Abstract Submitted
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Large-eddy simulation of the passage of a shock wave through homogeneous turbulence[1] N.O. BRAUN, D.I. PULLIN, D.I. MEIRON, California Institute of Technology — The passage of a nominally plane shockwave through homogeneous, compressible turbulence is a canonical problem representative of flows seen in supernovae, supersonic combustion engines, and inertial confinement fusion. The interaction of isotropic turbulence with a stationary normal shockwave is considered at inertial range Taylor Reynolds numbers, $Re_\lambda = 100 - 2500$, using Large Eddy Simulation (LES). The unresolved, subgrid terms are approximated by the stretched-vortex model (Kosovic et al., 2002), which allows self-consistent reconstruction of the subgrid contributions to the turbulent statistics of interest. The mesh is adaptively refined in the vicinity of the shock to resolve small amplitude shock oscillations, and the implications of mesh refinement on the subgrid modeling are considered. Simulations are performed at a range of shock Mach numbers, $M_s = 1.2 - 3.0$, and turbulent Mach numbers, $M_t = 0.06 - 0.18$, to explore the parameter space of the interaction at high Reynolds number. The LES shows reasonable agreement with linear analysis and lower Reynolds number direct numerical simulations.

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