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Achiral rigid magnetically actuated swimmers HENRY FU, University of Nevada, Reno, U. KEI CHEANG, Drexel University, FARSHAD MESHKATI, University of Nevada, Reno, MINJUN KIM, Drexel University — So far, many magnetically actuated artificial microswimmers have relied on either swimmer flexibility or chiral geometry to overcome constraints on swimming strategies at low Reynolds numbers and achieve propulsion. However, being either flexible or chiral is not a necessary condition for propulsion of microswimmers rotated by external fields. We analyze achiral, rigid swimming using experiment, numerical simulation, and symmetry analysis. Achiral rigid swimming is demonstrated with planar colloidal structures constructed of magnetic beads and rotated by a spatially uniform magnetic field. This swimming is numerically modeled using a boundary element method. Finally, symmetry analysis is used to generically determine which combinations of achiral rigid geometry and magnetic moment can achieve propulsion. For planar colloidal microswimmers the dipole moment must not be perpendicular to a symmetry plane in order to swim.

Henry Fu
University of Nevada, Reno

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