

Abstract Submitted
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Reduced-order Models for Two-phase Annular Flows in Vertical Pipes¹ THOMAS EWERS, Imperial College London, ALEXANDER WRAY, University of Strathclyde, OMAR MATAR, Imperial College London — We study the dynamics of two-phase annular flow in vertical pipes. The conditions considered are such that there is no mass exchange between the phases due, for instance, to liquid entrainment into the gas, and bubble entrainment within the liquid. The gas is assumed to be turbulent, whilst the liquid phase exists in the form of a thin film adjacent to the wall. Reduced-order models are derived using asymptotic reduction for both axisymmetric and non-axisymmetric cases. The turbulence in the gas is modelled using a mixing length relation, while the method of weighted residuals is used in the film wherein inertial contributions are significant but the flow remains laminar. Numerical computations are carried out, which reveal the development of large-amplitude waves in the axisymmetric, and non-axisymmetric cases. Extensions to non-isothermal situations are outlined.

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