

EXISTENCE OF CANONICAL MULTI-PHASE BRAKKE FLOWS

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Abstract. The Brakke flow is a measure-theoretic generalization of the mean curvature flow which allows to describe the evolution by mean curvature of surfaces admitting singularities and topological changes. A typical example is that of "grain boundaries": the interfaces separating different grains or phases in a material (e.g. a polycrystal) and evolving in time subject to a potential energy of surface tension type.

A standard drawback of Brakke flows is the loss of uniqueness of solutions. In this talk, I will discuss a result concerning the existence, for any arbitrary initial datum, of a Brakke flow of grain boundaries which is canonical, in the sense that the (indicator functions of the) corresponding grains are also a BV solution of mean curvature flow in the sense of Luckhaus - Sturzenhecker. As recently shown by Fischer et al., in certain conditions, the solution to multi-phase mean curvature flow is unique in the class of canonical Brakke flows, thus motivating its intrinsic interest.

The technique used to construct such canonical solutions is rather robust, and it can be modified to produce mean curvature flows with fixed boundary conditions, with interesting applications to Plateau's problem and the regularity theory for minimal surfaces, which I hope to discuss in the second part of the talk.

Based on joint works with Yoshihiro Tonegawa (Tokyo Institute of Technology).

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