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Non-Newtonian effects on the slip and mobility of a self-propelling active particle AKASH CHOUDHARY, PUSHPAVANAM S, IIT Madras — Self-propelling Janus particles generate concentration gradients along their surface by exploiting the asymmetry in surface activity. This gives rise to a ‘slip’ at the particle surface, which propels the particle without the requirement of external concentration gradients. In this work, we study the influence of viscoelasticity (second-order-fluid model) and shear-thinning/thickening (Carreau model) on the slip and mobility of an axisymmetric active particle. Using matched asymptotic expansions, we provide an analytical expression for the modification of slip. Using reciprocal theorem, we demonstrate the influence of fluid rheology on particle mobility for low Peclet numbers. The current study also provides insights into the transport of complex fluids through phoretic pumps.

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