Physics of Microbial Motility



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Swimming and Rheology of Active Suspensions in Viscoelastic Fluids

The natural habitat of microorganisms are non-Newtonian fluids, which besides shear viscosity also have an elastic response. Using a second-order model fluid, we present an analysis, how weak viscoelasticity affects the rheology of a dilute suspension of microswimmers [1]. Starting with modifications of the well-known Jeffery orbits and the orientational distribution due to tumbling and rotational diffusion, we show how the effective shear viscosity is influenced. In particular, for pushers such as E.coli bacteria, the shear viscosity is further reduced due to elastic stresses. In the end, we also comment on swimming in a viscoelastic fluid with a reciprocal stroke pattern [2].

References

- [1] A. Choudhary, S. Nambiar, and H. Stark, Comm. Phys. 6, 163 (2023).
- [2] M. Eberhard, A. Choudhary, and H. Stark, Phys. Fluids 35, 063119 (2023).

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