On the Stability of Second Order of Accuracy Difference Scheme for the Numerical Solution of the Time Delay Telegraph Equation

Allaberen Ashyralyev[1], Deniz Agirseven[2], Koray Turk[2]

[1] *Department of Mathematics, Near East University, Nicosia, TRNC, Mersin 10, Turkey,*

Peoples Friendship University of Russia (RUDN University), 6 Miklukho-Maklaya St, Moscow, 117198, Russian Federation,

Institute of Mathematics and Mathematical Modeling, 050010, Almaty, Kazakhstan

allaberen.ashyralyev@neu.edu.tr
[2] *Department of Mathematics, Trakya University, Edirne, Turkey*

denizagirseven@trakya.edu.tr   korayturk@trakya.edu.tr

Abstract: In this study, second order of accuracy difference scheme for approximate solution of initial-boundary value problem for time delay telegraph equation with Dirichlet condition is presented. The main theorem on stability of the difference scheme is established. Numerical results are provided.

Keywords: Difference schemes, stability, delay telegraph equations

2010 Mathematics Subject Classification: 65M06, 35L10, 35L20

References

[1] O. Arino, Delay Differential Equations and Applications, Springer, 2016.

[2] G. D. Blasio, Delay differential equations with unbounded operators on delay terms, Nonlinear Anal.-Theory Appl. vol. 52, no 1, 1–18, 2003.

[3] A. Allaberen, D. Agirseven, Bounded solutions of semilinear time delay hyperbolic differential and difference equations, Mathematics, vol. 7, no 12, 1163–1185, 2020.

[4] G. Kurulay, H. Ozbay, Design of first order controllers for a flexible robot arm with time delay, Appl. Comput., vol. 16, no 1, 48–58, 2017.

[5] A. Allaberen, D. Agirseven, K. Turk, On the stability of the telegraph equation with time delay, AIP Conference Proceedings, vol. 1759, no 1, 020022–4, 2016.