Existence of the Solution for Discontinuous Fuzzy Integro-differential Equations and Strong Fuzzy Henstock Integrals

Yabin Shao [1,2*] and Huanhuan Zhang [2]

[1] *College of Mathematics, Sichuan University, Chengdu, 610065, P. R. China*
[2] *College of Mathematics and Computer Science, Northwest University for Nationalities, Lanzhou, 730030, P. R. China*

Abstract: In this paper, we use convergence theorem and the properties of strong fuzzy Henstock integrals to establish some existence theorems of solution for a kind of the discontinuous fuzzy integro-differential equations. The results are generalizations of earlier investigation for continuous fuzzy systems.

Keywords: *fuzzy number; existence of solution; discontinuous fuzzy integro-differential equations; strong fuzzy Henstock integrals.*

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1 Introduction

Differential equations are used for modeling of various physical phenomena. Unfortunately, many problems are dynamical and too complicated and accurate differential equation model for such problems requires complex and time consuming algorithms hardly implementable in practice. Thus, a usage of fuzzy mathematics seems to be appropriate. In recent years, the fuzzy set theory introduced by Zadeh [5] has emerged as an interesting and fascinating branch of pure and applied sciences. The applications of fuzzy set theory can be found in many branches of science such as physical, mathematical, differential equations and information science.

The Cauchy problems for fuzzy differential equations have been studied by several authors [16,21–23,25,26] on the metric space (E^n, D) of normal fuzzy convex set with the distance D given by the maximum of the Hausdorff distance between the corresponding

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∗ Corresponding author: `mailto:yb-shao@163.com`