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Squirming propulsion in viscoelastic fluids MARCO DE CORATO, Università degli studi di Napoli Federico II, Dipartimento di Ingegneria chimica dei Materiali e della Produzione industriale, FRANCESCO GRECO, Istituto di Ricerche sulla Combustione, IRC-CNR, PIER LUCA MAFFETTONE, Università degli studi di Napoli Federico II, Dipartimento di Ingegneria chimica dei Materiali e della Produzione industriale — The locomotion of organisms in Newtonian fluids at low-Reynolds numbers displays very different features from that at large Reynolds numbers; indeed, in this regime the viscous forces are dominant over the inertial ones and propulsion is possible only with non-time-reversible swimming strokes. In many situations of biological interest, however, small organisms are propelling themselves through non-Newtonian fluids such as mucus or biofilms, which display highly viscoelastic properties. Fluid viscoelasticity affects in a complex way both the micro-organisms' swimming velocity and dissipated power, possibly affecting their collective behavior. In our work, we employ the so called "squirmer" model to study the motion of spherical ciliated organisms in a viscoelastic fluid. We derive analytical formulas for the squirmer swimming velocity and dissipated power that show a complex interplay between the fluid constitutive behavior and the propulsion mechanism.

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