Seminar

HPC Lab · CDS

Center for Data and Simulation Science

Wednesday, June 14, 2023
4–5:30 p.m.
Seminar Room 1
Mathematical Institute
University of Cologne
Weyertal 86–90

Speaker:

Dr. Robert Speck
Forschungszentrum Jülich

PARALLEL-IN-TIME COLLOCATION METHODS

The efficient use of modern supercomputers has become one of the key challenges in computational science. For the numerical solution of time-dependent processes, time-parallel methods have opened new ways to overcome both strong and weak scaling limits. If higher order accuracy in time is feasible, parallelization techniques based on collocation methods can provide temporal parallelism within a single time-step as well as across multiple ones. In this talk, we give an overview of three different approaches to introduce parallel-in-time integration for collocation methods: (1) parallel preconditioners for spectral deferred corrections, (2) the parallel full approximation scheme in space and time, and (3) diagonalization-based preconditioning for multi-step collocation problems. Those approaches can even be combined to obtain multi-time-parallel integrators. We shed light on the pros and cons of the different variants and their implementation on HPC systems. We also discuss current roadblocks and further research directions.

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