

A new high-order accurate conservative finite difference scheme for the coupled nonlinear Schrödinger equations

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July 10, 2020

Abstract

In this paper, a fourth-order accurate conservative finite difference scheme for solving the coupled nonlinear Schrödinger (CNLS) equations is proposed. Conservation of the discrete energy and masses, priori estimates, existence and uniqueness of numerical solutions, convergence with second-order in time and fourth-order in space as well as stability of the present scheme are proved by discrete energy method. A convergent iterative method for the present scheme is developed. Numerical experiments are given to support the theoretical analysis.

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