Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

**Phase field model simulation of droplet deformation and breakup in wall bounded turbulence** LUCA SCARBOLO, DAFNE MOLIN, ALFREDO SOLDATI — Prediction of droplet breakup in turbulence is crucial in many industrial and environmental processes such as fluid mixing in stirred chemical reactors or fluid clusters dispersion in large scale oceanic currents. To this aim we analyze the deformation and breakup of a single droplet in turbulent channel flow. The fluids are considered incompressible, density-matched and viscosity-matched. We use a Phase Field Model (PFM) based on the Cahn-Hilliard/Navier-Stokes equations system. We simulated a wide range of Weber numbers (ratio between inertial forces and surface tension) spanning two orders of magnitude with a Reynolds number $Re = 100$ based on the friction velocity and on the channel half height. We validate the approach by comparing specific droplet parameters such as the average droplet deformation and the droplet deformation in time, against available experiments. Turbulent flow statistics are also computed to examine the energy exchanges between the droplet and the surrounding fluid.

Alfredo Soldati
University of Udine

Date submitted: 02 Aug 2011 Electronic form version 1.4