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The Effect of Brownian Motion on the Trajectory of Diffusiophoretic Locomotors near a Solid Boundary ALI MOZAFFARI, Department of Chemical Engineering and Levich Institute, City College of New York, NIMA SHARIFI-MOOD, Department of Chemical and Biomolecular Engineering, University of Pennsylvania, JOEL KOPLIK, Department of Physics and Levich Institute, City College of New York, CHARLES MALDARELLI, Department of Chemical Engineering and Levich Institute, City College of New York — Diffusiophoretically self-propelled locomotors are a class of active colloids in which a particle autonomously swims through the liquid as a result of an unbalanced interaction with solute molecules asymmetrically distributed around the colloid. This solute distribution is maintained by a reaction which produces the solute on one catalytically active side of the Janus motor colloid. For the simplest case of diffusiophoretic self-propulsion near a planar infinite wall with zero solute flux, and repulsive solute-colloid interactions, hydrodynamic solutions for deterministic Stokes flow have shown that that for large catalytically active areas pointed away from the wall, and for distances less than the particle radius, the particles can skim at a constant distance along the surface without rotation, or can become stationary. To examine the effect of thermal fluctuations on the stability of these regimes for small motor sizes, Brownian dynamics simulations including the hydrodynamic interaction with the wall are undertaken, and we identify critical Peclet numbers above which the skimming and stationary regimes are stable. Below these values, less predictable behavior is found in which the colloid can be repelled from or intersect with the wall.

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