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Bubbling regime in planar co-flowing air-water sheets[1] C. GUTIÉRREZ-MONTES, R. BOLAÑOS-JIMÉNEZ, University of Jaen, Spain, A. SEVILLA, University Carlos III of Madrid, Spain, E. SANMIGUEL-ROJAS, C. MARTÍNEZ-BAZÁN, University of Jaen, Spain — We study by means of experiments and numerical simulations the periodic breakup of an air sheet surrounded by a co-flowing water sheet, for a fixed liquid- to-gas thickness ratio, $h = h^*_{w,0}/h^*_{a,0} \simeq 5.27$, as a function of their control parameters, namely the Weber number, $We = \rho_w\, u^{*2}_{w,0}\, h^*_{a,0}/\sigma$, and the water-to-air velocity ratio, $\Lambda = u^*_{w,0}/\bar{u}^*_{a,0}$, where $h^*_{a,0}$ and $h^*_{w,0}$ are the half-thicknesses of the air and water sheets at the exit. The bubble formation process is divided into two stages governed by different physical phenomena: the formation of an incipient neck, which moves downstream at the water velocity, and the collapse of the neck. Both stages are characterized and a simple theoretical model, which depends on the control parameters, is proposed for each one in order to provide the time scale for the bubbling process, finding a good agreement with the experiments and simulations. Finally, the experimental measurements of the bubbling frequency and bubble size are compared with those obtained numerically within the We- Λ parameter space studied.

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