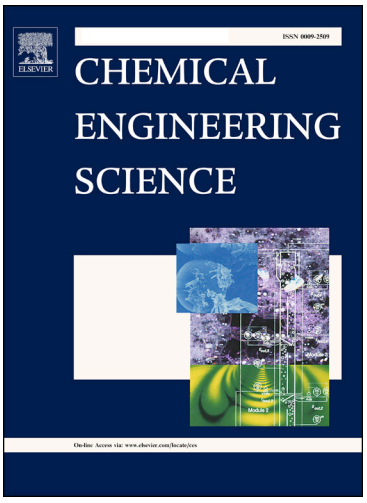

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Fluid structure behaviour in gas-oil two-phase flow in a moderately large diameter vertical pipe

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Abstract

Intermittent flows in vertical pipes occur in many industrial settings including power generation and downstream oil-and gas production. This type of flows include cap bubble, slug and churn flow regimes. These regimes are of interest as downstream processes and control may heavily depend on the intermittency of the inflow. There are a number of correlations that predicts the features in such flows in vertical pipes. Most of the correlations were developed for air and water fluid pair for slug flow regime in vertical pipes with 25 to 50 mm inner diameter. In this paper, an attempt has been made to assess the suitability of several of these correlations specific to slug flow regime for a fluid pair that is different to air-water system. In this work, air-silicone oil flow development was experimentally investigated in a vertical pipe with an inner diameter of 68mm. A Wire Mesh Sensor (WMS) and an Electrical Capacitance Tomography (ECT) sensor were installed in series at four locations (15D, 30D, 45D and 65D) downstream of the mixing section. The flow was visually observed using a high speed camera. The void fraction time series obtained from the WMS and the ECT were used to establish the flow characteristics such as slug length, slug frequency, void fraction in liquid slugs and Taylor bubble velocity. A comparison showed that the void fraction measurements using ECT and WMS are in good agreement. Axial measurements shows that the flow development beyond 45D is minimal. Change in physical

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