

Application of He's Homotopy Perturbation Method for Solving Fractional Fokker-Planck Equations

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The fractional Fokker-Planck equation (FFPE) has been used in many physical transport problems which take place under the influence of an external force field and other important applications in various areas of engineering and physics. In this paper, by means of the homotopy perturbation method (HPM), exact and approximate solutions are obtained for two classes of the FFPE initial value problems. The method gives an analytic solution in the form of a convergent series with easily computed components. The obtained results show that the HPM is easy to implement, accurate and reliable for solving FFPEs. The method introduces a promising tool for solving other types of differential equation with fractional order derivatives.

Key words: Fractional Fokker-Planck Equation; Homotopy Perturbation Method; Riemann-Liouville Fractional Derivative.