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Particle image velocimetry experiments on a model helical flagellum in viscoelastic fluids ANAND DESAI, BIN LIU, THOMAS POWERS, KENNETH BREUER, School of Engineering, Brown University — Live bacteria often live in polymer suspensions, and are inevitably subjected to the effects of fluid viscoelasticity. To study the viscoelastic effect on bacterial motility, we have constructed a scaled-up model system and use particle image velocimetry (PIV) to measure the flow field generated by a rigid helical filament that rotates and translates in a Boger fluid. The helix is made to swim freely – it is subjected to an external torque, and translates along its axial direction at a predetermined speed so that the net hydrodynamic force on the helix vanishes. By comparing the flow field with the Newtonian reference, we address the question on how the viscoelasticity of the fluid enhances or reduces the motility of the helix at different Deborah numbers.

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