

Abstract Submitted  
for the DFD19 Meeting of  
The American Physical Society

**Two-phase flow instability at a channel outlet** PAUL R. KANEELIL, AMIR A. PAHLAVAN, KENALPHA KIPYEGON, Princeton University, KRISTEN LEROY, KYLIE STENGEL, SAMUEL WARNER, ANNA M. GALEA, Lung Biotechnology PBC, HOWARD A. STONE, Princeton University — Parallel flow of two immiscible liquids in a microfluidic channel has a variety of applications including solvent extraction, membrane fabrication, chemical processing, and biomedical design. Here, we investigate a system where two immiscible liquids with the same viscosity enter a channel via two inlets, come into contact and form an interface as they flow side-by-side, and subsequently exit the channel via two outlets. We observe an instability at the exit junction, where the interface periodically oscillates and leads to droplet shedding. By systematically exploring the influence of geometric features and fluid flow on the instability, we characterize the underlying mechanism of the instability and offer pathways to control and suppress it.

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Date submitted: 01 Aug 2019

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