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Session A05: Active Matter and Liquid Crystals in Biological and Bio-Inspired Systems
8:00 AM–10:36 AM, Monday, March 15, 2021
Room: 05

Sponsoring Units: DSOFT DBIO DPOLY GSNP
Chair: Kimberly Weirich, Clemson University

Abstract: A05.00006 : Confinement-induced flow patterns in microtubule-based active fluids

9:24 AM–9:36 AM Live

← *Abstract* →

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Boundary conditions influence the outcome of fluid dynamics in conventional passive fluid systems. Such an influence also extends to active fluid systems where fluid can flow by itself without an external driving force. For example, an active fluid that is confined in a thin cylinder can self-organize into a circulation along the central axis of the cylinder but thinning the cylinder to a disk-like geometry suppresses the formation of circulation. These phenomena demonstrated the role of confinement geometry on flow patterns of active fluid. Here, we demonstrate two flow patterns induced by confinement. First, we will show that active fluid can convect within a trapezoidal confinement. Such convection was in a temperature-uniform system, in contrast to Rayleigh-Bénard convection which is induced by a temperature gradient. This result suggested the feasibility of developing convection in a temperature-homogeneous system. Second, we demonstrate a confinement-induced stationary vortex near a corner of confinement whose corner angle is below a critical value. This is similar to conventional Moffatt eddies, except the fluid is internally driven. Our work paves the path to controlling self-organization of active fluid using confinement.