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How Azimuthal Swirl Impacts Swimming Kinematics in a Viscoelastic Fluid[1] JEREMY P. BINAGIA, Stanford University, ARDELLA PHOA, Santa Clara University , ERIC S. G. SHAQFEH, Stanford University — Microorganisms are often found moving through viscoelastic environments such as mucus layers or biofilms. In 2014, Zhu & Lauga simulated the steady motion of a spherical "squirmer" in a viscoelastic fluid to understand how fluid elasticity impacts the organisms's speed. The squirmer model considers a spherical swimmer that includes a specified slip velocity at its surface. This model has been used extensively to study the motion of ciliates like *Paramecium*, colonies of the green algae *Volvox*, or as a simplified model for general swimmers like *E. coli*. In all cases, they found that a squirmer swims slower than it does in a Newtonian fluid. In that study and many others that use the squirmer model, only the first two axisymmetric swimming modes are considered. Only very recently have authors considered the addition of other modes, such as those that involve azimuthal surface velocities. Recently, we have conducted simulations showing that particular combinations of the axisymmetric swirling modes can actually lead to a speed increase in an elastic fluid. In this talk, we will describe how the inclusion of this azimuthal swirl affects swimming kinematics in elastic fluids, with a focus on how polymer deformation leads to changes in speed.

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