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Dynamics of a surfactant-laden bubble bursting through an interface[1] OMAR K. MATAR, CRISTIAN RICARDO CONSTANTE AMORES, ASSEN BATCHVAROV, LYES KAHOUADJI, Imperial College London, SEUNG-WON SHIN, Hongik University, JALEL CHERGUI, DAMIR JURIC, Laboratoire dInformatique pour la Mcanique et les Sciences de lIngnieur (LIMSI) — When a bubble is resting close to a liquid-gas interface, its rupture gives rise to the formation of a central jet. This jet breaks up into small droplets, which could transport biological material, toxins, salts, surfactants or dissolved gases. We perform fully three-dimensional direct numerical simulations of the phenomena using a hybrid interface-tracking/level-set method accounting for surfactant-induced Marangoni stresses, sorption kinetics, and diffusive effects. We have selected an initial bubble shape corresponding to a large Laplace number and a vanishingly small Bond number to neglect gravity, and isolate the effects of surfactant on the flow. According to the foregoing results, the presence of surfactants leads to a reduction in the number of ejected droplets through Marangoni-flow, driving motion from high to low interfacial surfactant concentration regions, and not via lowering of the mean surface tension. A parametric study regarding the strength of surfactant and solubility is also performed.

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