

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

35. Reduced-order models for two-phase annular flows in vertical pipes THOMAS EWERS, KUN ZHAO, OMAR K. MATAR, Imperial College London — Two-phase annular flow in vertical pipes is studied under conditions wherein gas (liquid) entrainment into the liquid (gas) is neglected. The gas core is taken to be turbulent whilst the thin annular film is assumed to be laminar. Reduced-order models are developed using asymptotic analysis for axisymmetric and non-axisymmetric flows. Turbulence is modelled using a Reynolds-averaged Navier-Stokes equations approach via a mixing length relation. A reduced-order model is developed to include temperature variations for the axisymmetric case only. Numerical simulations are carried out, which reveal the development of large-amplitude waves in the axisymmetric, and non-axisymmetric cases; only results for the isothermal case are presented. Comparisons with results obtained from full-scale direct numerical simulations of the annular flow are also presented.

Omar Matar
Imperial College London

Date submitted: 28 Jul 2017

Electronic form version 1.4