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**DNS of Decaying Compressible Turbulence Using Gas Kinetic Scheme**[1] WEI LIAO, YAN PENG, LI-SHI LUO, Old Dominion University, ROBERT RUBINSTEIN, NASA Langley Research Center — We apply the gas-kinetic scheme to direct numerical simulation of decaying compressible turbulence. We compute the kinetic energy $K(t)$, dissipation rate $\varepsilon(t)$, probability density functions (PDFs) of the two-point longitudinal velocity difference, shocklet strength, and local Mach number. Our results reveal the following features of decaying compressible turbulence: (1) With the initial Taylor microscale Reynolds number $\mathrm{Re}_\lambda$ fixed, increase of initial turbulent Mach number $\mathrm{Ma}_\mathrm{t}$ leads to an increase of the dissipation rate $\varepsilon$ at the initial stage; (2) Change of $\mathrm{Ma}_\mathrm{t}$ has little effect on $K(t)$ and the long-time asymptotics of $\varepsilon(t)$; (3) At the lower $\mathrm{Ma}_\mathrm{t}$ ($\approx 0.1$), intermittency persists, while at the higher $\mathrm{Ma}_\mathrm{t}$ ($\approx 0.5$), intermittency quickly dissipates, *i.e.*, the PDF of the two-point longitudinal velocity difference becomes Gaussian independent of the separation distance $\delta r$; and (4) the PDF's of both shock strength and the local Mach number all appear to follow scaling laws.

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Li-Shi Luo
Old Dominion University

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