Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Elastohydrodynamics of flagellated microorganisms GAOJIN LI, AREZOO ARDEKANI, Purdue University — The swimming motion of many microorganisms and cells are achieved by the waving deformation of their cilia and flagella. The typical structure of flagella and cilia contains nine doublets of parallel microtubules in a cylindrical arrangement surrounding one pair of microtubules in the center. The dynein molecular motors internally drive the sliding motion between the neighboring microtubules and cause the bending motion of the flagella and cilia and drive the microorganism swimming motion. In this work, we develop a numerical model for a microorganism swimming by an internally self-driven filament. Our numerical method captures the interaction between the elasticity of the flagellum and the surround fluid. The no-slip boundary conditions are satisfied by an iterative distributed Lagrangian multiplier method. We also investigate the effects of the non-Newtonian fluid rheology on the motion of an elastic flagellum near a wall.

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Date submitted: 28 Jul 2016 Electronic form version 1.4