# A convergent algorithm for mean curvature flow

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**Abstract:**
We will sketch a proof of convergence for a new algorithm for mean curvature flow of closed two-dimensional surfaces. The proposed and studied numerical method combines evolving surface finite elements, whose nodes determine the discrete surface like in previous methods, and linearly implicit backward difference formulae for time integration. The proposed method differs from the approaches of Dziuk and Barrett, Garcke & Nürnberg in that it discretizes Huisken's evolution equations (from [Huisken (1984)]) for the normal vector and mean curvature and uses these evolving geometric quantities in the velocity law projected to the finite element space. This numerical method admits a convergence analysis, which combines stability estimates and consistency estimates to yield optimal-order $H^1$-norm error bounds for the computed surface position, velocity, normal vector and mean curvature. The stability analysis is based on the matrix--vector formulation of the finite element method and does not use geometric arguments. The geometry enters only into the consistency estimates. We will also present various numerical experiments to illustrate and complement the theoretical results.