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Strongly regular relations of arithmetic functions

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Abstract

A simple, but very useful concept in number theory is that of an arithmetic function. On the other hand, hyperstructure theory, first introduced by Marty, is a generalization of group theory and it is connected to different fields of mathematics. In our paper, we present a link between the theories of algebraic structures, hyperstructures and arithmetic functions. More precisely, we present hyperstructures of arithmetic functions and determine their fundamental groups and fundamental rings. Moreover, we study their complete parts and strongly regular relations.

Keywords and phrases: arithmetic function, fundamental group, complete part, strongly regular relation, fundamental ring.

AMS Mathematics Subject Classification: 20N20.

1 Introduction

The hypergroup notion was introduced in 1934 at the 8th Congress of Scandinavian Mathematicians. Where F. Marty [11], the pioneer of hyperstructure theory, gave the definition of hypergroup as a natural generalization of the concept of group based on the notion of hyperoperation. The binary operation of two group elements is a group element whereas the binary hyperoperation of two hypergroup elements is a subset of the hypergroup. The work on this theory started with some published notes by Marty on hypergroups; using them in different contexts: algebraic functions, rational fractions, non commutative groups. Since then, after the research area was enlarged, many generalizations and connections of the theory to other fields were studied and interesting results on hyperstructures were obtained. The hyperstructures are studied from the theoretical point of view and for their applications to many subjects of pure and applied mathematics: geometry, topology, cryptography and code theory, graphs and hypergraphs, probability theory, binary relations, theory of fuzzy and rough sets,

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