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Simulation of sprays using a Lagrangian filtered density function approach WANJIAO LIU, SEAN GARRICK, University of Minnesota — Sprays and atomization have wide applications in industry, including combustion/engines, pharmaceutics and agricultural spraying. Due to the complexity of the underlying processes, much of the underlying phenomena are not fully understood. Numerical simulation may provide ways to investigate atomization and spray dynamics. Large eddy simulation (LES) is a practical approach to flow simulation as it resolves only the large-scale structures while modeling the sub-grid scale (SGS) effects. We combine a filtered density function (FDF) based approach with a Lagrangian volume-of-fluid method to perform LES. This resulting methodology is advantageous in that it has no diffusive or dissipative numerical errors, and the highly non-linear surface tension force appears in closed form thus the modeling of the SGS surface tension is not needed when simulating turbulent, multiphase flows. We present the methodology and some results for the simulation of multiphase jets.

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