

Abstract Submitted
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Comparison of granular and viscous swimmers BENJAMIN ROBERTSON, STEPHAN KOEHLER, RAENELL SOLLER, Physics Department, Emory University — Inspired by Purcell’s fundamental investigations of swimming in viscous fluids, we built a robotic granular swimmer with two rotating paddles. We investigate two types of swimming strategies, which have either one or two degrees of freedom. The strategy with one degree of freedom consists of two steps and mimics the opening and closing of Purcell’s scallop. We observe that the robot using the two- step scallop strategy can propel itself, which shows that unlike viscous fluids, quasi-static flows in granular media are not time reversible. The strategy with two degrees of freedom has four steps, where the rotation alternates between each paddle. The displacements using Purcell’s four-step strategy are remarkably similar for granular and viscous swimming. Moreover, the four-step strategy is far more effective than the two-step strategy.

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