Abstract Submitted
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The Effects of Filament Aging and Annealing on a Lamellipodium Undergoing Disassembly By Severing[1] PAUL MICHALSKI, ANDERS CARLSSON, Washington University — We construct a simplified model of a lamellipodium and use a numerical simulation to study its properties as it disassembles by filament severing. The growing lamellipodium is modeled as a 2D or 3D periodic lattice of crosslinked actin filaments. At each time step a new layer of actin filaments is added at the membrane, existing filaments are severed stochastically, and disconnected sections of the network are removed. Filament aging is modeled by including several different filament chemical states. Filament annealing is included by allowing existing filaments to grow new filaments. The properties of the model are studied as functions of the number of states and the severing and annealing rates. We find that the network width is proportional to the sum of the average lifetimes of the states, and is well modeled by a simple kinetic theory. The edge of the growing network becomes sharper as either the number of states or the dimensionality is increased. Annealing increases the average length of the network, and we find that the network length diverges at a critical annealing rate.

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