Hacettepe Journal of Mathematics and Statistics
Volume 40 (2) (2011), 341 – 348

UPPER AND LOWER NA-CONTINUOUS MULTIFUNCTIONS

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Received 21 : 06 : 2010 : Accepted 04 : 04 : 2011

Abstract

The aim of this paper is to introduce a new class of continuous multifunctions, namely upper and lower na-continuous multifunctions, and to obtain some characterizations concerning upper and lower na-continuous multifunctions. The authors investigate the graph of upper and lower na-continuous multifunctions, and the preservation of properties under upper na-continuous multifunctions. Also, the relationship between upper and lower na-continuous multifunctions and some known types of continuous multifunctions are discussed.

Keywords: α-open sets, δ-open sets, multifunctions, α-compact spaces, δ-connected spaces.

2010 AMS Classification: 54 C 60, 54 C 10.

Communicated by Lawrence M. Brown

1. Introduction

One of the important and basic topics in the theory of classical point set topology and in several branches of mathematics, which has been investigated by many authors, is continuity of functions. This concept has been extended to the setting of multifunctions. A multifunction, or multivalued mapping, has many applications in mathematical programming, probability, statistics, fixed point theorems and even in economics. There are several weak and strong variants of continuity of multifunctions in the literature, for instance continuity [11], strong continuity [2] and super continuity [1].

In 1986 Chae and Noiri [5] introduced the concept of na-continuous functions, and some of its properties were given by the authors. A function $f : (X, \tau) \to (Y, \vartheta)$ is said to be *na-continuous* if for each point $x \in X$ and each α-open set V in Y containing $f(x)$, there exists a δ-open set U in X containing x such that $f(U) \subseteq V$. The purpose of this paper is to extend this concept to multifunctions, and to discuss the results obtained.

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