Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Bio-inspired robot design for viscous fluids GRACE MA, TYLER LIPMAN, SUNGHWAN JUNG, Virginia Tech — Many modern micro-robots are designed for biomedical applications to transport drugs to targets or to operate tests in the body for diagnosis. However, most micro-robots simply mimic the morphology and the propulsive mechanism of micro-organisms without understanding the underlying physics of low-Re swimming. Two types of swimming motions have been observed in micro-organisms; stresslet and source-dipole swimming. The stresslet swimmer (e.g. E. coli) uses a rotating helical appendage, whereas the source-dipole swimmer (e.g. Paramecium) creates surface velocity for propulsion. Using this principle, we designed a robot to swim in very viscous fluids either by rotating a helix or creating surface velocity, simply by changing the orientation of the appendage. Further, we will discuss the performance of this robot (swimming speed and rotation speed) with respect to the number, winding angle, and radius of helices in a very viscous fluid.

Grace Ma
Virginia Tech

Date submitted: 05 Nov 2015 Electronic form version 1.4