

Giga

Surface Evolution Equations

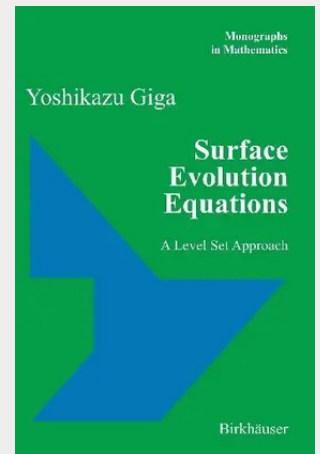
A Level Set Approach

This book is intended to be a self-contained introduction to analytic foundations of a level set method for various surface evolution equations including curvature flow equations. These equations are important in various fields including material sciences, image processing and differential geometry. The goal of this book is to introduce a generalized notion of solutions allowing singularities and solve the initial-value problem globally-in-time in a generalized sense. Various equivalent definitions of solutions are studied. Several new results on equivalence are also presented.

We present here a rather complete introduction to the theory of viscosity solutions which is a key tool for the level set method. Also a self-contained explanation is given for general surface evolution equations of the second order. Although most of the results in this book are more or less known, they are scattered in several references, sometimes without proof. This book presents these results in a synthetic way with full proofs. However, the references are not exhaustive at all. The book is suitable for applied researchers who would like to know the detail of the theory as well as its favour. No familiarity with differential geometry and the theory of viscosity solutions is required. The prerequisites are calculus, linear algebra and some familiarity with semicontinuous functions. This book is also suitable for upper level under graduate students who are interested in the field.

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