Abstract Submitted
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Numerical simulation of a round liquid jet using the refined level set grid method with subgrid Lagrangian drop breakup model[1] DOKYUN KIM, PARVIZ MOIN, CTR, Stanford University — An accurate and robust numerical method has been developed to simulate the breakup of a round liquid jet surrounded by a coaxial flow of gas. A Refined Level Set Grid (RLSG) method coupled to a Lagrangian drop breakup model is used to capture the breakup process of the liquid jet. The phase interface is tracked by the level-set method, while small subgrid droplets produced from resolved ligaments are transferred from the level-set representation to the Lagrangian drops. The further secondary atomization is handled by a stochastic breakup model. When thin ligaments are not resolved on the level-set grid, a capillary breakup model is used to predict the drop size distribution from the pinching off process and inserted as Lagrangian drops. This method improves the mass conservation error as well as reducing the computational cost. The numerical results are consistent with the observed breakup mechanisms in the experiment and the stability analysis. The drop size distribution of the resulting spray is also compared with the experimental data. These numerical results demonstrate the applicability and feasibility of our method for simulation of the atomization process of liquid jets.

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Dokyun Kim
Stanford University

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