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Numerical Simulations of Gas-Liquid Dispersion in Millichannels Through Parallel Contacting Sections[1] XIAOJIN TANG, THOMAS ABADIE, OMAR MATAR, Imperial College London — The generation of a regular train of bubbles or droplets in microchannels has been a challenge for the past decade for optimising microreactor design and operation. Although many contacting methods (e.g. T-junctions, cross-junctions) have been studied for single channels, the effects of operating conditions for generating well-controlled bubble dispersions with multiple contacting sections still requires further understanding. For industrial applications, millichannels can be more useful than microchannels to avoid blockage and for higher throughput. However, few research results in millichannels could be found in the literature. We study the gas dispersion in a liquid flowing in a rectangular millichannel through three parallel contacting sections. A finite-volume solver with a Volume-Of-Fluid method to capture the interface is used. The effects of geometry and operating conditions on the gas flow through the contacting sections are analysed along with the breakup frequencies. The effects of contacting section geometry on bubble size distributions and velocities under which stable bubble trains can be formed are discussed as a step towards developing an optimal structure of millichannels where uniform and highly dispersed bubble swarms can be achieved.

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