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Tie Zhang, Can Tong

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A remark on the fractional order differential equations

Tie Zhang*, Can Tong

Department of Mathematics, Northeastern University, Shenyang 110004, China

Abstract

An important solving method was presented in article [J. Comp. Appl. Math. 236 (2012) 2754–2762] which shows that: "The exact solution of a fractional order differential equation can be obtained by means of the solution of an integer order differential equation". This article and its method have been cited by many researches. In this paper, we will show that this solving method is wrong, and then we use several counter-examples to disconfirm this solving method.

Keywords: Fractional differential equation; solving method; counter-example

2000 MSC: 23A33, 26A33, 34A99

1. Introduction

In recent years, the study of fractional order differential equations has attracted much attention in the field of differential equations and mathematical modeling. The authors in [2, Theorem 5] gave a solving method which shows that: "The exact solution of a fractional order differential equation can be obtained by means of the solution of the corresponding integer order differential equation". This is a surprising result and article [2] and its method have been cited by many researches [1, 3, 4, 5, 6, 8, 9, 11, 12, 13, 14, 16, 17, 18, 19, 20]. In particular, based on the method and result given in [2, Theorem 5], the author in [6] derived a new method for finding the exact solution of a class of fractional order differential equations. We know that the study of integer order differential equations is more mature and simple than that of fractional order differential equations. Therefore, if this solving method given in [2] is correct, the study of fractional

*Corresponding author at: Department of Mathematics, Northeastern University, Shenyang 110004, China. *E-mail address* : zhangt@mail.neu.edu.cn (T. Zhang). Tel & Fax: +86-024-83680949.

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