Abstract Submitted
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A robust non-dissipative all-mach number scheme for unstructured grids[1] SUMAN MUPPIDI, KRISHNAN MAHESH, University of Minnesota — We are interested in simulations of high speed external flows, and those in scramjet like geometries (of which supersonic jets in crossflow are an example). We are therefore developing an algorithm that solves the compressible equations on unstructured grids using a predictor-corrector approach, a novel scaling for pressure, and a characteristic filter based shock-capturing. Hou and Mahesh (J. Comp. Phys., vol 205) formulated an all-Mach number approach to solve compressible flows on structured grids, that this work has extended to unstructured grids. The attraction of this method is that the compressible Navier Stokes equations naturally revert to Zero-Mach number equations in the incompressible limit (the discrete energy equation results in the divergence-free condition at zero Mach number), avoiding the stiffness in the equations without preconditioning or artificial compressibility. The shock capturing scheme employed in the present algorithm was developed by Park and Mahesh (AIAA paper, 2007-722) for unstructured grids, and is implemented as a predictor-corrector approach. This ensures that shock-capturing is active only in regions of discontinuity, avoiding any dissipation in regions away from shocks. This feature improves the overall accuracy of the simulations. We will present issues regarding the algorithm, its implementation, and some example results/simulations.

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Suman Muppidi
University of Minnesota

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