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Controlling the trajectories of bubble trains at a microfluidic junction PRAVIEN PARTHIBAN, SAIF KHAN, National University of Singapore — The increasing number of applications facilitated by digital microfluidic flows has resulted in a sustained interest in not only understanding the diverse, interesting and often complex dynamics associated with such flows in microchannel networks but also in developing facile strategies to control them. We find that there are readily accessible flow speeds wherein resistance to flow in microchannels decreases with an increase in the number of confined bubbles present, and exploit this intriguing phenomenon to sort all bubble of a train exclusively into one of the arms of a nominally symmetric microfluidic loop. We also demonstrate how the arm into which the train filters into can be chosen by applying a *temporary* external stimulus by means of an additional flow of the continuous liquid into one the arms of the loop. Furthermore, we show how by tuning the magnitude and period of this temporary stimulus we can switch controllably, the traffic of bubbles between both arms of the loop even when the loop is *asymmetric*. The results of this work should aid in developing viable methods to regulate traffic of digital flows in microfluidic networks.

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