

16-811 Final Project Proposal

Emma Benjaminson (ebenjami)

14 October 2019

I propose developing a novel model from first principles for the motion of 2-link microswimmers in a new configuration of time-varying magnetic field. Microswimmers are micron-scale robotic devices constructed by joining magnetic particles with DNA nanotechnology. The contribution of this work will be to predict the gait of 2-link microswimmers in this new field configuration and to compare the resultant motion characteristics against current locomotion strategies. The new configuration of time-varying magnetic field creates a single line of maximum magnetic field magnitude and moves that line across a microfluidic channel, theoretically pulling microswimmers trapped inside this line of maximum magnitude. I will model a single microswimmer's motion in such a field from first principles. I will predict the maximum velocity at which I can move the line of maximum magnitude without losing control over the microswimmers. Time allowing, I will also obtain experimental results to confirm the model's predictions.