Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

An efficient framework for qualitative and quantitative analysis of magnetically actuated, rigid microswimmers FARSHAD MESHKATI, University of Nevada, Reno, U KEI CHEANG, MINJUN KIM, Drexel University, HENRY FU, University of Nevada, Reno — Artificial microswimmers or microrobots have been actively investigated for possible applications in microactuation, drug-delivery, in situ sensing and diagnostics, and microtransport and assembly. We describe simple achiral, rigid microswimmers actuated by rotating magnetic fields, and elucidate the the minimal conditions for propulsion. We present an efficient method for analyzing the propulsion of such swimmers, which is capable of predicting the speed and direction of swimming as well as the swimmer's rotational dynamics. The method assumes knowledge of the swimmer's geometry and magnetic dipole moment,which can be measured from its response to an impulsive change in the direction of the magnetic field. The method only requires a single calculation of the swimmer's mobility matrix using a boundary element method such as the method of regularized Stokeslets. We validate our method by finding good agreement with experiment for both qualitative and quantitative predictions. The method described can be easily applied to rigid swimmers with arbitrary geometries which are rotated by external magnetic fields.

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Date submitted: 01 Aug 2013 Electronic form version 1.4