

Exact solution for linear and nonlinear systems of PDEs by Homotopy-Perturbation method.

ABSTRACT

In this paper, the homotopy-perturbation method (HPM) proposed by J.-H. He is adopted for solving linear and nonlinear systems of partial differential equations (PDEs). In this method, a homotopy parameter p , which takes the values from 0 to 1, is introduced. When $p = 0$, the system of equations usually reduces to a sufficiently simplified form, which normally admits a rather simple solution. As p gradually increases to 1, the system goes through a sequence of 'deformations', the solution of each of which is 'close' to that at the previous stage of 'deformation'. Eventually at $p = 1$, the system takes the original form of the equation and the final stage of 'deformation' gives the desired solution. Some examples are presented to demonstrate the efficiency and simplicity of the method.

Keyword: Exact solutions; Homotopy-perturbation method; System of PDEs.