Abstract Submitted
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A combined structured planar laser-induced fluorescence (S-PLIF) and particle image velocimetry (S-PIV) method for interfacial and near-wall measurements[1] VICTOR VOULGAROPOULOS, OMAR MATAR, CHRISTOS MARKIDES, Imperial College London — The application of experimental laser-based methods to obtain spatiotemporally resolved information has been emerging as increasingly important in various fields of fluid dynamics, owing to their ability to provide a holistic picture of the phenomena involved and to play a crucial role in benchmarking numerical models. Two-phase systems consisting of fluids with strong variations in their refractive indices in the visible wavelengths, e.g., any gas-liquid system, have, however, been found to compromise traditional laser-based techniques. These optical techniques become susceptible to laser-light refractions and reflections close to the fluid interface, resulting in erroneous interface location and velocity measurements. In this work, we investigate horizontal gas-liquid stratified pipe flows employing a new structured illumination technique. We perform simultaneous structured planar laser-induced fluorescence (S-PLIF) and structured particle image velocimetry (S-PIV) measurements to obtain phase and velocity fields, by minimising total internal reflections effects encountered in traditional PLIF and PIV measurements. The wave characteristics as well as the near-wall and interfacial flow properties are discussed.

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