A Finite Element simulation of the lamellipodial actin cytoskeleton

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This poster presents a Finite Element method for the simulation of the lamellipodial part of the cytoskeleton of living cells.

The numerical method resolves a mathematical model that has been developed by Ch.Schmeiser and his collaborators (V. Small, D. Oelz, N. Sfakianakis, A. Manhart, V. Milisic) in Vienna. In the model several properties of the cytoskeleton are included: polymerization and bending of actin filaments, stretching and twisting of crosslink proteins, adhesion the with the substrate and myosin contractile forces.

We present simulations of the effect of the previously mechanical characteristic of the cytoskeleton. Special emphasis is given in the simulation results propagating lamellipodia under the influence of an external force and/or variable filament polymerization rate.