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Development of three-dimensionality in the wake of a nitrobenzene drop falling in water. LOUIS L. STEYTLER, University of Illinois at Urbana-Champaign, REKHA R. RAO, Sandia National Laboratories, ARNE J. PEARLSTEIN, University of Illinois at Urbana-Champaign — The development of three-dimensionality in the wake of a nitrobenzene drop falling in water is investigated numerically using an Arbitrary Lagrangian-Eulerian method, with a moving mesh and an interface-fitted grid. Computations covering flow regimes from steady to unsteady laminar flow for Reynolds numbers (based on the continuous phase properties) up to approximately 800 (i.e., over a range of drop sizes) are reported. The vortical structures in the wake are compared to available experimental results. The flow structures internal to the drops and the drop shapes and trajectories are reported. Some implications for mass and heat transfer are discussed.

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