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Backflow at liquid-gas interface driven by Marangoni effects HONGYUAN LI, PENGYU LV, HUILING DUAN, Peking University — Liquid-gas interface on submerged structured surfaces is ubiquitous in nature and has various practical applications. These interfaces, however, are subject to non-uniform surface tension induced by surfactant concentration gradient. Careful PIV experiments with surfactant-laden fluorescent particle solutions show that even trace of surfactants have significantly decrease on slip velocity than numerical predictions for surfactant-free flow, and even can produce negative slip velocity (i.e., backflow). We present the mechanism of backflow, which is induced by surfactant concentration gradient. Meanwhile, we investigate the characteristics of backflow. This work is expected to be essential for the design of slippery surfaces and microfluidic devices that are unaffected by Marangoni stress, and it can provide guidance for correcting PIV measurements, especially for the case of liquid-gas interface.

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