Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

A novel technique to control the bubble formation process in a co-flow configuration with planar geometry[1] JAVIER RUIZ-RUS, ROCÍO BOLAÑOS-JIMÉNEZ, CÁNDIDO GUTIÉRREZ-MONTES, CARLOS MARTÍNEZ-BAZÁN, University of Jaén, Spain, ALEJANDRO SEVILLA, University Carlos III of Madrid, Spain — We present a novel technique to properly control the bubble formation frequency and size by forcing the water stream in a co-flow configuration with planar geometry through the modulation of the water velocity at the nozzle exit. The main goal of this work is to experimentally explore whether the bubbling regime, which is naturally established for certain values of the water-to-air velocity ratio, $\Lambda = u_w/u_a$, and the Weber number, $We = \rho_w u_w^2 H_o/\sigma$, can be controlled by the imposed disturbances. A detailed experimental characterization of the forcing effect has been performed by measuring the pressure fluctuations in both the water and the air streams. In addition, the velocity amplitude, which characterizes the process, is obtained. The results show that a minimum disturbance amplitude is needed for an effective control of the bubbling process. Moreover, the process is governed by kinematic non-linear effects, and the position of the maximum deformation is shown to be described through a one-dimensional flow model for the water sheet, based on the exact solution of the Euler equation.

[1]Supported by the Spanish MINECO, Junta de Andalucía and EU Funds under projects DPI2014-59292-C3-3-P, P11-TEP7495 and UJA2013/08/05

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Date submitted: 31 Jul 2015 Electronic form version 1.4