

Abstract Submitted
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On the Lagrangian study of circulations MINPING WAN, ZUOLI XIAO, SHIYI CHEN, Department of Mechanical Engineering, Johns Hopkins University, Baltimore, MD 21218, GREGORY EYINK, Department of Applied Mathematics and Statistics, Johns Hopkins University, Baltimore, MD 21218 — The conservation of circulations was argued by G. I. Taylor to play a key role in the production of dissipation in turbulent fluids, by the process of vortex line-stretching. We present evidence from a numerical simulation of high-Reynolds-number turbulence for violation of circulation conservation by Lagrangian tracking of material loops. Although violated in individual realizations, we find that the circulations are still conserved in some average sense. Taylor's vortex line-stretching picture is also examined by Lagrangian tracking of material lines. The difference between material lines and vortex lines is discussed with special attention to the role of viscosity.

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