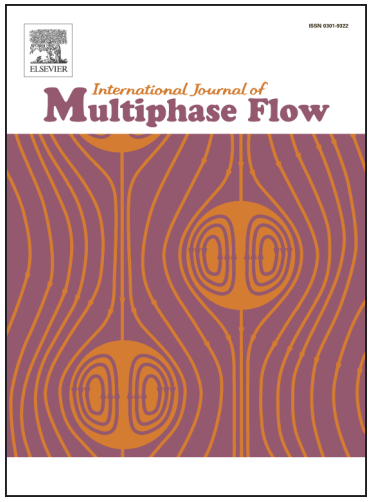

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Experimental Investigation of a Developing Two-Phase Bubbly Flow in Horizontal Pipe

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Abstract

Experimental results for various water and air superficial velocities in developing adiabatic horizontal two-phase pipe flow are presented. Flow pattern maps derived from videos exhibit a new boundary line in intermittent regime. This transition from water dominant to water-gas coordinated regimes corresponds to a new transition criterion C_T=2, derived from a generalized representation with the dimensionless coordinates of Taitel, Y. & Dukler, A. E., 1976, American Institute of Chemical Engineers (AIChE) Journal, Vol. 22.

Velocity, turbulent kinetic energy and dissipation rate, void fraction and bubble size radial profiles measured at 40 pipe diameters for J_L=4.42 m/s by hot film velocimetry and optical probes confirm this transition: the gas influence is not continuous but strongly increases beyond J_G=0.06 m/s. The maximum dissipation rate, derived from spectra, is increased in two-phase flow by a factor 5 with respect to the