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Modeling the swimming of microbes in anisotropic fluids MADISON KRIEGER, Brown University, SAVERIO SPAGNOLIE, University of Wisconsin, Madison, THOMAS POWERS, Brown University — Microbes commonly swim in non-Newtonian fluids such as mucus, soil, and tissue. Some of these complex fluids are characterized by long-chain molecules which can align, leading to anisotropy. We study a simple model of swimming in an anisotropic fluid, that of an infinitely long two-dimensional sheet deforming via propagating waves and immersed in a nematic liquid crystal. The liquid crystal is categorized by the dimensionless Ericksen number, which compares viscous and elastic effects. At infinite Ericksen number, where viscous effects dominate over elastic effects and the only time scale is the period of the propagating wave, we calculate the swim- ming speed and power dissipation as a function of the anisotropic viscosities and the tumbling parameter. We also calculate the swimming speed and power dissipation at finite Ericksen number, where the orientation elasticity introduces an additional time scale, the relaxation time.

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