Abstract

Emden-Fowler equations are of much more significance in the study of chemically reacting systems, fluid dynamics and various branches of mathematical physics. In the present dissertation, the stability analysis of the numerical simulation of the nonlinear time-fractional Emden-Fowler equations are investigated.

Caputo-Fabrizio fractional derivative is applied in transformation of Emden-Fowler equations from classical to fractional form. The resulting fractional order equations are solved by implementing numerical technique. In addition, Banach contraction principle and h-stable mapping are used to analyze the stability. Accuracy and efficiency of Caputo-Fabrizio fractional derivative are then checked graphically and results are drafted in tables to validate the numerical investigations.