

## Accepted Manuscript

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PII: S0301-9322(14)00005-6

DOI: <http://dx.doi.org/10.1016/j.ijmultiphaseflow.2013.12.010>

Reference: IJMF 1991

To appear in: *International Journal of Multiphase Flow*

Received Date: 13 May 2013

Revised Date: 17 October 2013

Accepted Date: 27 December 2013



Please cite this article as: Bottin, M., Berlandis, J.P., Hervieu, E., Lance, M., Marchand, M., Öztürk, O.C., Serre, G., Experimental Investigation of a Developing Two-Phase Bubbly Flow in Horizontal Pipe, *International Journal of Multiphase Flow* (2014), doi: <http://dx.doi.org/10.1016/j.ijmultiphaseflow.2013.12.010>

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

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**Keywords:** Horizontal pipe, bubbly two-phase flow, experiment, physical modeling

## 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  $C_1=2$ , 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

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