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A note on helical locomotion in a porous medium.[1] YE CHEN, NOAH LORDI, MICHAEL TAYLOR, ON SHUN PAK, Santa Clara University — Microorganisms and artificial microswimmers often need to swim through environments that are more complex than purely viscous liquids in their natural habitats or operational environments, such as gel-like mucus, wet soil and aquifer. The question of how properties of these complex environments affect locomotion has attracted considerable recent attention. In this work, we focus on helical locomotion for its ubiquity as a propulsion mechanism adopted by many swimming bacteria. We present a theoretical model to examine how the additional resistance due to the network of stationary obstacles in a porous medium affects helical locomotion. Compared with previous theoretical and experimental results, we will elucidate the effects of the resistance on various types of helical locomotion. We also remark on the limitations as well as potential connections of our results with experimental measurements of bacterial swimming speeds in polymeric solutions.

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