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Spontaneous Circulation of Confined Active Suspensions FRANCIS WOODHOUSE, RAYMOND GOLDSTEIN, DAMTP, University of Cambridge — Many active fluid systems encountered in biology are set in total geometric confinement; cytoplasmic streaming is a prominent and ubiquitous example. Using the simple paradigm of a dilute dipolar swimmer suspension, we demonstrate that the two key constraints of circular confinement and fluid incompressibility yield qualitatively new dynamics, effectively quantizing the behaviour regimes. We show analytically that there is an activity threshold for spontaneous auto-circulation and verify this numerically. Long-time non-linear behaviour is investigated via simulations, which reveal steady states displaying nematic defect separation and a high-activity bifurcation to an oscillatory regime.

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