

A Numerical Method for Diffusion and Cahn-Hilliard Equations on Evolving Spherical Surfaces

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Abstract : In this paper, we present a simple effective numerical geometric method to estimate the divergence of a vector field over a curved surface. The conservation law is an important principle in physics and mathematics. However, many well-known numerical methods for solving diffusion equations do not obey conservation laws. Our presented method in this paper combines the divergence theorem with a generalized finite difference method and obeys the conservation law on discrete closed surfaces. We use the similar method to solve the Cahn-Hilliard equations on evolving spherical surfaces and observe stability results in our numerical simulations.

Keywords : conservation laws, diffusion equations, Cahn-Hilliard equations, evolving surfaces

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