient solver with an algebraic multigrid preconditioner for second-order elliptic PDEs called: Parallel Toolbox (PT). The PT is designed for multi-CPU and multi-GPU environments and uses non-overlapping-elements domain decomposition as parallelization approach. We discuss in detail the parallelization strategy, the resulting parallel performance properties, and recent optimizations in the communication pattern. Strong scalability benchmarks are presented for the bidomain equations of a state-of-the-art model of rabbit ventricles using the CARP (Cardiac Arrhythmias Research Package) simulator.