

Parallel Hierarchical Hybrid Multigrid Solver for Variable Viscosity

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The hierarchical hybrid grid (HHG) framework is designed to close the gap between the flexibility of finite elements and the performance of geometric multigrid by employing semi-structured meshes. It provides excellent scalability up to a million parallel threads and can solve in excess of 10^{12} unknowns in less than 2 minutes compute time on state-of-the-art supercomputers. The framework has recently been extended to solve the Stokes system as a building block for geophysical flow simulations. In this presentation we will concentrate on the analyzing the multigrid convergence in case of variable viscosity. In the cases of interest, close to optimal multigrid convergence can be maintained by combining suitable smoothers and Krylov space acceleration.