Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Magnetic Helical Microswimmers in Poiseuille Flow ALPEREN ACEMOGLU, SERHAT YESILYURT, Sabanci University — We analyze the motion of artificial magnetic microswimmers which mimic the swimming of natural organisms at low Reynolds numbers. Artificial magnetic microswimmers consist of a rigidly connected helical tail and a magnetic head. Magnetic swimmers are actuated with three orthogonal electromagnetic coil pairs. The swimmer motion is examined in the laminar flow which is introduced to channel with syringe pump. We recorded videos for forward (pusher-like swimming / in the head direction) and backward (puller-like swimming / in the tail direction) motion of swimmers. Swimmers have non-stable helical trajectories for forward motion and stable straight trajectories for backward motion. The flow effects on trajectories are observed for swimmers with different geometric parameters in the circular channels. Experiment results show that helical wavelengths of the trajectories are affected with the flow. Additionally, the flow has more pronounced effect on the trajectories of the swimmers in wide channels. Moreover, circular confinement in narrow channels leads to more stable trajectories; in wide channels swimmers follow complex trajectories. A CFD model is used to compare experiments with simulations and to analyze the effects of hydrodynamic interactions.

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Date submitted: 01 Aug 2014 Electronic form version 1.4