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Natural Daftardar-Jafari Method for Solving Fractional Partial Differential Equations

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Abstract: In this paper we introduce a new method, the natural Daftardar-Jafari method for solving fractional differential equations. This method is a combination of the natural transform and an iterative technique. The fractional derivative is considered in the Caputo sense.

Keywords: *fractional partial differential equations, natural transform, Daftardar-Jafari method, Caputo fractional derivative.*

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1 Introduction

Fractional Differential Equations(FDEs) have received so much attention in the past two decades due to their ability to model well situations that arise in different fields such as engineering, science and medicine [1]. The importance of FDEs has prompted researchers to look into the methods of their solution that are easy to implement and possess a considerable degree of accuracy. However, despite some significant progress that has been made in terms of the methods for solving FDEs, the fact remains that there are no agreed upon universal methods to solve them.

The Laplace transform method was used in [1] to solve linear ordinary and partial differential equations of fractional order. The Adomian decomposition method (ADM) was used in [2] to solve a system of non linear fractional differential equations. The fractional reduced differential transform method (FRDTM) was applied to the Klein-Gordon differential equation of fractional order in [3].

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