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Bulk viscosity effect on freely decaying compressible homogeneous isotropic turbulence SHAOWU PAN, ERIC JOHNSEN, University of Michigan, Ann Arbor — Despite growing interests in compressible turbulence, the effect of bulk viscosity has been long ignored. For certain gases, the bulk viscosity may be 1000 times greater than the shear viscosity and thus modify energy transfer and dissipation mechanisms. In this study, we use direct numerical simulations to investigate the role of bulk viscosity on decaying isotropic compressible turbulence. Our results show that bulk viscosity exhibits a negligible decrease on enstrophy, but moderate and significant increases on the turbulent kinetic energy and Taylor-scale Reynolds number, respectively. A Helmholtz decomposition of the velocity field indicates that the bulk viscosity has a negligible effect on the solenoidal part, but exhibits a cross-scale effect on the dilatational component.

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