Abstract Submitted
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Stable interface treatment in overset grid methods[1] 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 grid methods enable complex geometry capability while retaining high-order finite difference-based discretizations; however, no provably stable methods currently exist that are free of numerical dissipation. We have developed and will present the construction of time-stable interface treatments for solving hyperbolic and parabolic problems on overset grids. The treatments are based on the simultaneous approximation term (SAT) penalty method, and we use summation-by-parts (SBP) operators for the derivative approximations. Error analysis is performed to determine the order of interpolation that retains the accuracy of the spatial finite difference operator. Optimal estimates on the error bound are derived and confirmed with a convergence study of numerical simulations. The conditions for the treatment to be conservative have also been determined. Numerical examples are presented to confirm the stability and accuracy of the methods.

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