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Two-point statistics for turbulent relative dispersion in quasi-two-dimensional turbulent jets JULIEN R. LANDEL, University of Cambridge, DAMTP, C.P. CAULFIELD, DAMTP & BPI, University of Cambridge, ANDREW W. WOODS, BPI, University of Cambridge — The study of turbulent jets in relatively enclosed geometries is relevant to rivers flowing into lakes. In the event of a spillage of pollutants into a river, it is critical to understand how these agents disperse with the flow in order to assess damage to the environment. To measure turbulent relative dispersion in the streamwise and cross-stream directions of quasi-two-dimensional jets, we propose a Lagrangian-particle-tracking technique which we name virtual particle tracking (VPT). We seed virtual massless passive tracer particles in the velocity field of a flow measured experimentally using particle image velocimetry. These virtual particles evolve as point passive tracers in the time-dependent velocity field and can be tracked in time and space. After presenting the VPT technique, we show the time-evolution of two-point statistics, such as the distance between two virtual particles, measured from the evolution of large virtual particle clusters seeded in the flow of quasi-two-dimensional jets. We also compare the results given by VPT with a variety of other techniques. We find that the dispersion properties differ significantly between the large scale eddies and the high-speed sinuous core observed in the flow of quasi-two-dimensional jets. As a result, we observe large streamwise dispersion and a significant amount of tracers can be transported faster than the speed predicted by a simple top-hat advection model in the jet.

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