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Effects of the secondary baroclinic vorticity on turbulent energy cascade in the Ritchmyer–Meshkov instability[1] NAIFU PENG, YUE YANG, Peking University — We study turbulent mixing in the Richtmyer–Meshkov instability (RMI) induced by a planar shock wave at Mach 1.5 with multimode interfacial perturbations between air and SF_6. By separating different types of the perturbations, we develop a double-density model for simplifying the RMI, and find that the effects of the secondary baroclinic vorticity (SBV) play an important role during the flow evolution. The SBV, caused by the misalignment of the pressure gradient produced by the velocity perturbation and the density gradient near the interface, leads to the nonlinear evolution of the interface with the generation of spike- and bubble-like structures. Moreover, the SBV produces small-scale vortical structures and affects the turbulent energy cascade in the mixing zone. The kinetic energy spectrum affected by the SBV is closer to the $-3/2$ scaling law than the classical $-5/3$ law for constant-density homogeneous isotropic turbulence.

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