Interaction of a spherical shock wave with compressible isotropic turbulence[1] ANKIT BHAGATWALA, SANJIVA LELE, Stanford University — There have been several studies on the interaction of a planar shock wave with a turbulent inflow. However, such canonical problems do not address the more practical cases of interest, wherein the shock is spherical. We study the interaction of a spherical shock wave expanding outwards into a field of compressible isotropic turbulence. The shock is initiated by depositing a large amount of energy at the center of the domain. As it progresses through the domain, it modifies and is modified by the turbulent flow field. The turbulent field has a high enough turbulent Mach number and Reynolds number to have significant dilatational, vortical and entropic fluctuations. We present two cases, one in which turbulence is significantly modified by the shock and another in which the shock is significantly modified by the turbulence. We identify the physical mechanisms behind these observations and the parameters that are important to this problem. Finally, we highlight some of the crucial differences and challenges of simulating spherical shock-turbulence interaction compared to the planar case.

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