

Abstract Submitted
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Efficient Simulation of Compressible, Viscous Fluids using Multi-rate Time Integration¹ CORY MIKIDA, ANDREAS KLOECKNER, DANIEL BODONY, University of Illinois at Urbana-Champaign — In the numerical simulation of problems of compressible, viscous fluids with single-rate time integrators, the global timestep used is limited to that of the finest mesh point or fastest physical process. This talk discusses the application of multi-rate Adams-Bashforth (MRAB) integrators to an overset mesh framework to solve compressible viscous fluid problems of varying scale with improved efficiency, with emphasis on the strategy of timescale separation and the application of the resulting numerical method to two sample problems: subsonic viscous flow over a cylinder and a viscous jet in crossflow. The results presented indicate the numerical efficacy of MRAB integrators, outline a number of outstanding code challenges, demonstrate the expected reduction in time enabled by MRAB, and emphasize the need for proper load balancing through spatial decomposition in order for parallel runs to achieve the predicted time-saving benefit.

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