The Solution of the Linear Fractional Partial Differential Equations Using the Homotopy Analysis Method

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In this paper, the homotopy analysis method is applied to solve linear fractional problems. Based on this method, a scheme is developed to obtain approximation solution of fractional wave, Burgers, Korteweg-de Vries (KdV), KdV-Burgers, and Klein-Gordon equations with initial conditions, which are introduced by replacing some integer-order time derivatives by fractional derivatives. The fractional derivatives are described in the Caputo sense. So the homotopy analysis method for partial differential equations of integer order is directly extended to derive explicit and numerical solutions of the fractional partial differential equations. The solutions are calculated in the form of convergent series with easily computable components. The results of applying this procedure to the studied cases show the high accuracy and efficiency of the new technique.

Key words: Homotopy Analysis Method (HAM); Analytical Solution;
        Fractional Partial Differential Equations (FPDEs).