

Abstract Submitted
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Capillary structures formed with viscous threads in microchannels¹ SAMIRA DARVISHI, THOMAS CUBAUD, Stony Brook University — We investigate two-fluid flows with highly viscous threads formed within a sheath of a less viscous liquid. An experimental study is conducted in long plane microfluidic chambers to examine the formation of periodic capillary structures that result from the viscous folding instability. For the case of a non-wetting thread, a phase diagram of flow patterns is presented including thread breakup, partially coalesced folds, and fully coalesced folds regimes. When the thread is partially wetting, a range of forced wetting and thin film instabilities is observed during the thread lubrication transition in the cell. Novel combinations of viscous and capillary instabilities are shown to offer innovative mechanisms for manipulating the lubrication properties of high-viscosity fluids in microsystems.

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