Abstract

Klein-Gordon equation has very important role in quantum field theory and mathematical physics. In this work, we use Picard's iterative method to investigate the approximate solution and study the physical behavior of linear, nonlinear and damped Klein-Gordon equations with Caputo-Fabrizio time-fractional derivative. The advantage of using Picard's iterative method is that, it generates a sequence of functions that converges rapidly to a solution and gives fixed point iteration for finding numerical approximate solution of the equation.

Chapter 1 describes some basic definitions, important properties of Laplace transform and Caputo-Fabrizio time-fractional derivative.

In Chapter 2 and 3, we find the solution of corresponding linear, damped and nonlinear Klein-Gordon equations of fractional order time derivative by Picard's iterative scheme and then check the stability of the above mentioned scheme. To observe the influence of fractional parameter, graphical illustrations of results are also presented.