Abstract Submitted
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An experimental study of the effect of water-soluble fluorescent surfactant on the interfacial wave characteristics of annular flows[1] ANDRIUS PATAPAS, VICTOR VOULGAROPOULOS, Department of Chemical Engineering, Imperial College London, South Kensington Campus, London SW7 2AZ, UK., VALERIA GARBIN, Department of Chemical Engineering, TU Delft, Delft, Netherlands., RONNY PINI, Department of Chemical Engineering, Imperial College London, South Kensington Campus, London SW7 2AZ, UK., KARL ANDERSON, Shell International Exploration and Production, Shell Technology Center Houston, Houston, Texas, United States of America., OMAR MATAR, Department of Chemical Engineering, Imperial College London, South Kensington Campus, London SW7 2AZ, UK. — We study experimentally the effects of surfactants on gas-liquid annular flows. We present a novel method to prepare water-soluble fluorescent surfactant solution and its detailed characterisation. In the presence and absence of this fluorescent surfactant, we conduct a detailed study on air-water annular pipe flows. The liquid and gas Reynolds numbers range between 500 to 1375 and 0 to 40000, respectively. We perform structured planar laser-induced fluorescence (S-PLIF) and capacitance probe measurements to accurately obtain film-thickness measurements and reveal the temporal characteristics of the waves. We further explore the differences on the gas entrainment rates, entrainment depths, and size of the bubbles in the liquid films for both cases. Diagnostic methods to track surfactant concentration are also currently being developed.

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