

A 3D CFD numerical study of the bubble generation process into a bubble T-junction generator and its comparison with experimental data: Part II

SANTIAGO ARIAS^{1*}, ADELINE MONTLAUR^{1,2}

¹Escola d'Enginyeria de Telecomunicació i Aeroespacial de Castelldefels

Universitat Politècnica de Catalunya

c/ Esteve Terradas 5, 08860 Castelldefels, Barcelona (Spain)

santiago.arias@upc.edu, adeline.de.montlaur@upc.edu

²Laboratori de Càlcul Numèric

Universitat Politècnica de Catalunya

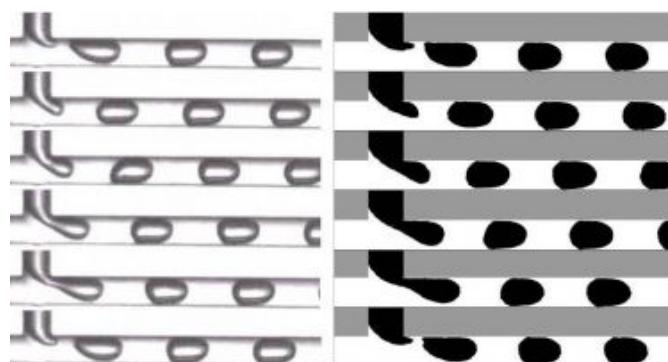
www-lacan.upc.edu

adeline.de.montlaur@upc.edu

ABSTRACT

This work is a continuation of the 3D numerical study of the bubble generation process into a T-junction bubble generator (1 mm of internal diameter) obtained with the commercial Computational Fluid Dynamics solver ANSYS Fluent v15.0.7 and presented in Part I. A complementary comparison with experimental data reproducing the same conditions is provided here [1].

The second part of this study focuses on the analysis of the geometry of the continuous and disperse phases in the bubble and slug flow regimes in air-water mixtures. The bubble size dispersion is very low in the considered flow patterns both in experiments and simulations. The concept of unit cell is used to identify three characteristic lengths of the two-phase flow, namely, the unit cell length, the liquid slug length and the bubble length. The relationship between these lengths and the bubble generation frequency, the gas mean velocity, the gas and liquid superficial velocities and volume average void fraction is analyzed. Numerical simulations provide values in accordance with the experimental ones, but always quantitatively smaller.



References

[1] Arias S., Legendre D., González-Cinca R., 2012. Numerical simulation of bubble generation in a T-junction. *Computers & Fluids* 56, 49-60.