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Swimming near deformable membranes at low Reynolds number¹ MARCELO A. DIAS, THOMAS R. POWERS, Brown University — Microorganisms are rarely found in Nature swimming freely in an unbounded fluid. Instead, they typically encounter other organisms, hard walls, or deformable boundaries such as free interfaces or membranes. Hydrodynamic interactions between the swimmer and nearby objects lead to many interesting phenomena, such as changes in swimming speed, tendencies to accumulate or turn, and coordinated flagellar beating. Inspired by this class of problems, we investigate locomotion of microorganisms near deformable boundaries. We calculate the speed of an infinitely long swimmer close to a flexible surface separating two fluids; we also calculate the deformation and swimming speed of the flexible surface. When the viscosities on either side of the flexible interface differ, we find that fluid is pumped along or against the swimming direction, depending on which viscosity is greater.

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