Sapiro, Guillermo; **Tannenbaum, Allen**
On affine plane curve evolution. (English) Zbl 0801.53008
J. Funct. Anal. 119, No. 1, 79-120 (1994).

Summary: An affine invariant curve evolution process is presented in this work. The evolution studied is the affine analogue of the Euclidean curve shortening flow. Evolution equations, for both affine and Euclidean invariants, are developed. An affine version of the classical (Euclidean) isoperimetric inequality is proved. This inequality is used to show that in the case of affine evolution of convex plane curves, the affine isoperimetric ratio is a non-decreasing function of time. Convergence of this affine isoperimetric ratio to the ellipse's value ($8\pi^2$), as well as convergence, in the Hausdorff metric, of the evolving curve to an ellipse, is also proved.

MSC:

53A15 Affine differential geometry
53C65 Integral geometry

Keywords:

curve shortening flow; isoperimetric inequality

Full Text: DOI