ON THE BRAKKE FLOW OF SURFACES
WITH FIXED BOUNDARY CONDITIONS

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Abstract. Brakke flow is a measure-theoretic generalization of the mean curvature flow which exploits the flexibility of geometric measure theory in order to describe the evolution by (generalized) mean curvature of surfaces exhibiting singularities, such as, for instance, a planar network with multiple junctions. In the first part of this talk, I will discuss the proof of the following result: given any n-dimensional rectifiable subset Γ_0 of a strictly convex bounded domain $U \subset \mathbb{R}^{n+1}$ such that $U \setminus \Gamma_0$ is not connected, there exists a Brakke flow of surfaces (possibly weighted with integer multiplicities) starting from Γ_0 and with the additional property that their boundary coincides with $\partial \Gamma_0$ at all times. Furthermore, the flow subconverges, as $t \to \infty$ and in the sense of varifolds, to a (generalized) minimal surface in U with the prescribed boundary $\partial \Gamma_0$, thus providing a dynamical solution to Plateau's problem. In the second part, I will discuss recent developments concerning the relationship between the singularities of a stationary initial surface Γ_0 and the (non) uniqueness of the flow. This investigation leads to the definition of a class of *dynamically stable* stationary varifolds, which seems worthy of further study. Based on joint works with Yoshihiro Tonegawa (Tokyo Institute of Technology).

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