

Maurizio Paolini

Curvature flow with nonconvex anisotropy relaxed with a well-posed Allen-Cahn system

The bidomain model originates as a way to describe the propagation of the electric pulse in the cardiac tissue. It is a system of two reaction-diffusion equations of Allen-Cahn type associated to the intra- and extra-cellular medium, the two “domains”, that in this model are considered superposed after a homogeneization procedure. The anisotropy associated to each domain is different, and it can be shown formally that the singular limit as the relaxation parameter ϵ tends to zero leads to a geometric curvature evolution with an anisotropy that results from a particular combination of the two original anisotropies. The interesting point is that the combined anisotropy can become nonconvex (and hence the geometric evolution becomes ill-posed) even for strictly convex original anisotropies. We try to investigate this phenomenon using the result of some numerical simulations.