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On Some New Forms of Fsgb-Continuous Mappings in Fuzzy Topological Spaces.

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Abstract

This article introduces the new class of functions called stronger forms of fuzzy strongly generalized b-continuous mappings namely strongly fsgb-continuous , perfectl fsgb-continuous and completely fsgb-continuous functions on fuzzy topological spaces. We investigate some of their characterization and also the connection between the mappings.

Keywords: fb-OS, fsgb-CS , fg-OS ,FS ,strongly fsgb-ℂℕ , perfectly fsgb- ℂℕ and completely fsgb- ℂℕ.

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1.Introduction

Zadeh[10] developed the fundamental idea of fuzzy sets. Fuzzy topology was first introduced by C.L.Chang[6]. The theory of FTS was developed by several scholars. The concept of b-open sets in general topology was first developed by Andrejevic[1].

Jenifer and Megha introduced the fsgb-closed sets concepts in [7] and also the concept of fsgb-continuous , fsgb-irresolute, fsgb-open and fsgb-closed mappings in FTS[8]. The development of FTS has been aided by numerous researchers, including P. Sundaram, K. K. Azad, M. N. Mukharjee, and others.The objective of this article is introduce and investigate some stronger forms of fuzzy strongly generalized b-continuous functions namely strongly fsgb-continuous , perfectly fsgb-continuous and completely fsgb-continuous mappings in FTS

2. Preliminaries

Throughout this study(L,τ),(M,σ) and (N,γ)(or simply L,M and N) are fuzzy topological spaces(in-short as fts). The closure , interior and compliment of a fuzzy subset P of (L,τ) are denoted by *Cl(P)*,*Int(P)* and P^c respectively.

2.1 Definition [3] A fuzzy set P in a fts L is called fuzzy b-open set(fb-OS) iff $P \leq (IntCl(P) \vee ClInt(P))$.

2.2 Definition [3] Fuzzy b-interior and fuzzy b-closure of a Fuzzy set P is given by

(i) bInt(P) = $\vee\{Q: Q$ is a fb-open set of L and $P \geq Q\}$.

(ii) bCl(P) = $\wedge\{R: R$ is a fb-closed set of L and $R \geq P\}$.

2.3Definition [7]A fuzzy set P in a fts L is called a fsgb-closed set(fsgb-CS) if $bCl(P) \leq Q$, whenever $P \leq Q$ and Q is fuzzy generalized open set(fg-OS) in L.

2.4Definition [7] A fuzzy set P in a fts L is called a fsgb-open set(fsgb-OS) if $bInt(P) \geq Q$, whenever $P \geq Q$ and Q is fg -OS in L.

2.5Definition Let L, M be 2 FTS . A mapping $g: L \to M$ is known as

i)f-continuous map(in short f-ℂℕ map)[3] if $g^{-1}(P)$ is fuzzy-OS in L , for every f-OS P of M.

ii)f-completely continuous map(in short fc-ℂℕ map)[9] if $g^{-1}(P)$ is fuzzy regular open set in L , for every f -OS P in M.

iii) f-perfectly continuous map(in short fp-ℂℕ map)[3] if $g^{-1}(P)$ is f-OS and f-CS in L , for every f-OS P in M.

iv) fuzzy strongly generalized b-continuous(in short fsgb- ℂℕ map)[7] if $g^{-1}(P)$ is fsgb-CS in L, for every f-CS P in M.

) Fuzzy strongly generalized b-irresolute(in short fsgb-irr)[7] if $g^{-1}(P)$ is fsgb-CS in L for every fsgb-CS P in M.

3. Strongly Fsgb-continuous mappings in FTS.

Defintion3.1: A mapping $g: L \to M$ is strongly fsgb-continuous (in short strongly fsgb- ℂℕ) if and only if the inverse of every fsgb-OS in M is f-OS in L.

Theorem3.2: A mapping $g: L \to M$ is strongly fsgb- ℂℕ map if and only if the inverse of every fsgb-CS in M is f-CS in L.

Proof: Consider that g is strongly fsgb- ℂℕ map. Let P be fsgb-CS in M. Then 1-P is fsgb-OS in L.As g is strongly fsgb-ℂℕ , $g^{-1}(1-P)$ is f-OS in L. And $g^{-1}(1-P) = 1 - g^{-1}(P)$, so $g^{-1}(P)$ is f-CS in L.

Conversely, consider that the inverse of every fsgb-CS in M is f-CS in L. Let Q be fsgb-OS in M, then 1-Q is fsgb-CS in M. By proposition, $g^{-1}(1-P)$ is f-CS in L. And $g^{-1}(1-Q) =$

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MODIFIED NUMERICAL TECHNIQUE FOR FRACTIONAL DELAY DIFFERENTIAL EQUATIONS VIA TAYLOR WAVELETS

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ABSTRACT. This paper presents modified numerical technique for solving fractional delay differential equations (FDDEs) based on Taylor wavelets. The exact formula in the RLFI (Riemann Liouville fractional integral) sense is utilized to reduce the computing problem into a system of algebraic equations and can be solved with suitable solver easily. Several examples are solved in order to show the accuracy, efficiency and applicability of the scheme.

Keywords: Fractional delay differential equations; Taylor wavelets; Riemann Liouville fractional integral; Numerical solution.

1. INTRODUCTION

In recent years, many scientist and researchers have paid special interest to the fractional calculus as it has abundant applications in various branches of science and engineering such as automatic control systems, networks, biology, long transmission lines, medicine, economics, biology, traffic model, signal processing ,informatics, etc [1]. Fractional differential equations are the generalization of ordinary differential equations to an arbitrary order. The development of fractional differential operators found in [2]. The fractional delay differential equations (FDDEs) are the special kind of delay differential equations where the action on a process not only depending on the current state but also on its previous state. It is because of their nonlocal properties and complexity in nature, obtaining analytical solutions for such FDDE is difficult task. Therefore constructing the efficient numerical methods plays very essential role for the approximate solutions of FDDEs. Wavelet theory is relatively new and emerging area in the applied mathematical research [3]. It is one of the powerful tools for obtaining the numerical solutions and has applications in optimal

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