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Numerical Simulation of Bubble Formation in a Microchannel Using a Micro-Pillar LUZ AMAYA-BOWER, Central Conn State Univ — A three dimensional numerical simulation of bubble formation in a microchannel with a micro-pillar is investigated. Simulation results are validated against experimental data, where the working fluids are water and nitrogen. The gas enters the microchannel through a single slit located at 0, along the pillar's depth. The bubble formation process has two main regimes, namely discrete bubble and attached ligament. The transformation from one regime to another is dictated by the capillary number Ca and the volumetric flow ratio Q. An analysis is performed to evaluate the critical values at which the transformation takes place. In addition, for the discrete bubble regime, the simulation results provide a proportional correlation between Q and the size of bubbles, and an inversely proportional relationship between Q and formation time, for each Ca. The computations are performed in the range of 10^{-4} <Ca <10^{-2} and 0.5 <Q <10^{-2}.

Luz Amaya-Bower
Central Conn State Univ

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