Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Chaotic advection of microswimmers in the vortex lattice flow[1]
SIMON BERMAN, KEVIN MITCHELL, University of California, Merced — We investigate theoretically the chaotic trajectories of microswimmers in an externally-driven two-dimensional vortex lattice flow. To this end, we generalize the invariant manifolds of passive advection by introducing swimming invariant manifolds (SwIMs), which govern the chaotic transport of swimmers. We use the geometry of the SwIMs to identify suitably defined one-way barriers to swimmers in physical space, which allow us to distinguish between qualitatively different swimmer trajectories in different parts of space. Lastly, we examine the interplay between the SwIMs and invariant tori that trap swimmers inside vortices.

[1]Supported by NSF grant CMMI-1825379.

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Date submitted: 31 Jul 2020 Electronic form version 1.4