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Modeling of Actin-Skeleton Dynamics in Keratocyte Lamellipodia

D. Oelz
Vienna University of Technology
Vienna, Austria

We describe the meshwork of Actin Filaments in Keratocyte Lammelipodia using a locally two-directional model on the basis of the basic physical properties of its constituents. In this sense our modeling approach is to start from "first principles". Going to the continuous limit with respect to the distribution of filaments we obtain the Lagrangian and its associated variational equations, a system of partial differential and algebraic equations. In this work we use an ansatz for rationally symmetric solutions. We assume that the dynamics of the network a driven by a constant rate of polymerization and depolymerization and we (numerically) compute the evolution of the network using a quasi-stationary approach. The simulations reproduce several features of the Actin Network dynamics found experimentally: treadmilling, lateral flow and a characteristic distribution of angles between filaments.