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The Refined Level Set Grid Method for Simulating Primary Atomization MARCUS HERRMANN, Stanford University — Simulating the primary atomization of turbulent liquid jets and sheets is a difficult task, since the liquid/gas interface can exhibit a wide range of scales. This is especially challenging for grid-based tracking schemes, like the Volume-of-Fluid method or the level set method, since it has to be demonstrated, that the simulated interface geometry becomes grid independent upon grid refinement. To this end, a novel level set approach geared towards massively parallel computers, termed Refined Level Set Grid (RLSG) method is presented. RLSG allows for the independent refinement of the interface tracking level set grid. This ensures grid converged representation of the phase interface with respect to a base-grid, on which the Navier-Stokes equations are solved. Furthermore, RLSG provides a natural, consistent interface to Lagrangian secondary breakup spray models, thereby ensuring that small-scale structures that are infeasible to resolve by a grid-based approach are treated correctly. Finally, using the RLSG method, a sub-grid model for the surface tension term in the multiphase Navier-Stokes equations can be derived, thus enabling LES simulation of the turbulent breakup process.

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