非线性Schrodinger方程的高精度守恒差分格式

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摘要　　本文首先分析线性Schr\"odinger方程一种高阶差分格式的构造方法,

得到方程的耗散项. 在此基础上对三次非线性Schr\"odinger方程, 提出了一种精度为

$\ssize O\, (\tau^2+h^2)$的差分格式, 证明了该格式保持了连续方程的两个守恒量,

且是收敛的与稳定的. 并通过数值例子与已有隐格式进行了比较, 结果表明, 本文格式在计算量类似的情况下,

提高了数值精度.

关键词　　NLS方程　差分格式　高精度　稳定性

分类号

A HIGH ACCURATE AND CONSERVATIVE FINITE DIFFERENCE SCHEME FOR NONLINEAR SCHRoDINGER EQUATION

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Abstract In this paper, we, at first, considered a sort of method constructed high accurate finite difference scheme for linear Schrodinger equation and get dissipation term of the equation. Next, we proposed a conservative finite difference scheme with precision $\ssize O\, (\tau^2+h^2)$ for the nonlinear Schrodinger equation. It is proved that the scheme preserves two conservative quantities and is convergent and stable. The numerical results show that the scheme has higher precision than the other implicit schemes.

Key words　　NLS equation　difference scheme　high precision　stability

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