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A numerical investigation into the effects of fluid rheology and stroke kinematics on swimming alga cells in complex fluids CHUANBIN LI, ROBERT GUY, BECCA THOMASES, UC Davis — It is observed in experiments that when the fluid viscosity or elasticity is changed, *Chlamydomonas reinhardtii* exhibits changes in both flagellar kinematics and the swimming speed. In order to understand the effects of rheology on both gait and swimming performance, we develop a computational model of the swimmer. We use flagellar strokes fit from experimental data to set up a constrained system, determining the forces on the swimmer and its swimming velocity. Our approach to simulating the swimming behavior demonstrates low computational costs even in three dimensions. In our simulations, stroke patterns and fluid rheologies are changed separately, so that we can dissect the contributions of stroke kinematics of the alga and the fluid environment, which can not be achieved with experiments.

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