Solving the nonlinear Schrödinger equation using energy conserving Hamiltonian Boundary Value Methods

L. Barletti, L. Brugnano, G. Frasca Caccia, F. Iavernaro

Abstract

Recently, the class of energy conserving Runge-Kutta methods named *Hamiltonian Boundary Value Method (HBVMs)* has been devised for the efficient numerical solution of Hamiltonian problems [1]. Their use, in turn, has been extended to the solution of *Hamiltonian partial differential equations* and, in particular, the semilinear wave equation [1,2]. In this talk, we present the further application of HBVMs for solving the nonlinear Schrödinger equation.

[1] L. Brugnano, F. Iavernaro. *Line Integral Methods for Conservative Problems.* Series: Monographs and Research Notes in Mathematics. Chapman et al./CRC, 2016.
`http://web.math.unifi.it/users/brugnano/LIMbook/`

[2] L. Brugnano, F. Iavernaro, G. Frasca Caccia. Energy conservation issues in the numerical solution of the semilinear wave equation. *Applied Mathematics and Computation,* **270** (2015) 842–870