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Undulatory Swimming in Shear-thinning Fluids[1] XIAONING SHEN, DAVID GAGNON, PAULO ARRATIA, University of Pennsylvania — Many fluids in which microorganisms move, feed, and reproduce possess shear-rate dependent viscosity behavior (e.g. shear-thinning). Such fluids include wet soil, clay suspension, mucus, and gels. In this talk, we experimentally investigate the effects of shear-rate dependent viscosity on the swimming behavior of the nematode *Caenorhabditis elegans* using velocimetry and tracking methods. Here, aqueous solutions of xanthan gum, which is a rod-like stiff polymer, are used with concentrations varying from the semi-dilute to the concentrated regime. The data is compared to swimming in simple, Newtonian fluids. We find that the nematode swims at an approximately constant speed in the semi-dilute regime. Surprisingly, the nematode exhibits 40% increases in swimming speed once immersed in a concentrated solution. The enhancement in swimming speed seems to be related to the dynamics of rod-like polymer networks formed in concentrated solutions.

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