A prefilter generated by a set in EQ-algebras

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Abstract

In this paper we introduce the notion of a prefilter generated by a nonempty subset of an EQ-algebra E and we investigate some properties of it. After that by some theorems we characterize a generated prefilter.Then by constituting the set of all prefilters of an EQ-algebra E denoted by $PF(E)$, we show that it s an algebric lattice. Finally, we prove that, the set of all principle prefilters of an ℓEQ-algebra E is a sublattice of $PF(E)$.

Keywords: (Good, separated) EQ-algebra, ℓEQ-algebra.
Mathematics Subject Classification [2010]: 03G1, 03G05

1 Introduction

V. Novák and B. De Baets introduced a spacial algebra called EQ-algebra in [5]. An EQ-algebras have three binary (meet, multiplication and a fuzzy equality) and a top element and also a binary operation implicatin is drived from fuzzy equality. Its implication and multiplication are no more closely tied by the adjunction and so, this algebra generalizes commutative residuated lattice. These algebras intended to develop an algebric structure of truth values for fuzzy type theory. EQ-algebras are interesting and important algebra for studing and researching and also residuated lattices [3] and BL-algebras [1, 4, 7] are particular casses of EQ-algebras.

Definition 1.1. [2] An algebra $(E, \wedge, \otimes, \sim, 1)$ of type $(2, 2, 2, 0)$ is called an EQ-algebra where for all $a, b, c, d \in E$:
$(E1)$ $(E, \wedge, 1)$ is a $\wedge$-semilattice with top element 1. We set $a \leq b$ iff $a \wedge b = a$,
$(E2)$ $(E, \otimes, 1)$ is a monoid and $\otimes$ is isotone in both arguments w.r.t. $a \leq b$,
$(E3)$ $a \sim a = 1$, (reflexivity axiom)
$(E4)$ $(a \wedge b) \sim c) \otimes (d \sim a) \leq c \sim (d \wedge b)$, (substitution axiom)
$(E5)$ $(a \sim b) \otimes (c \sim d) \leq (a \sim c) \sim (b \sim d)$, (congruence axiom)
$(E6)$ $(a \wedge b \wedge c) \sim a \leq (a \wedge b) \sim a$, (monotonicity axiom)
$(E7)$ $a \otimes b \leq a \sim b$,
for all $a, b, c \in E$.

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