Abstract Submitted
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Lagrangian statistics of bubbles in a turbulent boundary layer[1]
MICHAEL MATTSON, KRISHNAN MAHESH, University of Minnesota, Twin Cities — We are developing the capability to simulate bubbly flows in complex geometries using unstructured grids and an Euler–Lagrangian methodology. In the Lagrangian bubble model, the bubbles are treated as a dispersed phase in the carrier fluid, and individual bubbles are point–particles governed by an equation for bubble motion. The behavior of the bubble radius is determined by integrating the Rayleigh–Plesset equation. For this talk, direct numerical simulation is used to solve the Navier–Stokes equations for a spatially–evolving turbulent boundary layer ($Re_\theta = 600 - 1800$) and bubbles are injected into the near-wall region. Except for the Reynolds number, the simulation matches all parameters of an experiment by Sanders, *et al.* (J. Fluid Mech., 2006). The bubbly suspension is dilute and one–way coupled equations are used. The temporal evolution of the bubble dispersion, probability density functions of the forces on a bubble and void–fraction profiles will be presented, and the impact of bubble behavior on drag reduction and the effect of cavitation number will be discussed.

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