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Lagrangian statistics in compressible isotropic homogeneous turbulence[1] YANTAO YANG, JIANCHUN WANG, YIPENG SHI, SHIYI CHEN, Center for Applied Physics and Technology and SKLTCS, College of Engineering, Peking University, Beijing, China — In this work we conducted the Direct Numerical Simulation (DNS) of a forced compressible isotropic homogeneous turbulence and investigated the flow statistics from the Lagrangian point of view, namely the statistics is computed following the passive tracers trajectories. The numerical method combined the Eulerian field solver which was developed by Wang et al. (2010, *J. Comp. Phys.*, **229**, 5257-5279), and a Lagrangian module for tracking the tracers and recording the data. The Lagrangian probability density functions (p.d.f.'s) have then been calculated for both kinetic and thermodynamic quantities. In order to isolate the shearing part from the compressing part of the flow, we employed the Helmholtz decomposition to decompose the flow field (mainly the velocity field) into the solenoidal and compressive parts. The solenoidal part was compared with the incompressible case, while the compressibility effect showed up in the compressive part. The Lagrangian structure functions and cross-correlation between various quantities will also be discussed.

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