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Active nematic defect dynamics influenced by submerged microstructures[1] DIMITRIUS KHALADJ, AMANDA TAN, KEVIN MITCHELL, LINDA HIRST, University of California, Merced — Active nematics represent an interesting framework to study energy-driven defects in structured fluids. We study the behavior of an active microtubule/kinesin fluid in which mobile topological defects are continually created and annihilated, braiding around each other to form a chaotic self-mixing fluid. In this work we present a novel effect: the use of virtual boundaries imposed by submerged microstructures as a strategy to control defect flow dynamics. We use micro-fabrication to prepare complex geometries using SU-8 photoresist. The 2D active layer is confined between aqueous and oil layers, in an experimental geometry designed with structures of different depths directly below the active layer. Flow dynamics of the active phase are investigated using fluorescence microscopy. The boundary effect produces similar defect dynamics to those seen for hard boundaries, including stagnation points near boundaries and positional dependence of defect charges.

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Dimitrius Khaladj
University of California, Merced

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