

Fractional Series Solutions of Nonlinear Fractional Differential Equations via LRPS Technique

Abstract: : The purpose of this work is to provide and analyzed the approximate analytical solutions for certain systems of fractional initial value problems (FIVPs) under the time-Caputo fractional derivatives by means of a novel attractive algorithm, called the Laplace residual power series (LRPS) algorithm. It combines the Laplace transform operator and the RPS algorithm. The proposed algorithm produces the fractional series solutions in the Laplace space based upon basically on the limit concept and then transforming back them to original spaces to get a rapidly convergent series approximate solution. To validate the efficiency, accuracy, and applicability of the proposed algorithm, two illustrative examples are performed. Obtained solutions are simulated graphically and numerically. The analysis of results reached shows that the proposed algorithm is applicable, effective, and very fast in determining the solutions for many fractional problems arising in the various areas of applied mathematics

Keywords: Laplace residual power series; transform function; fractional power series; nonlinear fractional differential equation.

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