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A NUMERICAL ALGORITHM FOR SOLVING NONLINEAR FREDHOLM FUZZY INTEGRO-DIFFERENTIAL EQUATIONS USING VARIATIONAL ITERATION METHOD

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Abstract. This paper deals with analytic solution of nonlinear Fredholm fuzzy integro-differential equations by using variational iteration method (VIM). We study the uniqueness of solution and convergence of the proposed method. Finally, illustrative example is presented to show the effectiveness of the proposed method in solving problem.

Keywords. Fuzzy function, Nonlinear Problems, Fredholm fuzzy integro-differential equations, Variational iteration method, Convergence analysis.

AMS (MOS) subject classification: 03E72, 45G10, 65R20.

1 Introduction

The variational iteration method (VIM) has been successfully applied to various kinds of linear and nonlinear problems such as nonlinear differential equations, nonlinear partial differential equations [1], integro-differential equations [2] and system of integro-differential equations [3], Kdv and mKdv equations [4], linear and nonlinear wave equations[5] and non linear partial differential equations with fractional order [6]. This method was proposed by He [7, 8] as general Lagrange multiplier method [9]. The VIM is developed in order to solve linear and nonlinear integral and inegro-differential equations by Wazwaz and the higher order nonlinear Volterra-Fredholm integro-differential equation by M. A. Fariborzi Araghi and Sh. Sadigh Behzadi (see [10] and [11]).

Recently, much attention to the study of fuzzy differential and integro-differential equations and these topics have been developed in theoretical and numerical point of view. Concept of fuzzy number and fuzzy arithmetic which was first impllemented in various problems by Zadeh [12]. Study of the theory of fuzzy differential equations and its existence and uniqueness of the solution has covered by [13, 14, 15, 16] and of fuzzy integral equations

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