Study of numerical and semi-analytical method for conformable fractional functional equations

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In this thesis, the background of an appearance of fractional calculations is investigated and its applications are studied. In the following, some of the definitions of fractional derivative and integral that are most considered by the researchers, are expressed, especially the definition of conformable fractional derivative and integral that this thesis is biased on this type of fractional calculus, are presented. A number of analytic methods for solving conformable fractional differential equations are presented. Some of these are, the general solution of the first-order linear ordinary differential equations, solving the Bernoulli and Riccati equations, and the Lie symmetry analysis method for solving first-order ordinary differential equations, D'Alambert technique, homogeneous equation with constant coefficients, Euler's equidimensional equation, Lagrange approach, undetermined coefficients scheme, and the Lie symmetry analysis method for solving second-order ordinary differential equations. In addition, the first integral method, the sine-Gordon expansion approach, and the modified Kudryashov scheme for solving partial differential equations are adopted for solving conformable fractional differential equations. Moreover, solving the conformable fractional differential equations are studied with semi-analytical methods such as Adomian decomposition method, homotopy perturbation method, optimal homotopy asymptotic method, and Runge-Kutta numerical technique. Also, the Neumann scheme, the homotopy perturbation technique, and the optimal homotopy asymptotic method, for solving the conformable fractional Volterra integral equations of the second kind are generalized, and the results presented in such a way that those can be easily compared. The last chapter finalizes the results of the present thesis and suggests a series of topics about the future researches.

Keywords : Conformable fractional derivative- Conformable fractional integral-

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