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Experiment on miscible displacement in capillary tubes varying Korteweg stress. YUICHIRO NAGATSU, YUJI HOSOKAWA, YOSHIHITO KATO, YUTAKA TADA, Nagoya Institute of Technology, Japan — It is known that flow in the miscible displacements in vertically capillary tube is governed by a Peclet number, a gravity parameter, and a viscosity contrast. Additionally, we know that a spike is formed at the displacement tip, depending on these parameters. It is hypothesized that the stress believed to act in the region with a steep concentration gradient between the two miscible fluids, which mimics an interfacial tension acting on two immiscible fluids, plays an important role on the spike formation, in addition to the combination of these parameters. The stress is referred as to Korteweg stress. The present study has established an experimental system which can vary the Korteweg stress effect although these three parameters are unchanged. Experimental results show that under the same condition of these three parameters, the spike is formed or not formed in the cases where the Korteweg stress effect is large or small, respectively. This is the first experimental result that directly shows that the Korteweg stress is responsible for the spike formation.

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