Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Mixing of inertial particles at a turbulent - non turbulent interface SERGIY GERASHCHENKO, Cornell University, LUIS RUELAS, San Jose State University, ZELLMAN WARHAFT, Cornell University — Motivated by the problem of entrainment of dry air into clouds, water droplets are sprayed into the high turbulence side of a shearless turbulence mixing layer: a layer in which there is a step in turbulence intensity across the interface but there is negligible change in the mean velocity (Veeravelli and Warhaft, JFM, 1989, 208, 191). Active and passive grids are used to form the mixing layer. A splitter plate is used to separate droplet-non droplet interface near the origin. Particle concentration, size and velocity are determined by Phase Doppler Particle Analyzer, the velocity field by hot wires, and the droplet accelerations by particle tracking. The results are compared with injecting the particles into one side of homogeneous turbulence. We show that the particle number density is approximately an order of magnitude smaller on the low turbulence side of the turbulent-non-turbulent interface compared with that of a turbulent- turbulent interface with the same initial distribution of inertial particles on one side. Stokes and Froude number effects are investigated. Sponsored by the U.S. NSF.

Sergiy Gerashchenko
Cornell University

Date submitted: 31 Jul 2009 Electronic form version 1.4