On enumeration of complete semihypergroups and M-P-Hs.

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Abstract

In this paper, we compute the number of complete semihypergroups generated by semigroups of order 2 or 3. Also, we enumerate M-polysymmetrical hypergroups of order less than 6. We show that there are 7 isomorphism classes of M-polysymmetrical hypergroups of order 5 and calculate Cayley tables of them.

Keywords: complete semihypergroup, polysymmetrical hypergroup, semigroup.
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1 Introduction

The concept of a hyperstructures first was introduced by Marty at the 8^{th} international Congress of Scandinavian Mathematicians. The hyperstructure theory had applications to several domains of theoretical and applied mathematics[4, 5].

In [7] and [6] introduced K_H-hypergroups; particularly studied the relations of similitude in K_H-hypergroups. De Salvo [8] computed the number of K_H-hypergroups of given size $n \leq 4$.

J. Mittas in his paper[9], which has been announced in the French Academy of Sciences, has introduced a special type of hypergroup that he has named polysymmetrical. Polysymmetrical hypergroups are special class of K_H-hypergroups. Also, in the same paper J. Mittas has given certain fundamental properties of this hyperstructure.

Staring from the above paper and having called Mittas structure M-polysymmetrical hypergroup (in order to distinguish this polysymmetrical hypergroup from other types of polysymmetrical hypergroups) we have proceeded to a profound analysis of this hypergroup[10] and its subhypergroups[11].

We recall the construction of K_H-(semi)hypergroups[6]: let $(H, \circ)$ be a (semi)hypergroup and $\{A_a | a \in H\}$ a family of non-empty and pairwise disjoint sets, having as indexes the elements of H; the the set $K = \cup_{a \in H} A_a$ becomes a (semi)hypergroup under the following hyperoperation:

$$x * y = \cup_{c \in a \circ b} A_c, \ \forall x \in A_a, \ y \in A_b.$$

We say the $(K, *)$ is a K_H-(semi)hypergroup, generated by the (semi)hypergroup H.

If $(K, *)$ is a K_H-semihypergroup and H be a semigroup then we say that $(K, *)$ is a complete semihypergroup and $K/\beta^* \cong H$.

We recall definition of M-polysymmetrical hypergroup of [11] as follows:

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