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The Chebyshev spectral viscosity method for the time dependent eikonal equation. (English)


Summary: A wide range of applications requires an accurate solution of a particular Hamilton-Jacobi (H-J) equation known as the Eikonal equation. In this paper, we employ the Chebyshev pseudospectral viscosity method to solve this equation. This method essentially consists of adding a spectral viscosity to the equation for high wave numbers of the numerical solution. This spectral viscosity, which is sufficiently small to retain the formal spectral accuracy is large enough to stabilize the numerical scheme. Here the method is described in detail and the numerical results for several examples are provided which reveals the efficiency of the proposed method.

MSC:

65N35 Spectral, collocation and related methods for boundary value problems involving PDEs

Keywords:
pseudospectral viscosity method; Chebyshev polynomials; level set method; Hamilton-Jacobi equations; eikonal equation

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