

Abstract Submitted  
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**Undulatory swimming in non-Newtonian fluids**<sup>1</sup> AREZOO ARDEKANI, GAOJIN LI, Purdue University — Microorganisms often swim in complex fluids exhibiting both elasticity and shear-thinning viscosity. The motion of low Reynolds number swimmers in complex fluids is important for better understanding the migration of sperms and formation of bacterial biofilms. In this work, we numerically investigate the effects of non-Newtonian fluid properties, including shear-thinning and elasticity, on the undulatory locomotion. Our results show that elasticity hinders the swimming speed, but a shear-thinning viscosity in the absence of elasticity enhances the speed. The combination of the two effects hinders the swimming speed. The swimming boost in a shear-thinning fluid occurs even for an infinitely long flagellum. The swimming speed has a maximum, whose value depends on the flagellum oscillation amplitude and fluid rheological properties. The power consumption, on the other hand, follows a universal scaling law.

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Arezoo Ardekani  
Purdue University

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