

Sanz-Serna, J. M.; Verwer, J. G.

Conservative and nonconservative schemes for the solution of the nonlinear Schrödinger equation. (English) [Zbl 0593.65087](#)

IMA J. Numer. Anal. 6, 25-42 (1986).

Authors' summary: Five methods for the integration in time of a semidiscretization of the nonlinear Schrödinger equation are extensively tested. Three of them (a partly explicit scheme and two splitting procedures) are found to perform poorly. The reasons for their failure, including the so-called nonlinear blow-up, are analysed. We draw general conclusions on the advantages and drawbacks associated with the use of time-integrators which exactly conserve energy.

Reviewer: [Michael Sever \(Jerusalem\)](#)

MSC:

[65Z05](#) Applications to the sciences

[81Q05](#) Closed and approximate solutions to the Schrödinger, Dirac, Klein-Gordon and other equations of quantum mechanics

[65M06](#) Finite difference methods for initial value and initial-boundary value problems involving PDEs

[65M20](#) Method of lines for initial value and initial-boundary value problems involving PDEs

Cited in **1** Review
Cited in **55** Documents

Keywords:

conservative schemes; nonconservative schemes; semidiscretization; nonlinear Schrödinger equation; explicit scheme; splitting; nonlinear blow-up; time-integrators

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