Dynamics of Continuous, Discrete and Impulsive Systems
Series **B:** *Applications & Algorithms* **25 (2018)** 53-61

NUMERICAL SOLUTIONS OF THE DISSIPATIVE NONLINEAR SCHRÖDINGER EQUATION WITH VARIABLE COEFFICIENT ARISES IN ELASTIC TUBE

Kim Gaik Tay[1] Yan Yee Choy[2], Wei King Tionng[3] and Chee Tiong Ong[4]

[1]Department of Communiaction Engineering
Universiti Tun Hussein Onn Malaysia
86400 Parit Raja, Batu Pahat, Johor, Malaysia

[2]Department of Mathematics and Statistics
Universiti Tun Hussein Onn Malaysia
86400 Parit Raja, Batu Pahat, Johor, Malaysia

[3]Department of Computational Science and Mathematics
University of Malaysia Sarawak

[4]Department of Mathematical Science
University of Technology Malaysia

Abstract. In this paper, we solved the dissipative nonlinear Schrödinger Equation (DNLSV) with variable coefficient by Crank-Nicolson (CN) implicit finite-difference method. The DNLSV equation arises in nonlinear wave modulation in an elastic tube with a symmetrical stenosis filled with viscous fluid. We then compared numerical solutions with its progressive wave solution. The CN scheme is consistent with the differential equation and is unconditionally stable.

Keywords. dissipative, nonlinear Schrödinger Equation , Crank-Nicolson, finite-difference method, progressive wave solution

AMS (MOS) subject classification: 65N40

1 Introduction

The studies in [1] - [2] have investigated a weakly nonlinear wave modulation in a prestressed fluid-filled stenosed elastic tube filled with a Newtonian fluid where approximate viscous fluid equations without boundary conditions were used, while similar studies but viscous equations with boundary conditions were used have been examined in [1] and [3] . Then, by applying the reductive perturbation method in long wave approximation, stretched coordinate of boundary-value type and extending the field quantities into the asymptotic series of order ϵ where ϵ is a small parameter, the governing equations in [1] -