ICM 1998, Berlin, Aug. 18–27

Abstracts of Short Communications and Posters

Section:

15. Numerical Analysis and Scientific Computing

1991 MS Classification: 65M06
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Finite difference schemes that inherit the energy conservation or dissipation property from partial differential equations
We propose a method to make finite difference schemes which inherit the energy conservation or dissipation property from nonlinear partial differential equations, such as the Korteweg-de Vries equation and the Cahn-Hilliard equation.
The inherited properties are satisfied exactly. The most important feature of our discretization method is rigorous discretization of variational derivative using summation by parts.
Because of the inherited properties we can expect that derived schemes are numerically stable and yields solutions converging to PDE solutions. We proved the stability and convergence of the scheme for the Cahn-Hilliard equation, and numerically verified the inheritance of the energy conservation and dissipative properties for the KdV eq. and the Cahn-Hilliard eq.