Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

**Single Pass Drop Size Distributions in an Inline Rotor-Stator Mixer** KARL KEVALA[1], KEN KIGER[2], RICHARD CALABRESE[3], University of Maryland — Rotor-stator mixers are employed to produce liquid-liquid dispersions. Despite their importance, there have been few studies that examine the fundamentals governing dispersion processes occurring in them. We have developed a technique to measure single pass drop size distributions (DSD) exiting an inline rotor-stator device. A continuous, turbulent water phase is fed to the mixer. At time zero, a single drop of oil is injected into the device, and the resulting daughter DSD is measured at the exit via Phase Doppler Anemometry. Bivariate statistics of drop size and residence time are obtained. Results indicate that, for the operating conditions studied, lower viscosity fluids have a bimodal distribution, with a shift towards a monomodal distribution at higher RPM or decreased throughput. More viscous fluids exhibit a monomodal distribution and a shift towards a bimodal distribution at higher RPMs and decreased throughput. Turbulent RANS CFD simulations are being performed in order to assist in interpretation of experimental data. Preliminary results indicate that bimodal distributions may be the result of droplet reentrainment into the stator and / or a large spread in the internal time distributions that drops spend in the region close to the rotor blade.

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Date submitted: 10 Aug 2005 Electronic form version 1.4