Numerical solutions of fuzzy differential equations using reproducing kernel Hilbert space method

Abstract

Modeling of uncertainty differential equations is very important issue in applied sciences and engineering, while the natural way to model such dynamical systems is to use fuzzy differential equations. In this paper, we present a new method for solving fuzzy differential equations based on the reproducing kernel theory under strongly generalized differentiability. The analytic and approximate solutions are given with series form in terms of their parametric form in the space (Formula presented.) The method used in this paper has several advantages; first, it is of global nature in terms of the solutions obtained as well as its ability to solve other mathematical, physical, and engineering problems; second, it is accurate, needs less effort to achieve the results, and is developed especially for the nonlinear cases; third, in the proposed method, it is possible to pick any point in the interval of integration and as well the approximate solutions and their derivatives will be applicable; fourth, the method does not require discretization of the variables, and it is not effected by computation round off errors and one is not faced with necessity of large computer memory and time. Results presented in this paper show potentiality, generality, and superiority of our method as compared with other well-known methods.