Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Direct numerical simulation of droplet-laden homogeneous shear turbulence PABLO TREFFTZ-POSADA, ANTONINO FERRANTE, University of Washington — We have performed direct numerical simulations (DNS) of droplet-laden homogeneous shear turbulence (DLHST) at initial $Re_\lambda = 75$ with 6260 droplets of diameter approximately equal to the Taylor lengthscale (i.e, 5% droplet volume fraction). The droplet to carrier-fluid density and viscosity ratios have been set to 10. The droplet Weber number based on the r.m.s. velocity has been varied between $0.1 \leq We_{rms} \leq 5$. First, we present our numerical methods for overcoming the challenges of simulating DLHST. Then, we present the effects of varying the shear number (Sh) on the budget of turbulence kinetic energy (TKE). For example, in the two-fluid TKE equation the power of the surface tension is directly proportional to the rate of change of droplet surface area (with opposite sign). DNS results show the effects of shear on droplet deformation/breakup/coalescence and how this affects the power of the surface tension, and, thus, the evolution of TKE.

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Date submitted: 01 Aug 2019 Electronic form version 1.4