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Entrainment and scattering in microswimmer–colloid interactions HENRY SHUM, University of Waterloo, JULIA YEOMANS, University of Oxford — We use boundary element simulations to study the interaction of model microswimmers with a neutrally buoyant spherical particle. Three swimmer models are used: a spherical squirmer and two bacteria with different flagellum lengths. The particle size is varied from much smaller than to much larger than the size of the swimmer. These two extremes respectively approximate swimmers encountering a tracer and a fixed, flat surface. We find that the centre of mass motion of the particle due to hydrodynamic interactions is insensitive to the particle radius when the swimmer passes distantly. In head-on collisions, particles become entrained by the swimmer and can experience large displacements. Simultaneously, swimmers can be deflected through large angles by interactions with a particle if the particle is large enough. This deflection, in turn, alters the path of the particle. Based on numerical results, we estimate the effective diffusivity of a particle in a dilute bath of swimmers and show that there is a non-monotonic dependence on particle radius. Similarly, we show that the effective diffusivity of a swimmer scattering in a suspension of particles varies non-monotonically with particle radius.

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