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Characterizations of interior hyperideals of semihypergroups towards fuzzy points

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Abstract

Using a generalized version of the notion of quasi-coincidence of a fuzzy point, we discuss on a generalization of $(\in, \in \vee q)$-fuzzy interior hyperideal, called $(\in, \in \vee q_k)$-fuzzy interior hyperideal in a semihypergroup. Also, we characterize this notion in different ways. Specially, by using a fuzzy subset of a semihypergroup, we discuss on the generated $(\in, \in \vee q_k)$-fuzzy interior hyperideal.

Keywords: Semihypergroup, Interior hyperideal, Quasi-coincidence, $(\in, \in \vee q_k)$-fuzzy interior hyperideal
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1 Preliminaries and Notations

In this section, for the purpose of reference, we present some definitions and results about semihypergroups and fuzzy sets on which our research in this paper is based.

A *hypergroupoid* [1] is a non-empty set S together with a map $\cdot : S \times S \longrightarrow \mathcal{P}^*(S)$ where $\mathcal{P}^*(S)$ denotes the set of all the non-empty subsets of S. The image of the pair (x, y) is denoted by $x \cdot y$. If $x \in S$ and A, B are non-empty subsets of S, then $A \cdot B$ is defined by $A \cdot B = \cup_{a \in A, b \in B} a \cdot b$. Also $A \cdot x$ is used for $A \cdot \{x\}$ and $x \cdot A$ for $\{x\} \cdot A$. A hypergroupoid $(S, \cdot)$ is called a *semihypergroup* if $(x \cdot y) \cdot z = x \cdot (y \cdot z)$, for all $x, y, z \in S$. A non-empty subset $\mathcal{I}$ of a semihypergroup S is called a *subsemihypergroup* if $\mathcal{I} \cdot \mathcal{I} \subseteq \mathcal{I}$. A subsemihypergroup $\mathcal{I}$ of a semihypergroup S is called *interior hyperideal* if, for all $x, y \in S$ and $a \in \mathcal{I}$, we have $x \cdot a \cdot y \subseteq \mathcal{I}$. Let S and S' be semihypergroups. A function $f : S \longrightarrow S'$ is called a *homomorphism* if it satisfies the condition $f(x \cdot y) = f(x) \cdot f(y)$, for all $x, y \in S$.

According to [6], a function $\mu : X \longrightarrow [0, 1]$ is called a *fuzzy subset* of X. Let f be a mapping from a set X to a set Y and μ, λ be fuzzy subsets of X and Y, respectively. Then the *homomorphic preimage* $f^{-1}(\lambda)$ and *homomorphic image* $f(\mu)$ are fuzzy sets in X and Y, respectively, defined by $f^{-1}(\lambda)(x) = \lambda(f(x))$ and

$$f(\mu)(y) = \begin{cases} \sup\{\mu(x) \mid x \in f^{-1}(y)\} & \text{if } f^{-1}(y) \neq \emptyset, \\ 0 & \text{otherwise}, \end{cases}$$

for all $x \in X$ and $y \in Y$.

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