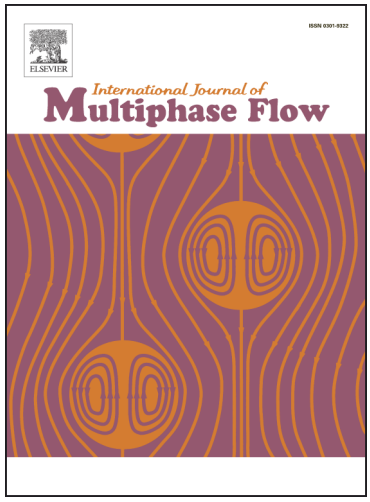

Length-area-volume of long bubbles in horizontal slug flow

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Length-area-volume of long bubbles in horizontal slug flow

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Abstract

The morphology of long bubbles in horizontal slug flows is experimentally investigated through images obtained with a high-speed camera. The flow conditions resulted in very long and interface-perturbed bubbles, so that a special procedure needed to be developed to correctly identify all of their geometric features. The procedure furnishes a complete characterization of the three-dimensional aspects of the nose, main body, hydraulic jump and tail of bubbles, including their fractal dimension and gas-liquid interface area. Image treatment and numerical computations were carried out with Wolfram's Mathematica 8.0 software system. The results are compared with the previously advanced theory of Fagundes Netto et al. (Int. J. Multiphase Flow 25 (1999) 1129-1160). Characteristic volumes and areas of long bubbles in slug flows are correlated through simple power-law expressions.

Keywords: Horizontal Slug Flow, Interface, Fractal dimension

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