Existence and Uniqueness for Nonlinear Multi-variables Fractional Differential Equations

J.M. Yu [1*], Y.W. Luo [2], S.B. Zhou [3] and X.R. Lin [3]

[1] *Key Laboratory of Network Control & Intelligent Instrument of Ministry of Education,*
Chongqing University of Posts and Telecommunications, Chongqing, 400065, PR China
[2] *Department of Mathematics and Computer Science, Guangxi Teacher Education University,*
Naning Guangxi, 530023
[3] *College of Computer Science, ChongQing University, ChongQing, 400044, China*

Abstract: The existence and uniqueness of solutions of nonlinear multi-variables fractional differential equations have been investigated. Using Schauder fixed points theorems and Global contraction mapping theory, we obtain two results concerning the existence and uniqueness of solutions respectively. Moreover, our results are more general than in [8].

Keywords: *existence and uniqueness; nonlinear multi-variables fractional differential equations; Schauder fixed points theorems.*

Mathematics Subject Classification (2000): 35G99, 35A05.

1 Introduction

In recent years, interest has increased concerning the fractional differential equations [5, 13, 26]. Most of works are devoted to the solvability of linear fractional equations in terms of special functions [1, 7] and to problems of analyticity in the complex domain [6]. There are also some studies on the solution of nonlinear differential equations [8]–[11] and [20]. D. Delbosco argues nonlinear fractional equation [11]. E. Ahmed has investigated the fractional-order Lotka–Volterra predator-prey system [20]. Very few contributions exist, as far as we know, concerning nonlinear multi-variables fractional equations of the form

---

* Corresponding author: mailto:zdyjm@163.com