Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

DNS of droplet motion in a turbulent flow[1] MICHELE ROSSO, S. ELGHOBASHI, Department of Mechanical and Aerospace Engineering, University of California, Irvine — The objective of our research is to study the multi-way interactions between turbulence and vaporizing liquid droplets by performing direct numerical simulations (DNS). The freely-moving droplets are fully resolved in 3D space and time and all the relevant scales of the turbulent motion are simultaneously resolved down to the smallest length- and time-scales. Our DNS solve the unsteady three-dimensional Navier-Stokes and continuity equations throughout the whole computational domain, including the interior of the liquid droplets. The droplet surface motion and deformation are captured accurately by using the Level Set method. The pressure jump condition, density and viscosity discontinuities across the interface as well as surface tension are accounted for. Here, we present only the results of the first stage of our research which considers the effects of turbulence on the shape change of an initially spherical liquid droplet, at density ratio (of liquid to carrier fluid) of 1000, moving in isotropic turbulent flow. We validate our results via comparison with available expe

[1]This research has been supported by NSF-CBET Award 0933085 and NSF PRAC (Petascale Computing Resource Allocation) Award

Said Elghobashi
University of California, Irvine

Date submitted: 29 Jul 2013 Electronic form version 1.4