

A New Interpretation of Multi-Polarity Fuzziness Subalgebras of BCK/BCI-Algebras

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ABSTRACT

In this paper, as a further generalization of m -polar fuzziness subalgebras, we present the conception of an m -polar (ω, θ) -fuzzy subalgebra in BCK/BCI-algebras and discuss some interesting properties of it. We define an m -polar $(\in_{\hat{p}}, \in_{\hat{p}} \vee q_{\hat{\delta}})$ -fuzzy subalgebras and explore some of its significant attributes. Certain features of m -polar $(\in_{\hat{p}}, \in_{\hat{p}} \vee q_{\hat{\delta}})$ -fuzzy subalgebras are established.

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1. Introduction

In 1966, Imai and Iséki created two algebraic structures known as ‘BCK/BCI algebras’ [1,2]. Since then, the concept and the generalizations have been researched in a variety of ways. Some classifications of BCK/BCI-algebras are considered in [3–6]. The theory of fuzzy sets, which was initiated by Zadeh in his pioneering paper [7] in 1965, was applied by many researchers to discuss the phenomena of uncertainty and vagueness in real life problems. In 1994, Zhang [8] gave a remarkable generalization of Zadeh’s fuzzy set and presented the bipolar fuzzy sets. The various features of bipolar information in algebraic structures are considered in [9–12]. To deal with multi information in the fuzzy set theory, Chen et al. [13] gave the notation of multi polar valued function and constructed m -polar fuzzy (m - \mathcal{F}) sets. After the introduction of m - \mathcal{F} sets by Chen et al., m - \mathcal{F} set theory has become an active area of research in various fields such as lie algebras [14,15], ordered semihypergroups [16], subgroups [17], BCK/BCI-algebras [18–20]. For more studies related to BCK and BCI algebraic structures, see [21].

Fuzzy groups were introduced in 1971 due to Rosenfeld [22] while Bhakat and Das worked on fuzzy group of type $(\in, \in \vee q)$ based on point fuzzy set in groups [23]. Jun, Muhiuddin and Al-Roqi worked on fuzzy subalgebra of type (α, β) based on point fuzzy set in BCK/BCI-algebras [24–26]. In this side, Ibrara et al. [27], Dudek et al. [28] and Narayanan

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