SOLVING FUZZY FRACTIONAL WAVE EQUATION BY THE VARIATIONAL ITERATION METHOD IN FLUID MECHANICS

December 2019
December 2019
DOI:10.12941/jksiam.2019.23.381

**Authors:**

**Firdous Khan**
JNEC, MGMU

**Kirtiwant P. Ghadle**
Dr. Babasaheb Ambedkar Marathwada University



Abstract

In this paper, we are extending fractional partial differential equations to fuzzy fractional partial differential equation under Riemann-Liouville and Caputo fractional derivatives , namely Variational iteration methods, and this method have applied to the fuzzy fractional wave equation with initial conditions as in fuzzy. It is explained by one and two-dimensional wave equations with suitable fuzzy initial conditions.



J. Korean Soc. Ind. Appl. Math. Vol.23, No.4, 381–394, 2019 http://doi.org/10.12941/jksiam.2019.23.381

# SOLVING FUZZY FRACTIONAL WAVE EQUATION BY THE VARIATIONAL ITERATION METHOD IN FLUID MECHANICS

FIRDOUS KHAN[1†], AND KIRTIWANT P. GHADLE[1]

[1]DEPARTMENT OF MATHEMATICS, DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD-431004 (M.S.) INDIA

*Email address*: {k.fir.jahan@gmail.com, ghadle.maths@bamu.ac.in}

ABSTRACT. In this paper, we are extending fractional partial differential equations to fuzzy fractional partial differential equation under Riemann-Liouville and Caputo fractional derivatives, namely Variational iteration methods, and this method have applied to the fuzzy fractional wave equation with initial conditions as in fuzzy. It is explained by one and two-dimensional wave equations with suitable fuzzy initial conditions.

## 1. INTRODUCTION

In now a day, there have been many implementations in obtaining exact solutions in the subject of a fuzzy fractional partial differential equation. Amiri defines the fuzzy generalized Pantograph Equation under Hukuhara differentiability [1]. The concept of the fuzzy derivative was initially defined by Chang and Zadeh [2]. The concept of the fuzzy matrix is first introduced by Thomason 1977 [3]. VIM for obtaining the analytical solution of nonlinear fuzzy initial value problem (NLFIVP) relating to the fuzzy Duffing's equation without changing of the first-order system [4]. Applications of VIM, and finding the exact solution of fractional order by using FIVP is compared [5]. Jafari had explained Huan VIM for fractional Riccati differential equation with following NL equations,

$$ {}^{c}D^{\alpha}_{0+}u(t) = A(t) + B(t)u + C(t)u^2, t > 0, m-1 < \alpha \leq m, \tag{1.1} $$

with fuzzy initial condition,

$$ u^j(0) = \tilde{C}_j, j = 1, \cdots, m-1, m \epsilon \mathbf{N} $$

Where A(t), B(t) and C(t) are given functions, $\tilde{C}_j, j = 1, 2, \cdots, m-1, m \in \mathbf{N}$, are arbitrary fuzzy numbers and $\alpha$ is an order of the fractional derivative [6]. N-th order fuzzy differential equation for VIM is done by Abbasbandy at.al [7]. Using Laplace transforms method

Received by the editors October 9 2019; Revised December 10 2019; Accepted in revised form December 12 2019; Published online December 25 2019.

2000 *Mathematics Subject Classification.* 35R13,76M25.

*Key words and phrases.* Fractional partial differential equation, Variation iteration Method (VIM), Fuzzy initial conditions.

† Corresponding author.

Citations (0) References (24)

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