



universität
wien



DK Seminar

November 12, 2014, 14:00 - 15:30

University of Vienna, Faculty of Mathematics, OMP 1, HS 2

Stefanie Hirsch

University of Vienna

Acto-Myosin Bundles

Acto-Myosin bundles are macroscopic structures within a cell that are used for various processes such as transport of nutrients and mechanical stability of the cell. Dietmar Ölz developed a model relating the flows of F-Actin to the effects of cross-link and bundling proteins, the forces generated by myosin-II filaments as well as external forces at the tips of the bundle. In the asymptotic regime where actin filaments are assumed to be short compared to the length of the bundle, a fixed and a free boundary value problem can be derived. The model consists of transport equations for the density of actin filaments (for two families of left and right moving filaments), coupled to elliptic equations for the velocities of these filaments, as well as an ODE for the tip of the bundle.

The fixed and the free boundary value problem both have been solved using fixed point techniques. However, if we consider the situation where one family of actin filaments has been completely depolymerized in some part of the bundle, we see that the elliptic nature of the velocity equations is lost, and it is unclear how to solve the system (or if this is even possible). As a consequence, we go one step back in the modeling, before the asymptotic limit, and look at the velocity equations in integral form.