Abstract Submitted
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An Experimental Investigation of Surfactant Effects on the Wave Characteristics of Annular Flows[1] ANDRIUS PATAPAS, VICTOR VOULGAROPOULOS, VALERIA GARBIN, RONNY PINI, CHRISTOS MARKIDES, OMAR MATAR, Imperial College London, KARL ANDERSON, Shell — While a wide scope of research has been performed in the field of multiphase flows, the study of surface active agents in gas-liquid annular flows has lagged despite their ability in considerably improving heat and mass transfer rates. More detailed insight is still needed to promote quantitative interpretations of the surfactant-induced effects on the wave characteristics and entrainment properties of these thin films. In this work, we study water-air annular pipe flows in both the presence and absence of a water-soluble fluorescent surfactant. The liquid Reynolds numbers, based on the film properties, range between 400 to 1500. We perform structured planar laser-induced fluorescence (S-PLIF) measurements to accurately obtain film-thickness measurements and reveal the temporal characteristics of the waves. We further explore the differences on the entrainment rates and size of the bubbles in the liquid films for both cases, by visualising the flow from two observation angles. Surfactant-tracking diagnostic methods are also currently being developed.

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