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The Modeling of Turbulent Radiative Shocks with Applications to High-Energy-Density Physics and Astrophysics[1] TIBERIUS MORAN-LOPEZ, JAMES HOLLOWAY, University of Michigan, OLEG SCHILLING, Lawrence Livermore National Laboratory, LAWRENCE LIVERMORE NATIONAL LABORATORY COLLABORATION — Radiation transport, shock physics, and turbulence are coupled in many high-energy-density environments including supernovae, stellar life cycles, high-energy laser experiments, and black hole evolutions. A turbulent radiative gas dynamics model for examining such phenomena is developed. A four-equation Reynolds-averaged Navier–Stokes model for the turbulent kinetic energy, turbulent kinetic energy dissipation rate, density variance, and temperature variance is used to describe the effects of turbulence while an equilibrium diffusion model describes the radiative transfer. The mean radiative flux introduces additional terms addressed by modeled transport equations. This model will contribute to an improved understanding of high energy density and astrophysical phenomena in which radiation and turbulence are important.

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