

Abstract Submitted
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Evolution of local structure along pathlines in a turbulent round jet JOSEPH MATHEW¹, Indian Institute of Science — Studies of the velocity gradient tensor (VGT) have revealed several features of the local structure of flows. In homogeneous, isotropic turbulence, conditional mean trajectories in the phase space of 2nd and 3rd invariants (Q and R) of the VGT spiral clockwise to the origin (Ooi et al., 1998). Local topologies change from sheets to stretching vortices to compressing ones, repeatedly. In this study, the evolution of many fluid particles were computed alongside a temporal DNS of a round jet. Trajectories in Q - R space from successive positions along fluid pathlines were found to be qualitatively different from the conditional mean trajectories found earlier. Large departures occur in the 2nd and 1st quadrants of Q - R space. The implied local topology is focal—that of stretching and compressing vortices; dissipation was large, arising from changes to vortex stretching. On these selected curves large changes to Q occur almost all the time.

¹Membership is pending with reciprocal society (Indian Physics Association) not APS

Joseph Mathew
Indian Institute of Science

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