Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Two-Phase Filtered Density Function Approach for Large Eddy Simulation of a Water Droplet Laden 2D Mixing Layer[1] MARK CARRARA, PAUL DESJARDIN[2], State University of New York at Buffalo — In this study, the two-phase velocity-scalar filtered density function (TVSFDF) transport equation for large eddy simulation (LES) is considered in the limit of a continuum-dispersed phase two-phase flow. All quantities conditionally filtered in the dispersed phase marginal filtered density function transport equation are disregarded leaving only terms conditionally filtered on the phase interface. These conditionally surface-filtered terms account for phase-coupling between the dispersed and continuum phases of the flow. Closure models are presented and implemented for both the gas phase and for phase coupling terms for a 2D water droplet laden temporally developing turbulent mixing layer. Modeled marginal FDF transport equations are presented and a statistically equivalent set of Ito stochastic differential equations (SDE) are derived from each marginal FDF equation. Simulations are conducted via a full stand-alone Lagrangian particle Monte-Carlo method and the effect of variable Stokes number on turbulent dispersion characteristics of evaporating and non-evaporating two-way coupled droplets is discussed.

[1]Research supported by Sandia National Laboratories under contract No. 64782 and the National Science Foundation under grant No. CTS-0348110
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Date submitted: 16 Aug 2005 Electronic form version 1.4