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The hydrodynamic mobility of chiral colloidal aggregates ERIC KEAVENY, MICHAEL SHELLEY, Courant Institute, New York University — A recent advance in colloidal technology [Zerrouki *et al.*, Nature **455**, 380 (2008)] uses magnetic aggregation to enable the formation of micron-scale particle clusters with helical symmetry from doublets composed of two micron-scale beads of different radii bonded together by a magnetic cement. Such self-assembled structures offer a means of controllable transport and separation in a low Reynolds number environment using externally applied magnetic or electric fields. We identify two necessary conditions that reveal further parameterized expressions that describe the positions of the beads in an aggregrate as a function of size ratio of the two beads composing the doublets. With the geometry of the structure known, we perform hydrodynamic calculations to ascertain entries of the mobility matrix for the aggregate and establish the relationship between the applied torque about the helical axis and translations parallel to this direction. For larger values of the particle radius ratio the coupling between rotations and translations changes sign as the number of doublets in the aggregate increases indicating that the clusters possess a more complex superhelical structure.

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