

Existence and Uniqueness for a Model of Contractile Forces in Acto-Myosin Bundles

Starting from a microscopic model developed by Dietmar Ölz for an actomyosin bundle within a cell, a system of coupled hyperbolic and elliptic equations is derived in the asymptotic regime where filaments are considered to be short compared to the length of the bundle.

In this limit, two situations can be described: a problem with fixed boundary, in which we can compute the forces acting on the tips of the bundle, and a problem where we prescribe the forces at the free boundary, and thus compute the position of the tips. For the problem with fixed boundary, existence and uniqueness of solutions is proven by standard PDE methodology and some fixed point arguments. The aim for the free boundary value problem (a work in progress) is to first transform it to a fixed boundary problem, and then use some of the techniques developed before.