CENTER FOR FLUID MECHANICS
AND
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SEMINAR SERIES

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Swimming in a Granular Medium

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 repetitive 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 stroking sequence 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, four-step strategies are far more effective than two-step strategies.

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3:00pm