Simulations of Compressible Viscous Flows and Wave Scattering Using the Immersed Boundary Method\textsuperscript{1} WALTER ARIAS-RAMIREZ, UNICAMP-Univ de Campinas, BRITTON J. OLSON, Lawrence Livermore National Laboratory, LLNL, WILLIAM R. WOLF, UNICAMP-Univ de Campinas, UNIVERSITY OF CAMPINAS TEAM, LAWRENCE LIVERMORE NATIONAL LABORATORY TEAM — The immersed boundary method (IBM) in combination with a high-order finite difference compact formulation is used to study canonical test cases in fluid mechanics and acoustics, including viscous compressible flows, acoustic wave reflection and diffraction, and shock-wave reflections. In this study, two IB formulations are implemented: the continuous forcing and the discrete forcing approaches. Results obtained for the two methodologies are presented for 1-D problems involving acoustic and shock wave reflection, plane wave acoustic scattering along a cylinder and the viscous flow past a solid cylinder. Additionally, a grid convergence study is carried out for the simulations showing first-order convergence for the current implementation of the continuous forcing approach and second-order convergence for the discrete forcing approach.

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