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Braids in a two-body micro swimming MEHDI MIRZAKHANLOO, MIR ABBAS JALALI, M.-REZA ALAM, University of California, Berkeley — Here we show that microswimmers' trajectories may get entangled as a result of their mutual hydrodynamic interactions, resulting in a group behavior that is significantly different from individual swimmers' trajectories. Specifically, we consider a two-swimmer motion of "Quadroar", a newly proposed swimmer consists of two axles of rotating disks connected through a linear reciprocating actuator. In the absence of hydrodynamic interaction, each microswimmer moves along a straight path. When hydrodynamic interaction is introduced, the two swimmers move along tightly woven trajectories whose properties depend on the swimmers' initial conditions. We also show that if swimmers are sent toward each other they may reach an equilibrium at which while they are swimming (i.e. spending energy) no net motion is achieved. We further discuss that since the streamlines of the flow induced by the Quadroar closely resemble the oscillatory flow field of the green alga Chlamydomonas reinhardtii, our findings can thus be utilized to understand the interactions of microorganisms with each other.

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