

New Block Distributed Schur Complement Preconditioners for CFD Simulation on Many-Core Architectures

At the German Aerospace Center, the parallel simulation systems TAU and TRACE have been developed for the aerodynamic design of aircrafts or turbines for jet engines. For the parallel iterative solution of large, sparse real or complex systems of linear equations, required for both CFD solvers, block-local preconditioners are compared with reformulated global block Distributed Schur Complement (DSC) preconditioning methods. Numerical, performance and scalability results of block DSC preconditioned FGMRes algorithms are presented for typical TAU and TRACE problems on many-core systems together with an analysis of the advantages of using block compressed sparse matrix data formats.

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