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Impact of Viscoelasticity on the Coordinated Swimming of Motile Bacteria ALIREZA KARIMI, AREZOO ARDEKANI, University of Notre Dame — The formation of bacterial communities is often associated with production of extracellular polymeric substances which impart viscoelastic behavior to the surrounding fluid. This phenomenon greatly affects the hydrodynamic interactions of swimming bacteria and the resulting chaotic dynamics. To investigate this process, we used a kinetic model developed to study the behavior of self-propelled particles in conjunction with Oldroyd-B constitutive equation and the Stokes equations. Using large-scale numerical simulations of the system, we analyzed the effect of the viscoelasticity on the coordinated behavior of the microorganisms. In addition, by varying the corresponding parameters of the problem such as Weissenberg number and viscosity ratio, we explored different flow regimes in order to gain insight regarding the characteristics of the flow patterns induced by the collective motion of motile bacteria.

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