1077-VK-2811 **Csilla Szabo*** (csilla.szabo@usma.edu), West Point, NY. *A Markov Model for Actin Polymer Dynamics and Cell Membrane Protrusion.*

Actin is a helical polymerizing protein, which is vital to the cell. This protein forms the cytoskeleton of the cell and plays a key role in cell motility. Without the ability to move cells would not be able to perform critical cell processes such as wound healing, immune system response and embryonic development. This work focuses on the role of actin in membrane protrusion, which is the first in a series of steps leading to cell motility. I present a Markov model for actin polymerization and depolymerization, where the polymer ends and membrane position are tracked. The membrane-polymer interaction is modeled as a Brownian Ratchet where the thermal fluctuations of the membrane create space for the actin filament to polymerize. The concentration and diffusion of both active ATP-bound and inactive ADP-bound monomers in the cytoplasm, conditional on the membrane position, is also included in the model. The main goals of this work are as follows: 1. Find the polymer length distribution and determine if treadmilling or steady-state behavior is observed. 2. Examine the polymer-membrane interaction and determine the protrusion velocity. 3. Determine if diffusion is a sufficient mechanism for delivering monomers to the leading edge of polymer growth. (Received September 22, 2011)