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Study of Bubbly Flows in Turbulent Boundary Layers SHEILLA TORRES-NIEVES, JOSE LEBRON-BOSQUES, FRANCISCO MORAGA, LUCIANO CASTILLO, Rensselaer Polytechnic Institute — Microbubble injection into a liquid turbulent boundary layer has been proven to effectively reduce frictional drag. Most of the experiments done to date have been conducted on flat plate geometries were bubbles are injected into a nominally zero-pressure-gradient turbulent boundary layer. Numerical simulations, although limited, have been performed to support these experiments. In fact, none of the published bubbly flow simulations deal with the case of non-zero pressure gradients. In this work, Reynolds Averaged Navier Stokes (RANS) simulations are performed to study different boundary layers, containing bubbles, on a horizontal flat plate. The behavior and distribution of these bubbles, and their effect on the mean velocity, Reynolds stresses and turbulent kinetic energy will be considered in this investigation. CFDShipM, a code developed at Rensselaer, will be modified in order to account for both a favorable and an adverse pressure gradient. Simulations will cover a range of void fractions, and bubble sizes. Furthermore, the results will be compared against the LDA data from Cal et al (2006), Brzek et al. (2006) and others.

Sheilla Torres-Nieves
Rensselaer Polytechnic Institute

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