Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

A Direct Numerical Simulation of a Temporally Evolving Liquid-Gas Turbulent Mixing Layer LAM XUAN VU, ROBERT CHIODI, OLIVIER DESJARDINS, Cornell Univ — Air-blast atomization occurs when streams of co-flowing high speed gas and low speed liquid shear to form drops. Air-blast atomization has numerous industrial applications from combustion engines in jets to sprays used for medical coatings. The high Reynolds number and dynamic pressure ratio of a realistic air-blast atomization case requires large eddy simulation and the use of multiphase sub-grid scale (SGS) models. A direct numerical simulations (DNS) of a temporally evolving mixing layer is presented to be used as a base case from which future multiphase SGS models can be developed. To construct the liquid-gas mixing layer, half of a channel flow from Kim et al. (JFM, 1987) is placed on top of a static liquid layer that then evolves over time. The DNS is performed using a conservative finite volume incompressible multiphase flow solver where phase tracking is handled with a discretely conservative volume of fluid method. This study presents statistics on velocity and volume fraction at different Reynolds and Weber numbers.

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Date submitted: 01 Aug 2017 Electronic form version 1.4