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Rotation axes, bistability, and controllability of rigid achiral magnetically rotated microswimmers FARSHAD MESHKATI, HENRY FU, University of Nevada, Reno — We investigate magnetically actuated microswimmers through analytical and numerical schemes which are applicable to arbitrary rigid geometries. We examine the dynamics of a simple nonhelical, achiral, rigid swimmer composed of three connected colloidal beads. We consider magnetic fields that can rotate either perpendicular to its rotation axis, or at a nonperpendicular angle to its rotation axis. We find the steady rotating orbits of the swimmer and evaluate them for stability. We show that certain experimental conditions, determined by magnetic field strength, rotation frequency, and angle of field relative to rotation axis, can result in more than one stable orbit. We compare this to experimental observations of bistability of helical swimmers. We scrutinize the dependence of the rotation axis of the swimmer on experimental parameters and compare it to the experimental observations of wobbling in the literature. Finally, we show that the controllability of these types of swimmers can be improved by manipulating the angle between the direction of the magnetic field and its axis of rotation.

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