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Lagrangian description of the unsteady flow induced by a jellyfish JIN-TAE KIM, LEONARDO P CHAMORRO, University of Illinois at Urbana-Champaign — The unsteady flow induced by a single pulse of *Aurelia aurita* was quantified via 3D particle tracking velocimetry. Inspection of the flow included Lagrangian statistics, velocity and acceleration probability density functions (PDF), acceleration variance as well as pair dispersion. PDF of the Lagrangian velocity components indicated more intense mixing in the radial direction and revealed three stages dominated by flow acceleration, mixing, and dissipation. During the mixing phase, the flow shares characteristics of homogeneous isotropic turbulence. We show that a single pulse may induce rich dynamics, where pair dispersion exhibits a super-diffusive t^3 regime during the accelerated flow due to large-scale flow inhomogeneity; this is followed by a coherent t^2-Batchelor scaling in the mixed wake and then t^1-Brownian motions in a late stage dominated by flow dissipation. Kolmogorov microscales during the fully mixed phase were obtained with three distinct approaches, namely, Heisenberg-Yaglom relation of the Lagrangian acceleration variance, the fluctuating rate of the strain tensor in the Eulerian frame and the Batchelor scaling in pair dispersion, which showed good agreement.

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