p-Fuzzy quasi-hypergroups obtained from fuzzy binary relations*

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Abstract

On a set H equipped with a fuzzy binary relation R which is reflexive, we first introduce a family of hyperoperations $*_{R_p}$ where $p \in [0,1]$. As a result we obtain a family of commutative quasi-hypergroup $\langle H; *_{R_p} \rangle$. Then we show that for every $a, b \in H$ the family $\{a *_{R_p} b\}_{p\in[0,1]}$ can be considered as the p-cuts of a fuzzy set $a *_R b$ and in this manner we synthesize a fuzzy hyperoperation $*_R$ and we show $\langle H; *_R \rangle$ is a p-fuzzy quasi-hypergroup. Lastly, we prove that any fuzzy hyperoperation satisfying some given properties also has the same properties as this fuzzy hyperoperation.

Keywords and phrases : *Fuzzy hyperoperation, p-fuzzy quasi-hypergroup, fuzzy binary relation.*

1. Introduction

The association between hyperstructures and binary relations has been studied by many reachers (for instance [1, 2, 4-7, 9, 10, 13, 15, 17, 18]). Chvalina [1, 2], and Hort [13] use ordered structures for the construction of semihypergroups and hypergroups. Stefanos Spartalis constructs H_v-semigroup, semihypergroup and H_v-group by the use of a binary relation. Corsini and Leoreanu [6] study hypergroups and binary relations. Feng has studied the connection between hyperstructures and fuzzy binary relations in [12].

In this paper we do the following. On a set H equipped with a fuzzy binary relation R which is reflexive, we first generalize the $\circ$ hyperoperation (introduced by Rosenberg [17] and studied by Corsini and Leoreanu [5]) and introduce a family of hyperoperations $*_{R_p}$ where $p \in [0,1]$. As

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