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Modeling helical swimming in shear-thinning fluids NOAH LORDI, Santa Clara University, EBRU DEMIR, Beijing Computational Science Research Center, Santa Clara University, YANG DING, Beijing Computational Science Research Center, ON SHUN PAK, Santa Clara University — Swimming bacteria, such as Escherichia coli, propel by rotating their helical flagella with rotary motors in the cell membrane. Helical microswimmers rotated by external magnetic fields have been fabricated to mimic the helical propulsion of bacteria. While helical propulsion has already been extensively studied with the Newtonian fluid assumption, the performance of this propulsion mechanism in non-Newtonian fluids has attracted considerable attention recently. Biological and synthetic microswimmers move through complex fluids that often display shear-thinning viscosity. In this talk, we will discuss a theoretical model to investigate the effect of shear-thinning rheology on helical propulsion. We will highlight the similarities and differences in the propulsion performance in contrast to the results in the Newtonian limit, and compare model predictions with recent experiments on helical propulsion in shear-thinning fluids.

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