Mathematical and Computer Modelling 54 (2011) 2597–2601

Contents lists available at SciVerse ScienceDirect

Mathematical and Computer Modelling

journal homepage: www.elsevier.com/locate/mcm

Mixed θ-continuity on generalized topological spaces

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ARTICLE INFO

Article history:
Received 25 March 2011
Received in revised form 13 June 2011
Accepted 14 June 2011

Keywords:
Mixed weak continuity
Mixed θ-continuity
Mixed faint continuity
(ν_1, ν_2)-regular
G-regular

ABSTRACT

We introduce and investigate the notions of mixed $\theta(\mu, \nu_1\nu_2)$-continuous functions and mixed faintly $(\mu, \nu_1\nu_2)$-continuous functions between a generalized topology μ and two generalized topologies ν_1, ν_2. We investigate relationships between such two continuities and another mixed continuity on generalized topological spaces.

1. Introduction

Császár [1] introduced the notions of generalized topology and generalized open sets. He also introduced the notions of continuous functions and associated interior and closure operators on generalized topological spaces. In [2], he introduced and investigated the notions of mixed generalized open sets ((ν_1, ν_2)-*semiopen*, (ν_1, ν_2)-*preopen*, (ν_1, ν_2)-β'-*open*) on two generalized topologies. Császár and Makai jr. [3] modified the notions of δ and θ by mixing two generalized topologies. In the same way, the author introduced and investigated the notion of mixed weak $(\mu, \nu_1\nu_2)$-continuity [4] between a general topology μ and two generalized topologies ν_1, ν_2. The purpose of this paper is to introduce and investigate the notions of mixed $\theta(\mu, \nu_1\nu_2)$-continuity and mixed faint $(\mu, \nu_1\nu_2)$-continuity between a generalized topology μ and two generalized topologies ν_1, ν_2. In particular, we investigate characteristics of the continuities and relationships among mixed θ-continuity, mixed faint continuity and mixed weak continuity on general topological spaces.

2. Preliminaries

Let X be a nonempty set, and let μ be a collection of subsets of X. Then μ is called a *generalized topology* (briefly GT) [1] on X if $\emptyset \in \mu$ and $G_i \in \mu$ for $i \in I \neq \emptyset$ implies $G = \cup_{i\in I} G_i \in \mu$. We say that the GT μ is *strong* [3] if $X \in \mu$. We call the pair (X, μ) a *generalized topological space* (briefly GTS) on X. The elements of μ are called μ-*open* sets and the complements are called μ-*closed* sets. The generalized-closure of a subset A of X, denoted by $c_\mu(A)$, is the intersection of generalized closed sets including A. The interior of A, denoted by $i_\mu(A)$, is the union of generalized open sets included in A. Let μ be a GT on a nonempty set X and $P(X)$ the power set of X. Let us define the collection $\theta(\mu) \subseteq P(X)$ by $A \in \theta(\mu)$ iff for each $x \in A$, there exists $M \in \mu$ such that $c_\mu M \subseteq A$ [5]. Then $\theta(\mu)$ is also a GT included in μ [5]. The elements of $\theta(\mu)$ are called θ-*open* sets and the complements are called θ-*closed* sets. Simply, $\theta(\mu)$ is denoted by θ.

Let (X, μ) be a GTS and $A \subseteq X$. We mention here the following notations:

$c_\theta(A) = \cap\{F \subseteq X : A \subseteq F, F$ is θ-closed F in $X\}$ [6];

$i_\theta(A) = \cup\{V \subseteq X : V \subseteq A, V$ is θ-open V in $X\}$ [6];

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0895-7177/$ – see front matter
doi:10.1016/j.mcm.2011.06.032