

Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Flow through a Catenoid: The Fluid Tube¹ MACKENZIE DUCE, California Polytechnic State University at San Luis Obispo, AARON BROWN, DANIEL HARRIS, Brown University — Minimal surfaces have been studied for centuries by mathematicians, and can be readily realized using fluid films such as a film of soapy water. In particular, two rings are known to be connected by a catenoid-shaped film, however, beyond a critical ring spacing the catenoid solution fails to exist and the structure collapses. In this work, we experimentally investigate a variation of this classic problem by introducing steady flow through the catenoid structure formed by an oil film in water. We demonstrate that the flow robustly stabilizes a thin tube-like structure, with lengths well beyond the critical spacing anticipated without flow. We characterize the shape, length, and stability of this novel “fluid tube structure as a function of the flow rate, ring diameter, and ring shape.

¹We acknowledge the financial support of the Cal Poly Physics Department

Mackenzie Duce
California Polytechnic State University at San Luis Obispo

Date submitted: 01 Aug 2019

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