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Atomisation and droplet formation mechanisms in a model two-phase mixing layer STEPHANE ZALESKI, Univ Pierre et Marie Curie – Paris 6 and CNRS, YUE LING, Baylor University, DANIEL FUSTER, Univ Pierre et Marie Curie – Paris 6 and CNRS, GRETAR TRYGGVASON, Johns Hopkins University — We study atomization in a turbulent two-phase mixing layer inspired by the Grenoble air-water experiments. A planar gas jet of large velocity is emitted on top of a planar liquid jet of smaller velocity. The density ratio and momentum ratios are both set at 20 in the numerical simulation in order to ease the simulation. We use a Volume-Of-Fluid method with good parallelisation properties, implemented in our code http://parissimulator.sf.net. Our simulations show two distinct droplet formation mechanisms, one in which thin liquid sheets are punctured to form rapidly expanding holes and the other in which ligaments of irregular shape form and breakup in a manner similar but not identical to jets in Rayleigh-Plateau-Savart instabilities. Observed distributions of particle sizes are extracted for a sequence of ever more refined grids, the largest grid containing approximately eight billion points. Although their accuracy is limited at small sizes by the grid resolution and at large size by statistical effects, the distributions overlap in the central region. The observed distributions are much closer to log normal distributions than to gamma distributions as is also the case for experiments.

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