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Bubble formation dynamics in a planar co-flow configuration: Influence of geometric and operating characteristics[1] CÁNDIDO GUTIÉRREZ-MONTES, ROCÍO BOLAÑOS-JIMÉNEZ, CARLOS MARTÍNEZ-BAZÁN, University of Jaén, ALEJANDRO SEVILLA, University Carlos III of Madrid — An experimental and numerical study has been performed to explore the influence of different geometric features and operating conditions on the dynamics of a water-air-water planar co-flow. Specifically, regarding the nozzle used, the inner-to-outer thickness ratio of the air injector, $\beta = H_i/H_o$, the water-to-air thickness ratio, $h = H_w/H_o$, and the shape of the injector tip, have been described. As for the operating conditions, the water exit velocity profile under constant flow rate and constant air feeding pressure has been assessed. The results show that the jetting-bubbling transition is promoted for increasing values of β, decreasing values of h, rounded injector tip, and for uniform water exit velocity profiles. As for the bubble formation frequency, it increases with increasing values of β, decreasing values of h, rounded injector and parabolic-shaped water exit profiles. Furthermore, the bubble formation frequency has been shown to be lower under constant air feeding pressure conditions than at constant gas flow rate conditions. Finally, the effectiveness of a time-variable air feeding stream has been numerically studied, determining the forcing receptivity space in the amplitude-frequency plane. Experimental results corroborate the effectiveness of this control technique.

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