Abstract Submitted
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High-order provably stable overset grid methods for hyperbolic problems, with application to the Euler equations NEK SHARAN, Graduate Student, Department of Aerospace Engineering, University of Illinois at Urbana-Champaign, CARLOS PANTANO, Associate Professor, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, DANIEL BODONY, Associate Professor, Department of Aerospace Engineering, University of Illinois at Urbana-Champaign — Overset grids provide an efficient and flexible framework to implement high-order finite difference methods for simulations of compressible viscous flows over complex geometries. However, prior overset methods were not provably stable and were applied with artificial dissipation in the interface regions. We will discuss new, provably time-stable methods for solving hyperbolic problems on overlapping grids. The proposed methods use the summation-by-parts (SBP) derivative approximations coupled with the simultaneous-approximation-term (SAT) methodology for applying boundary conditions and interface treatments. The performance of the methods will be assessed against the commonly-used approach of injecting the interpolated data onto each grid. Numerical results will be presented to confirm the stability and the accuracy of the methods for solving the Euler equations. The extension of these methods to solve the Navier-Stokes equations on overset grids in a time-stable manner will be briefly discussed.

Nek Sharan
Univ of Illinois - Urbana

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