

On lower level subsets of Anti Fuzzy Γ -Ideals in Γ -CI-Algebras

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ABSTRACT— *The purpose of this paper is to introduce the notion of a lower level subsets of anti fuzzy Γ -ideals in Γ -CI-algebras, we study lower level subsets, level subsets, upper sets, fuzzy and anti fuzzy Γ -ideals in Γ -CI-algebras. Those are extended from lower level subsets, level subsets, upper sets, fuzzy and anti fuzzy ideals in CI-algebras respectively. Some characterizations of lower level subsets, level subsets, upper sets, fuzzy and anti fuzzy fuzzy Γ -ideals in Γ -CI-algebras are obtained.*

Keywords— Γ -CI-algebra, Γ -ideal, upper set, level subset, lower level subset, fuzzy Γ -ideal, anti fuzzy Γ -ideal.

1. INTRODUCTION

In what follows, let X denote an CI-algebra unless otherwise specified. By an CI-algebra we mean an algebra $(X; *, 1)$ of type $(2, 0)$ with a single binary operation “ $*$ ” that satisfies the following identities: for any $x, y, z \in X$,

1. $x * x = 1$,
2. $1 * x = x$,
3. $x * (y * z) = y * (x * z)$.

In, 2006, H. S. Kim and Y. H. Kim defined a BE-algebra. Biao Long Meng, defined notion of CI-algebra as a generation of a BE-algebra [9]. BE-algebras and CI-algebras are studied in detail by some researchers [3, 7, 9, 11] and some fundamental properties of CI-algebra are discussed.

The concept of an ordered Γ -CI-algebras was first given by Pairote Yiarayong and Phakakorn Panpho in [12] which is in fact the generalization of a CI-algebras.

In this paper is to introduce the notion of a Γ -CI-algebras, we study lower level subsets, level subsets, upper sets, fuzzy and anti fuzzy Γ -ideals in Γ -CI-algebras. Those are extended from lower level subsets, level subsets, upper sets, fuzzy and anti fuzzy ideals in CI-algebras respectively. Some characterizations of lower level subsets, level subsets, upper sets, fuzzy and anti fuzzy fuzzy Γ -ideals in Γ -CI-algebras are obtained.

2. BASIC PROPERTIES

In this section we refer to [12, 13] for some elementary aspects and quote few definitions and examples which are essential to step up this study. For more detail we refer to the papers in the references.

Definition 2.1. [12, 13] Let X and Γ be any nonempty sets. If there exists a mapping $X \times \Gamma \times X \rightarrow X$ written as (x, γ, y) by $x\gamma y$, then $(\Gamma, X; 1)$ is called a Γ -CI-algebra if

1. $x\gamma x = 1$ for all $x \in X$ and $\gamma \in \Gamma$,
2. $1\gamma x = x$ for all $x \in X$ and $\gamma \in \Gamma$,
3. $x\gamma(y\beta z) = y\gamma(x\beta z)$