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Direct Numerical Simulation of Passive Scalar Mixing in Shock Turbulence Interaction XIANGYU GAO, IVAN BERMEJO-MORENO, University of Southern California, JOHAN LARSSON, University of Maryland — Passive scalar mixing in the canonical shock-turbulence interaction configuration is investigated through shock-capturing Direct Numerical Simulations (DNS). Scalar fields with different Schmidt numbers are transported by an initially isotropic turbulent flow field passing across a nominally planar shock wave. A solution-adaptive hybrid numerical scheme on Cartesian structured grids is used, that combines a fifth-order WENO scheme near shocks and a sixth-order central-difference scheme away from shocks. The simulations target variations in the shock Mach number, M (from 1.5 to 3), turbulent Mach number, M_t (from 0.1 to 0.4, including wrinkled- and broken-shock regimes), and scalar Schmidt numbers, Sc (from 0.5 to 2), while keeping the Taylor microscale Reynolds number constant ($Re_\lambda \approx 40$). The effects on passive scalar statistics are investigated, including the streamwise evolution of scalar variance budgets, pdfs and spectra, in comparison with their temporal evolution in decaying isotropic turbulence.

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