

國立中山大學應用數學系

學術演講

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講題：A signed distance function preserving scheme for mean
Curvature flow and related applications

時間：2023/03/08 (Wednesday) 14:10 ~ 15:00

地點：理 SC 4009-1 教室

茶會：13:30

Abstract

Mean curvature flow is an important research topic in geometry, applied mathematics, and the natural sciences. In this talk, we propose a scheme for solving mean curvature flow and some related problems efficiently and accurately on Cartesian grids. Our method uses the sign distance function defined in a narrowband near the moving interface to represent the evolution of the curve. We derive the equivalent evolution equations of distance function in the narrowband. The novelty of the work is to determine the equivalent evolution equation on Cartesian grids without extra conditions or constraints. The proposed method extends the differential operators appropriately so that the solutions on the narrowband are the distance function of the solution to the original mean flow solution. Furthermore, the extended solution carries the correct geometric information, such as distance and curvature, on Cartesian grids. Consequently, it is possible to adapt the existing numerical methods, for instance, finite difference or WENO scheme, that are developed on the Cartesian grids to solve PDEs on curves. The computational domain is a thin narrowband whose widths are a small constant multiple of uniform Cartesian grid spacing. Some experiments confirm that the proposed method is convergent numerically.

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