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Simulations of Magnetic Micro-swimmers[1] ERIC KEAVENY, MARTIN MAXEY, GEORGE KARNIADAKIS, Division of Applied Mathematics, Brown University — Following a recent realization of artificial micro-swimming (Dreyfus et. al., *Nature*, **437**, 862-865), we conduct simulations of a swimmer whose mechanism of propulsion is the magnetically driven undulation of a flagellum-like tail composed of chemically linked paramagnetic beads. In our model, the tail is treated as a series of spheres tied together by inextensible, bendable links. The spheres interact magnetically through mutual dipole interactions, and hydrodynamic interactions are achieved by the force-coupling method. We compare the swimming speeds determined by the simulations with those obtained experimentally and by previous theoretical modeling. In addition, we evaluate the performance of the micro-swimmer in external flow fields and explore the use of alternative applied magnetic fields.

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