Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Large-eddy simulations of the shock-turbulence interaction canonical problem[1] IVAN BERMEJO-MORENO, JOHAN LARSSON, SANJIVA LELE, Center for Turbulence Research, Stanford University — We present results of large-eddy simulations of the interaction between a nominally planar shock wave and incoming isotropic turbulence passing through it. The numerical hybrid method in use combines fifth-order WENO and sixth-order central finite-difference schemes in a structured grid, with a sensor that switches between both schemes near shock waves. We compare results obtained with different SGS models, focusing on their performance in the relaxation region immediately downstream of the shock wave, where the effects of non-equilibrium and anisotropy are most noticeable. SGS models under evaluation include pure and mixed dynamic eddy-diffusivity models (with gradient and similarity mixed terms, and different types of eddy-diffusivities), as well as the structure-based stretched-vortex model. Extensions of existing models are proposed to improve their performance, evaluated through comparison of time-averaged turbulence quantities with filtered DNS results (see Phys. Fluids 21, 126101 (2009)).

[1]Supported by the Department of Energy under the SciDAC II program

Ivan Bermejo-Moreno
Center for Turbulence Research, Stanford University

Date submitted: 06 Aug 2010 Electronic form version 1.4