

Abstract Submitted
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Motility of rotating flagella in viscoelastic fluids BIN LIU, THOMAS POWERS, KENNETH BREUER, Brown University — Bacteria achieve motility by eluding the constraints of kinematic reversibility, for instance, by rotating a helical flagellum. We study experimentally the motility of the flagellum with a scaled-up model system, a motorized helical coil that rotates along its axial direction. The rotating helix is tethered on a linear stage that advances at a predetermined speed along the axial direction. A free-swimming speed is obtained when the net force on the helix is zero. In the Newtonian case, the free-swimming speed of the helix is always proportional to its rotation rate. We show how such motility is affected by the presence of the viscoelasticity of the fluid, a ubiquitous environment for living bacteria.

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