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The Diffusiophoretic Self-Propulsion of Patchy Particles Driven By a Catalytic Reaction on the Particle Surface NIMA SHARIFI MOOD, CHARLES MALDARELLI, JOEL KOPLIK, The Benjamin Levich Institute for Physico-Chemical Hydrodynamics, City College of New York, ILONA KRETZSCHMAR, Department of Chemical Engineering, The City College of New York , AMAR PAWAR, Complex Fluids Microstructure, Procter and Gamble Co. — The autonomous motion generated by using a catalytic reaction on part of the surface of a particle to generate a concentration gradient across the particle and an attendent diffusophoretic propulsion has received the most attention. In this presentation, we provide a theoretical description of the effect of the intermolecular forces on the hydrodynamic propulsion. The analysis is undertaken in the limit in which the fluxes generated by diffusion and the intermolecular forces are larger than the convective flux, the flow is inertialess and the catalytic reaction rate is infinite. Finite element calculations are used to determine the concentration fields as a function of the size of the cap. The velocity field and propulsion velocity are computed analytically in the low Reynolds number limit in terms of the moments of the concentration field. This propulsion velocity is compared with our own recent experimental measurements of this motor.

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