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On the large time behavior of the solution to the regularized weighted mean curvature flow problem

An initial boundary value problem for the weighted mean curvature flow equation in a smooth bounded domain is considered. Under an assumption that the boundary has the positive mean curvature, and a weight function is positive, the problem is regularized to eliminate the singularity and degeneracy of the differential operator. The Rothe's method is applied to reduce the resulting quasi-linear parabolic problem to a family of the linear elliptic problems. Each of these problems in every temporal layer is numerically solved using the regularized successive approximations. In view of applications to Current Density Impedance Imaging, the large time behavior of the numerical solution to the regularized weighted mean curvature flow problem is investigated. In the numerical experiments it is shown that for a sufficiently large time the regularized solution is approaching the equilibrium solution, i.e., the function of the Dirichlet weighted least gradient. However, the numerical convergence is no more than linear. Therefore, further studies, analytical and numerical, will be done to establish the global convergence result for the original problem and to improve the rate of convergence. The work is supported in part by the NSF grant DMS-181882.