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Lagrangian statistics for bubbles in a turbulent boundary layer[1]
MICHAEL MATTSON, KRISHNAN MAHESH, University of Minnesota — We are developing the simulation capability for 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. For this talk, direct numerical simulation is used to solve the Navier–Stokes equations for a spatially-evolving turbulent boundary layer ($Re_\theta = 1430$) and bubbles are injected into the near-wall region. The bubbly suspension is dilute and one-way coupled equations are used. The temporal evolution of the bubble dispersion and probability density functions of the bubble forces will be presented, with emphasis on the role Stokes number and injection location play in determining bubble behavior.

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