Long Time Existence of Solutions to an Elastic Flow of Networks

In this talk we consider the L^2–gradient flow of the elastic energy of networks in $\mathbb{R}^2$ which leads to a fourth order evolution law with non-trivial nonlinear boundary conditions. Hereby we study configurations consisting of a finite union of curves that meet in triple junctions and may or may not have endpoints fixed in the plane.

We investigate the long time behaviour of solutions to this flow. Starting from a suitable initial network of class $W_p^{4-4/p}$ with $p \in (5, 10)$ we prove that the flow exists globally in time or at least one of the following happens: as the time approaches the maximal time of existence, the length of at least one curve tends to zero or at one of the triple junctions of the network all the angles between the concurring curves tend to zero or to π.

This is joint work with Harald Garcke and Alessandra Pluda.