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Barriers for active transport of bacteria in a microfluidic flow[1]
PAYTON JOHNSON, MINH DOAN, Bucknell University, KEVIN MITCHELL, UC-Merced, TOM SOLOMON, Bucknell University — We present experiments on the motion of swimming bacteria in a laminar, hyperbolic flow in a microfluidic cross channel. The bacteria used are a genetically-mutated "smooth swimming"[2] bacillus subtilis. The movement of bacteria in the flow is bounded by *swimming invariant manifolds* (SWIMs) that act as one-way barriers. The SWIMs are similar to 'burning invariant manifolds"[3] that act as one-way barriers that impede the motion of reaction fronts in a fluid flow. We explore the structure and bounding behavior of the SWIMs and how their separation from the passive manifolds depends on the bacteria swimming speed, normalized by the characteristic fluid speeds.

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[2]R. Rusconi, J.S. Guasto and R. Stocker, Nature Physics **10**, 212 (2014).
[3]J. Mahoney, D. Bargteil, M. Kingsbury, K. Mitchell and T. Solomon, Europhys. Lett. **98**, 44005 (2012).

Thomas Solomon
Bucknell Univ

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