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Session M05: Active Matter in Complex Environments IV
11:30 AM–2:18 PM, Wednesday, March 17, 2021
Room: 05

Sponsoring Unit: DSOFT
Chair: Tapomoy Bhattacharjee, Princeton University; Sujit Datta, Princeton University

Abstract: M05.00006 : Self-organization and mixing of microtubule-kinesin active fluid in an activity gradient

12:54 PM–1:06 PM Live

← *Abstract* →

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Active fluid, composed of kinesin-driven extensile bundles of microtubules, consumes ATP locally to create a self-mixing flow. Mean speed of microtubule-kinesin active fluid was shown to be tunable by varying its components' concentrations. Such tunability demonstrated the controllability of active fluid with uniform activity. However, how active fluid self-organizes when its activity is non-uniform remains poorly understood. Here, we characterized active fluid behavior and its associated mixing performance in an activity gradient. The activity gradient was created by imposing a temperature gradient because our previous work showed that microtubule-kinesin active fluid exhibited an Arrhenius response to temperature: Increasing temperature sped up active fluid flow, and thus, along a temperature gradient, active fluid flowed faster on one side and slower on the other, forming an activity gradient. We characterized how such a gradient influenced the mixing performance of active fluid in terms of mixing efficiency, stretching rate, and mean squared displacement, comparing with an activity-uniform sample. Our work suggests that applying an activity gradient can serve as a new *in-situ* method for controlling self-organization and mixing performance of microtubule-kinesin active fluid.