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Spontaneous Lift of Particles Through Inhomogeneous Slip Surfaces in Lubricated Contacts AIDAN RINEHART, UGIS LACIS, Royal Institute of Technology (KTH), THOMAS SALEZ, Laboratoire Ondes et Matire dAquitaine (LOMA), SHERVIN BAGHERI, Royal Institute of Technology (KTH) — We reveal how inhomogeneous surfaces can accomplish wear reduction and increased mobility for particles traveling near walls. We consider a model problem of a cylinder near a wall where the surface (cylinder or wall) has non-homogeneous slip properties. We demonstrate that through variations in surface slip length the lubrication pressure symmetry is broken. Using lubrication theory we provide the analytical solutions to the hydrodynamic force and torques acting on the cylinder. Using numerical simulations, we also report various particle trajectories arising from inhomogeneous slip surfaces, including migration, oscillation, and self-propulsion. We find a linear scaling between wall normal migration and slip length, $\Delta \sim l$, for wall parallel motion over a slip to no-slip wall transition. These findings are relevant especially for microfluidic and biological systems where particles typically reside in close proximity to walls.

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