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Propulsion and locomotion in hexatic liquid crystal THOMAS POWERS, MADISON KRIEGER, Brown University, SAVERIO SPAGNOLIE, University of Wisconsin, Madison — The long chainlike molecules in mucus can align and lead to liquid-crystalline order. The resulting anisotropy can affect swimming behavior of spermatozoa and bacteria. We study a simple model of swimming in an anisotropic fluid, that of an infinitely long two-dimensional sheet deforming via propagating transverse or longitudinal waves and immersed in a hexatic liquid crystal. The liquid crystal is categorized by the dimensionless Ericksen number Er, which compares viscous and elastic effects. We calculate how swimming speed depends on Er for small amplitude waves, and show that our perturbative approach breaks down at large Er for transverse waves but not longitudinal waves. We also calculate the fluid transported by the swimming motion.

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