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Flagellar Kinematics and Swimming Behavior of Algal Cells in Viscoelastic Fluids¹ PAULO ARRATIA, University of Pennsylvania, JING YANG, JERRY GOLLUB, Haverford College — The motility behavior of microorganisms can be significantly affected by the rheology of their fluidic environment. In this talk, we experimentally investigate the effects of fluid elasticity on both the flagella kinematics and swimming dynamics of the microscopic alga *Chlamydomonas reinhardtii*. We find that the flagellar beating frequency and wave speed are both enhanced by fluid elasticity. Interestingly, the swimming speeds during the alga power and recovery strokes are enhanced by fluid elasticity for $De > 1$. Despite such enhancements, however, the alga net forward speed is hindered by fluid elasticity by as much as 30% compared to Newtonian fluids of similar shear viscosities. The motility enhancements could be explained by the mechanism of stress accumulation in the viscoelastic fluid.

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