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Polymer dynamics driven by a helical filament[1] ANDREW BALIN, University of Oxford, TYLER SHENDRUK, Rockefeller University, ANDREAS ZOETTL, JULIA YEOMANS, University of Oxford — Microbial flagellates typically inhabit complex suspensions of extracellular polymeric material which can impact the swimming speed of motile microbes, filter-feeding of sessile cells, and the generation of biofilms. There is currently a need to better understand how the fundamental dynamics of polymers near active cells or flagella impacts these various phenomena. We study the hydrodynamic and steric influence of a rotating helical filament on suspended polymers using Stokesian Dynamics simulations. Our results show that as a stationary rotating helix pumps fluid along its long axis, nearby polymers migrate radially inwards and are elongated in the process. We observe that the actuation of the helix tends to *increase* the probability of finding polymeric material within its pervaded volume. At larger Weissenberg numbers, this accumulation of polymers within the vicinity of the helix is greater. Further, we have analysed the stochastic work performed by the helix on the polymers and we show that this quantity is positive on average and increases with polymer contour length. Our results provide a basis for understanding the microscopic interactions that govern cell dynamics in complex media.

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