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On generalization of derivation on MV-algebras

Leili Kamali Ardekani*
University of Ardakan

Abstract

In this paper, we extend the notion of derivation on MV-algebras. Moreover, we introduce four types of f-derivation on MV-algebras as a generalization of derivation and obtain some related results. Also, some connections among different types of f-derivation is studied.

Keywords: MV-Algebra, Boolean algebra, Derivation, f-Derivation, Isotone.
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1 Introduction

The notion of derivation, introduced from the analytic theory is helpful to the research of structure and property in algebraic systems. Jun and Xin [4] applied the notion of derivation to BCI-algebras, which is defined in a way similar to the notion in ring theory, and investigated some properties related to this concept. In [8] and [5], authors introduced the notion of f-derivation and (f, g)-derivation in BCI-algebras, respectively. In [7], Szász introduced the concept of derivation on lattices and investigated some of its properties. Then, f-derivation on lattices were defined and studied in [2].

In [1], Alshehri applied the notion of derivation to MV-algebras and investigated some of its properties. After in [3, 6], the notion of derivation and generalization of it on MV-algebras is studied.

In this paper, we review some notions related to MV-algebras. Also, we recall and introduce some of types of f-derivation on MV-algebras as a generalization of derivation. Then, we obtain some related results.

Definition 1.1. An *MV-algebra* is a structure $(M, \oplus, *, 0)$ where M is a non-empty set, "$\oplus$" is a binary operation, "$*$" is a unary operation, and "0" is a constant such that the following axioms are satisfied for any $a, b \in M$,

($MV1$) $(M, \oplus, 0)$ is a commutative monoid;

($MV2$) $(a^*)^* = a$;

($MV3$) $0^* \oplus a = 0^*$;

($MV4$) $(a^* \oplus b)^* \oplus b = (b^* \oplus a)^* \oplus a$.

*Speaker