

Abstract Submitted  
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**The effect of surfactant on counter-current gas-liquid flows in vertical tubes**<sup>1</sup> IVAN ZADRAZIL, OMAR MATAR, CHRISTOS MARKIDES, Imperial College London — Counter-current gas-liquid flows in vertical tubes are often accompanied by flow reversal. This so-called flooding phenomenon could occur for at least a part of the liquid phase from a counter-current to a co-current state, against the action of gravity. This phenomenon is of central importance to the oil-and-gas and nuclear industries, and has received considerable attention experimentally. The large majority of the previous work in this area, however, has considered the case of pure fluids, in the absence of additives; the latter are used frequently in industry in an attempt to control the onset of various flow regimes with little understanding of the mechanisms underlying their influence on the interfacial dynamics. In this study, we address this issue by investigating the dynamics of flooding in the presence of surfactants in a 4 m long, 32.4 mm nominal bore polymethyl methacrylate test section using high-speed shadowgraphy, and axial-view imaging. The system parameters include the superficial gas and liquid velocities, and surfactant concentration. We show that the presence of surfactant can have a dramatic effect on the flow structures and the onset of flooding. The mechanisms responsible for these phenomena are analysed.

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