

Numerical Solution of a Hyperbolic-Schrödinger

Equation with Nonlocal Boundary Conditions

Y. Ozdemir and M. Kucukunal

Department of Mathematics, Duzce University, Duzce, Turkey

Abstract

A numerical method is proposed for solving hyperbolic-Schrödinger partial differential equations with nonlocal boundary condition. The first and second orders of accuracy difference schemes are presented. A procedure of modified Gauss elimination method is used for solving these difference schemes in the case of a one-dimensional hyperbolic-Schrödinger partial differential equations. The method is illustrated by numerical examples.

References

- [1] Ashyralyev A. and Aggez N., A note on difference schemes of the nonlocal boundary value problems for hyperbolic equations, *Num. Func. Anal. & Opt.*, 25(5-6), 439-462, 2004.
 - [2] Ashyralyev A. and Gercek O., Nonlocal boundary value problems for elliptic-parabolic differential and difference equations, *Dis. Dyn. in Nat. & Soc.*, 2008(2008), 1-16, 2008.
 - [3] Ashyralyev A. and Ozdemir Y., On stable implicit difference scheme for hyperbolic-parabolic equations in a Hilbert space, *Num. Math. for Par. Diff. Eqn.*, 25(5), 1110-1118, 2009.
 - [4] Ashyralyev A. and Yildirim O., On multipoint nonlocal boundary value problems for hyperbolic differential and difference equations, *Tai. Jour. of Math.*, 14(1), 165-164, 2010.
 - [5] Ashyralyev A. and Sirma A., Modified Crank-Nicholson difference schemes for nonlocal boundary value problem for the Schrodinger equation, *Dis. Dyn. in Nat. & Sci.*, 10.1155/2009/584718, 2009.
 - [6] Simos T. E., Exponentially and trigonometrically fitted methods for the solution of the the Schrödinger equation, *Acta App. Math.*, 110(3), 1331-1352, 2010.
-