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Scaling and statistics in three-dimensional compressible turbulence JIANCHUN WANG, XIANTU HE, YIPENG SHI, SKLTCS and CAPT, College of Engineering, Peking University, China, LIAN-PING WANG, Department of Mechanical Engineering, University of Delaware, Newark, DE 19716, USA, ZUOLI XIAO, SHIYI CHEN, SKLTCS and CAPT, College of Engineering, Peking University, China — The scaling and statistical properties of three-dimensional (3D) compressible turbulence are studied using high resolution numerical simulation. The two-point statistics of solenoidal component of velocity field are found to be no significant difference from those in the incompressible turbulence, while scaling exponents for compressive component of velocity structure functions are saturated at high orders, similar to one-dimensional (1D) Burgers turbulence. Both numerical results and theoretical analysis based on the probability density function (PDF) equation reveal that the power law exponent in the PDF of 3D velocity divergence is different from that in the Burgers turbulence. The effect of various terms in the dynamic equation on PDF will also be presented.

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