Abstract Submitted
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Combined PIV, PLIF, and laser focal displacement measurements (LFDM) to quantify gas-liquid interfacial shear stress[1] IAN MCCARTHY, DAVID HANN, BUDDHIKA HEWAKANDAMBY, BARRY AZZOPARDI, University of Nottingham — Simultaneous Particle image velocimetry (PIV) and Planar Laser Induced Fluorescence imaging (PLIF), using a pulsed Nd:YAG laser alongside a specially design optical system to produce a pair of very fine light sheets. This equipment, coupled a dual set of high speed synchronized camera, and a combination of reflective seeding particles, fluorescent dye and tracers were used to calculate the shear stress at the gas liquid interface by determining the velocity vectors in both phases. These quantities, along with the position and profile of the interface were found at a number of different inlet conditions. These conditions related to various flow pattern regimes commonly discussed within the literature. These regimes; stratified, stratified- wavy, 2-D and 3-D waves are seen at various liquid and gas Reynolds values, with increasing complexity occurring as higher Reynolds numbers. Validation of the results was done via computing the shear stress in a number of different ways, and also compared with result of temporal film thickness taken using the LFDM. Results from these tests show good agreement with one another and those found in literature, with determination of gas-liquid shear stress found for regimes not previously investigated in this manner.

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