Extension of the Homotopy Perturbation Method for Solving Nonlinear Differential-Difference Equations

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In this paper, we have extended the homotopy perturbation method (HPM) to find approximate analytical solutions for some nonlinear differential-difference equations (NDDEs). The discretized modified Korteweg-de Vries (mKdV) lattice equation and the discretized nonlinear Schrödinger equation are taken as examples to demonstrate the validity and the great potential of the HPM in solving such NDDEs. Comparisons are made between the results of the presented method and exact solutions. The obtained results reveal that the HPM is a very effective and convenient tool for solving such kind of equations.