Abstract Submitted
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Numerical simulation of a liquid jet in a cross-flow using Refined Level Set Grid method[1] DOKYUN KIM, Mechanical Engineering, Stanford University, MARCUS HERRMANN, SOURABH APTE, JORG SCHLUTER, PARVIZ MOIN, Center for Turbulence Research, Stanford University — Numerical simulations are conducted to investigate the breakup mechanism of a liquid jet injected into a turbulent cross-flow using an unstructured grid LES solver. A Refined Level Set Grid (RLSG) method coupled to a Lagrangian spray model is used to capture the whole breakup process of the liquid jet. In the near field of liquid injection where the primary breakup occurs, the liquid jet penetrates into a cross-flow, bends in the cross-flow direction, and breaks into large drops. The position, motion and topological changes of this liquid column are described by the RLSG method. In the far field spray region, on the other hand, the Lagrangian stochastic spray model is used for the secondary breakup. The characteristics of the breakup process and the liquid jet, such as jet trajectories, jet cross-sections, and flattening, are examined in detail using this method. Our numerical result is compared with the experimental data, showing the applicability and feasibility of our method for simulation of the atomization process of liquid jets and sheets in turbulent flows.

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