Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Elastic actin comet tails: shape, stresses and propulsion AJAY GOPINATHAN, University of California, Santa Barbara, ANDREA LIU, University of Pennsylvania — Actin based motility is a recurring theme in a variety of biological systems ranging from keratocytes that use their dynamically re-arranging cytoskeleton for motility to bacterial pathogens like Listeria that hijack the host cell's actin machinery and are propelled by actin comet tails. The basic principle behind all these processes is the conversion of free energy of polymerization into a protrusive force. Recent experimental observations have suggested several distinctive features of such propulsion especially in the case of Listeria motion. We model the process by a finite element simulation of the actin comet tail which is treated as a continuum elastic material that is tethered to the rear of the bacterium. We investigate steady state properties such as the shape of the comet tail, stresses generated and also the time dependence of the motion.

Ajay Gopinathan
UCSB

Date submitted: 01 Dec 2004 Electronic form version 1.4