Abstract Submitted
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Studying Lagrangian dynamics of turbulence using on-demand fluid particle tracking in the JHU turbulence database[1] HUIDAN YU, Mechanical Engineering, IUPUI, KALIN KANOV, ERIC PERLMAN, RANDAL BURNS, Computer Science, ALEXANDER SZALAY, Physics & Astronomy, GREGORY EYINK, Applied Mathematics & Statistics, CHARLES MENEVEAU, Mechanical Engineering, Johns Hopkins University — The JHU public turbulence database (http://turbulence.pha.jhu.edu) provides access to large datasets generated from DNS of turbulence, at present the output of a 1024^3 pseudo-spectral DNS of forced isotropic turbulence (Re_λ=443) with 1024 time-steps. The resulting 27 TB dataset can be accessed remotely through an interface based on the Web-services model allowing remote users to issue subroutine-like calls on their host computers. Here we describe the newly developed getPosition function: Given an initial position, integration time-step, as well as an initial and end time, the getPosition function tracks arrays of fluid particles inside the database and returns particle locations at the end of the trajectory integration time. GetPosition is applied to study Lagrangian velocity structure functions as well as tensor-based Lagrangian time correlation functions. The roles of pressure Hessian and viscous terms in the evolution of the strain-rate and rotation tensors are also explored.

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