Abstract

Korteweg-de Vries (KdV) equation has important role in description of certain theoretical aspects of Mathematical Physics phenomena in quantum mechanics domain. In this work, we investigate stability analysis of fractional models for linear inhomogeneous, non-linear inhomogeneous and non-linear homogeneous KdV equations by using Banach contraction principle and S-stable mapping. The existing models with integer order derivative for linear inhomogeneous, non-linear inhomogeneous and non-linear homogeneous KdV equations were converted into corresponding fractional models using Caputo-Fabrizio fractional derivative, and then solved by means of an iterative scheme.

Essentials of Fractional Calculus are introduced in chapter 1. Preliminaries of Functional Analysis and Laplace transform constitute chapter 2. Fractional models for linear inhomogeneous, non-linear inhomogeneous and non-linear homogeneous KdV equations and their solutions by means of iterative scheme, are included in chapter 3. Next, Banach contraction principle and S-stable mapping are used to analyze the stability of corresponding fractional models. In last, the influence of fractional parameter on structure of waves obtained from KdV equations are also observed by graphical illustrations.