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Compressible turbulent mixing: Effects of compressibility and Schmidt number QIONGLIN NI, Department of Physics, University of Rome Tor Vergata — Effects of compressibility and Schmidt number on passive scalar in compressible turbulence were studied. On the effect of compressibility, the scalar spectrum followed the $k^{-5/3}$ inertial-range scaling and suffered negligible influence from compressibility. The transfer of scalar flux was reduced by the transition from incompressible to compressible flows, however, was enhanced by the growth of Mach number. The intermittency parameter was increased by the growth of Mach number, and was decreased by the growth of the compressive mode of driven forcing. The dependency of the mixing timescale on compressibility showed that for the driven forcing, the compressive mode was less efficient in enhancing scalar mixing. On the effect of Schmidt number (Sc), in the inertial-convective range the scalar spectrum obeyed the $k^{-5/3}$ scaling. For Sc>>1, a k^{-1} power law appeared in the viscous-convective range, while for Sc<<1, a $k^{-17/3}$ power law was identified in the inertial-diffusive range. The transfer of scalar flux grew over Sc. In the Sc>>1 flow the scalar field rolled up and mixed sufficiently, while in the Sc<<1 flow that only had the large-scale, cloudlike structures. In Sc>>1 and Sc<<1 flows, the spectral densities of scalar advection and dissipation followed the $k^{-5/3}$ scaling, indicating that in compressible turbulence the processes of advection and dissipation might deferring to the Kolmogorov picture. Finally, the comparison with incompressible results showed that the scalar in compressible turbulence lacked a conspicuous bump structure in its spectrum, and was more intermittent in the dissipative range.

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