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Modified Hybrid Fuzzy Algebra: MF-Algebra

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Abstract
The principles of modified hybrid fuzzy algebras (MF-Algebra) are introduced in this study. The notions of hybrid fuzzy algebra and several properties related to these ideas are investigated. This work investigates the connections between fuzzy algebra and fuzzy subalgebra.

Keywords: Fuzzy graphs, fuzzy hyper-graph, Fuzzy dual graph, interval valued, Intuitionistic

Introduction
Imai and Iseki published the initial research on BCK/BCI algebras as an extension of set-theoretic difference and propositional calculus in 1966 [6, 7]. According [14] invented B-algebras, which are related to a number of well-known algebras such as BCI/BCK-algebras. The authors [5, 10-19] proposed interval-valued intuitionistic fuzzy closed ideals of BG-algebras, intuitionistic L-fuzzy ideals, and intuitionistic fuzzy subalgebra, as well as some of their essential properties.

Since Zadeh [12] established the idea of a fuzzy subset of a set in 1965, scientists have been interested in extending the conceptions and discoveries of every mathematical concept to the boundary framework of fuzzy settings. Imai and Iseki [6] translated set theoretic difference and propositional calculus into BCK-algebras, and Iseki [7] created BCI-algebra, which is an extension of BCK-algebra [10]. Used the fuzzy set notion to produce fuzzy subalgebra and fuzzy ideals in BCK-algebra. Neggers and Kim [9] investigated the link between d-algebras and BCK-algebras in 1996 and discovered that the d-algebra class is a subset of BCK-algebras.

Akram and Dar [1] developed fuzzy d-algebra, fuzzy subalgebra, and fuzzy d-ideals of d-algebra. Kim introduced the concept of fuzzy dot subalgebra in d-algebra in [8]. In a d-algebra, Al-Shehrie [2] popularised the concept of fuzzy dot d-ideals. Un and colleagues [11]. By extending the concept of intuitionistic fuzzy set to d-algebra, fuzzy d-algebra and intuitionistic fuzzy topological d-algebra were created. According to Ravi [18-19] also compared various fuzzy graphs compared to algebra and other related fuzzy concepts. In this paper, we proposed the notions of intuitionistic fuzzy dot subalgebra and intuitionistic fuzzy dot d-ideals of d-algebra and investigated a variety of intriguing properties. This article provides an overview of fuzzy graphs and its variants. This section will only examine the types of fuzzy graphs, not their operations or properties. Section 2 deals to the basic preliminaries with notations.

Preliminaries
This section contains some key aspects relevant to this topic. Kim & Kim discovered a major family of logical algebras known as BG-algebras, which has subsequently been thoroughly explored by numerous researchers. This algebra is defined further down.

Notations
Subalgebra – Sῳ
Fuzzy subset – FS
Intuitionistic fuzzy set - IFS
Intuitionistic fuzzy – IF
Non-empty set –NES

non-empty subset- NESS

A BG- algebra is a NES with the binary operation * and constant 0 that obeys the following axioms.

1. $\beth * \beth = 0$
2. $\beth * 0 = \beth$

$(\beth * \delta) * (0 * \delta) = \beth$, for all $\beth, \delta$□$\beth$.

A Sῴ is a NES S of a BG-algebra $\beth$ is called a Sῴ of $\beth$ if $\beth * \delta$□S for any $\beth$, δ□S.

If $\beth$ is the common name $\beth$ for a group of items, then a fuzzy set $\beth$ in is defined as A={<$\beth$, $\mu(\beth)$>::$\beth$□$\beth$}, where $\mu(\beth)$ is called the membership value of $\beth$ in μ and $0 \leq \mu(\beth) \leq 1$.

In BG-algebra $\beth$, a fuzzy set μ is referred to as a fuzzy Sῴ of $\beth$ if $\mu(\beth * \delta) \geq low\{\mu(\beth), \mu(\delta)\}$ for all $\beth, \delta$□$\beth$.

Definition 1. A d-algebra is a NES with a binary operation and a constant 0 that meets the following axioms.

$\beth * \beth = 0$

$0 * \beth = 0$

$\beth * \delta = 0$ and $\delta * \beth = 0 \Rightarrow \beth = \delta$ for all $\beth, \delta \in \beth$. For brevity we also call $\beth$ a d-algebra.

Definition 2. A NESS S of a d-algebra $\beth$ is called a Sῴ of $\beth$ if $\beth * \delta \in S$, for all $\beth, \delta \in S$.

Definition 3. A NESS I of a d-algebra $\beth$ is called an ideal of $\beth$ if γ δ

$0 \in I$

$\beth * \delta \in I$ and $\delta \in I \Rightarrow \beth \in I$

$\beth \in I$ and $\delta \in \beth \Rightarrow \beth * \delta \in I$.

Definition 4. A FS μ of $\beth$ is called a fuzzy dot Sῴ of a d-algebra $\beth$ if for all $\beth, \delta \in \beth$, $\mu(\beth * \delta) \geq \mu(\beth).\mu(\delta)$, where. (dot) denotes ordinary multiplication.

Definition 5. A fuzzy subset μ of $\beth$ is called a fuzzy d-ideal of $\beth$ if it satisfies the following conditions:

(i) $\mu(0) \geq \mu(\beth)$

$\mu(\beth) \geq low\{\mu(\beth * \delta), \mu(\delta)\}$

$\mu(\beth * \delta) \geq low\{\mu(\beth), \mu(\delta)\}$.

Definition 6. A FS μ of $\beth$ is called a fuzzy dot d-ideal of $\beth$ if it satisfies the following conditions:

(i) $\mu(0) \geq \mu(\beth)$

$\mu(\beth) \geq \mu(\beth * \delta).\mu(\delta)$

$\mu(\beth * \delta) \geq \mu(\beth).\mu(\delta)$ for all $\beth, \delta \in \beth$.

Definition 7. An intuitionistic fuzzy set (IFS) A of a d-algebra $\beth$ is an object of the form $A = \{< \beth, \mu_A(\beth), \nu_A(\beth) > | \beth \in \beth\}$, where $\mu_A: \beth \rightarrow [0, 1]$ and $\nu_A: \beth \rightarrow [0, 1]$ with the condition $0 \leq \mu_A(\beth) + \nu_A(\beth) \leq 1$, $\forall \beth \in \beth$. The numbers $\mu_A(\beth)$ and $\nu_A(\beth)$ denote respectively the degree of membership and the degree of non-membership of the element $\beth$ in set A. For the sake of simplicity, we shall use the symbol $A = (\mu_A, \nu_A)$ for the IFSA $= \{< \beth, \mu_A(\beth), \nu_A(\beth) > | \beth \in \beth\}$. The function $\pi_A(\beth) = 1 - \mu_A(\beth) - \nu_A(\beth)$ for all $\beth \in \beth$. Here $\pi_A(\beth)$ is called the degree of hesitance of $\beth \in A$.

Definition 8. If $A = \{< \beth, \mu_A(\beth), \nu_A(\beth) > | \beth \in \beth\}$ and $B = \{< \beth, \mu_B(\beth), \nu_B(\beth) > | \beth \in \beth\}$ are any two IFS of a set $\beth$, then $A \subseteq B$ if and only if for all $\beth \in \beth$, $\mu_A(\beth) \leq \mu_B(\beth)$ and $\nu_A(\beth) \geq \nu_B(\beth)$,

$A = B$ if and only if for all $\beth \in \beth$, $\mu_A(\beth) = \mu_B(\beth)$ and $\nu_A(\beth) = \nu_B(\beth)$, $A \cap B = \{< \beth, (\mu_A \cap \mu_B)(\beth), (\nu_A \cup \nu_B)(\beth) > | \beth \in \beth\}$,

where $(\mu_A \cap \mu_B)(\beth) = low\{\mu_A(\beth), \mu_B(\beth)\}$ and $(\nu_A \cup (\nu_B)(\beth) = upper\{\nu_A(\beth), \nu_B(\beth)\}$, $A \cup B = \{< \beth, (\mu_A \cup \mu_B)(\beth), (\nu_A \cap \nu_B)(\beth) > | \beth \in \beth\}$,

where $(\mu_A \cup \mu_B)(\beth) = upper\{\mu_A(\beth), \mu_B(\beth)\}$ and $(\nu_A \cap \nu_B)(\beth) = low\{\nu_A(\beth), \nu_B(\beth)\}$.

Definition 9. An IFSA $= \{< \beth, \mu_A(\beth), \nu_A(\beth) > | \beth \in \beth\}$ of d-algebra $\beth$ is called an IF Sῴ of $\beth$ if it satisfies the following conditions:

$\mu_A(\beth * \delta) \geq low\{\mu_A(\beth), \mu(\delta)\}$

$\nu_A(\beth * \delta) \leq upper\{\nu_A(\beth), \nu_A(\delta)\}$ for all $\beth, \delta \in \beth$.

Definition 10. An IFSA $= \{< \beth, \mu_A(\beth), \nu_A(\beth) > | \beth \in \beth\}$ of d-algebra $\beth$ is called an IF d-ideal of $\beth$ if it satisfies the following conditions:

$\mu_A(0) \geq \mu_A(\beth)$

$\mu_A(\beth) \geq low\{\mu_A(\beth * \delta), \mu(\delta)\}$

$\mu_A(\beth * \delta) \geq low\{\mu_A(\beth), \mu_A(\delta)\}$ for all $\beth, \delta \in \beth$.

$\nu_A(0) \leq \nu_A(\beth)$

$\nu_A(\beth) \leq upper\{\nu_A(\beth * \delta), \mu(\delta)\}$

$\nu_A(\beth * \delta) \leq upper\{\nu_A(\beth), \nu_A(\delta)\}$ for all $\beth, \delta \in \beth$.

Definition 11. For any IFS $A = \{< \beth, \mu_A(\beth), \nu_A(\beth) > | \beth \in \beth\}$ of $\beth$ and $\zeta \in [01]$, the operator Q: IFS($\beth$) → IFS($\beth$), ◊:

IFS(ℶ) → IFS(ℶ), D_ζ: IFS(ℶ) → IFS(ℶ) are defined as

Q(A) = {< ℶ, μ_A(ℶ), 1 − μ_A(ℶ) > |ℶ ∈ ℶ } is called necessity operator

◊(A) = {< ℶ, 1 −ν_A(ℶ), ν_A(ℶ) > |ℶ ∈ ℶ } is called possibility operator

D_ζ (A) = {< ℶ, μ_A(ℶ) + ζ π_A(ℶ), ν_A(ℶ) + (1 −ζ)π_A(ℶ) > |ℶ ∈ ℶ } is called ζ -Model operator.

Clearly Q(A) ⊆ A ⊆ ◊(A) and the equality hold, when A is a fuzzy set also D_0(A) = Q(A) and D_1(A) = ◊(A). Therefore the ζ -Model operator D_ζ (A) is an extension of necessity operator Q(A) and possibility operator ◊(A).

Definition 12. For any IFS A = {< ℶ, μ_A(ℶ), ν_A(ℶ) > |ℶ ∈ ℶ } of ℶ and for any ζ, ξ ∈ [01] such that ζ +ξ ≤ 1, the (ζ, ξ)- model operator $F_{\zeta,\xi}$: IFS(ℶ) → IFS(ℶ) is defined as $F_{\zeta,\xi}$ (A) = {< ℶ, μ_A(ℶ) +ζ π_A(ℶ), ν_A(ℶ) +ξ π_A(ℶ) > |ℶ ∈ ℶ }, where π_A(ℶ) = 1 − μ_A(ℶ) −ν_A(ℶ) for all ℶ ∈ ℶ. Therefore we can write

$F_{\zeta,\xi}$ (A) as $F_{\zeta,\xi}$ (A)(ℶ) = (μ_Fζ,ξ (A)(ℶ), ν_Fζ,ξ (A)(ℶ))

where μ_Fζ,ξ (ℶ) = μ_A(ℶ) + ζ π_A(ℶ) and ν_Fζ,ξ (A)(ℶ)) = ν_A(ℶ) + ξ π_A(ℶ).

Clearly, $F_{0,1}$(A) = Q(A), $F_{1,0}$(A) = ◊(A) and $F_{\zeta,1-\zeta}$ (A) = D_ζ (A).

Remark

If ℶ and Δ be two d-algebras, then ℶ × ℶ is also a d-algebra under the binary operation ′∗′ defined in ℶ × ℶ by (ℶ, δ) ∗ (p, q) = (ℶ ∗ p, δ ∗ q) for all (ℶ, δ), (p, q) ∈ ℶ × ℶ.

Definition 14. Let A =< μ_A, ν_A > be IF subset of ℶ and ζ, ξ ∈ [0, 1] then (ζ, ξ) cut set of A is $A_{(\zeta,\xi)}$ = {ℶ | ℶ ∈ ℶ, μ_A(ℶ) ≥ ζ and ν_A(ℶ) ≤ ξ }

Lemma 1. If a, b, c, d ∈ [0, 1], then

–low {a, b} ≥ a.b

–upper {a, b} ≤ a + b − a.b

–low {a.b, c.d} ≥ low{a, c}.low{b, d}.

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Definition 15. An IFSA = {< ℶ, μ_A(ℶ), ν_A(ℶ) > |ℶ ∈ ℶ } of d-algebra ℶ is called an IF dot Sῳ of ℶ if it satisfies the following conditions:

μ_A(ℶ ∗ δ) ≥ μ_A(ℶ).μ(δ)

ν_A(ℶ ∗ δ) ≤ ν_A(ℶ) + ν_A(δ) −ν_A(ℶ).ν_A(δ) for all ℶ, δ ∈ ℶ.

Definition 16. An IFSA = {< ℶ, μ_A(ℶ), ν_A(ℶ) > |ℶ ∈ ℶ } of d-algebra ℶ is called an IF dot d-ideal of ℶ if it satisfies the following conditions:

μ_A(0) ≥ μ_A(ℶ)

μ_A(ℶ) ≥ μ_A(ℶ ∗ δ).μ(δ)

μ_A(ℶ ∗ δ) ≥ μ_A(ℶ).μ_A(δ) for all ℶ, δ ∈ ℶ.

ν_A(0) ≤ ν_A(ℶ)

ν_A(ℶ) ≤ ν_A(ℶ ∗ δ) + ν_A(δ) −ν_A(ℶ ∗ δ).ν_A(δ)

ν_A(ℶ ∗ δ) ≤ ν_A(ℶ) + ν_A(δ) −ν_A(ℶ).ν_A(δ) for all ℶ, δ ∈ ℶ.

Example 1. Consider d-algebra ℶ = {0, a, b, c} with the following cayley table.

*	0	e	f	g
0	0	0	0	0
e	e	0	0	E
f	f	f	0	0
g	g	g	e	0

The IF subset E = {< ℶ, μ_A(ℶ), ν_A(ℶ) > |ℶ ∈ ℶ } given by μ_E(0) = μ_E(b) = 0.6, μ_E(a) = μ_E(c) = 0.5 and ν_E(0) = ν_E(a) = 0.3, ν_E(b) = ν_E(c) = 0.4 then it is easy to verify that E = {< μ_E(ℶ), ν_E(ℶ) >} is an IF dot d-ideal of ℶ.

Theorem 1. Every IF d-ideal of d algebra ℶ is an IF dot d-ideal of ℶ.

Proof. Let E = {< ℶ, μ_A(ℶ), ν_A(ℶ) > |ℶ ∈ ℶ } be an IF d-ideal of ℶ, therefore we have

μ_A(0) ≥ μ_A(ℶ)

μ_A(ℶ) ≥ low{μ_A(ℶ ∗ δ), μ_A(δ)}

μ_A(ℶ ∗ δ) ≥ low{μ_A(ℶ), μ_A(δ)} for all ℶ, δ ∈ ℶ.

ν_E(0) ≤ ν_E(ℶ)

ν_E(ℶ) ≤ upper{ν_E(ℶ ∗ δ), μ(δ)}

ν_E(ℶ ∗ δ) ≤ upper{ν_E(ℶ), ν_E(δ)} for all ℶ, δ ∈ ℶ.

Now μ_E(ℶ) ≥ low{μ_E(ℶ ∗ δ), μ(δ)} ≥ μ_E(ℶ ∗ δ).μ(δ) and μ_E(ℶ ∗ δ) ≥ low{μ_E(ℶ).μ_E(δ)} ≥ μ_E(ℶ).μ_E(δ) for all ℶ, δ ∈ ℶ.

Also ν_E(ℶ) ≤ upper{ν_E(ℶ ∗ δ), μ(δ)} ≤ ν_E(ℶ ∗ δ) + μ_E(δ) – ν_E(ℶ ∗ δ).ν_E(δ) and ν_E(ℶ ∗ δ) ≤ upper{ν_E(ℶ), ν_E(δ)} ≤ ν_E(ℶ) + μ_E(δ) – ν_E(ℶ).ν_E(δ) for all ℶ, δ ∈ ℶ.

Hence the proof.

Remark. The converse of Theorem 1 is not true as shown in following Example.

Example 2. Consider d-algebra ℶ = {0, a, b} with the following cayley table.

*	0	a	b
0	0	0	0
a	b	0	b
b	a	a	0

$\nu_E(0) = 0.2$, $\nu_E(a) = 0.3$, $\nu_E(b) = 0.2$ then E =< μ_E, ν_E > is an IF dot d-ideal of ℶ. But E =< μ_E, ν_E > is not an IF d-ideal of ℶ. Since $\mu_E(a) = 0.2 \geq \text{low}\{\mu_E(a * b), \mu_E(b)\} = \text{low}\{\mu_E(b), \mu_E(b)\} = 0.2$.

Theorem 2. Every IF dot d-ideal of a d algebra ℶ is IF dot Sὣ of ℶ.

Remark. The converse of Theorem 2 is not true.

Example 3. Consider d-algebra ℶ as in Example 2 and IF subset E = {< ℶ, μ_E(ℶ), ν_E(ℶ) > |ℶ ∈ ℶ } given by $\mu_E(0) = 0.1$, $\mu_E(a) = 0.2$, $\mu_E(b) = 0.2$ and $\nu_E(0) = 0.2$, $\nu_E(a) = 0.2$, $\nu_E(b) = 0.1$ then it can be easily verified that E =< μ_E, ν_E > is an IF dot Sὣ of ℶ. But E =< μ_E, ν_E > is not an IF dot d ideal ℶ. Since $\mu_E(0) = 0.1 \geq \mu_E(a) = 0.2$ and $\nu_E(0) = 0.2$ $\mu_E(b) = 0.2$.

Theorem 3. If E = {< ℶ, μ_E(ℶ), ν_E(ℶ) > |ℶ ∈ ℶ } and F={< ℶ, μ_F(ℶ), ν_F(ℶ) >|ℶ ∈ ℶ} are two IF dot d-ideals of ℶ d-algebra ℶ, Then (A ∩ B) is also an IF dot d-ideal of ℶ.

Proof. We have A ∩ B = {< ℶ, $(\mu_A \cap \mu_B)$(ℶ), $(\nu_A \cup \nu_B)$(ℶ) > |ℶ ∈ ℶ },
where $(\mu_A \cap \mu_B)$(ℶ) = low{μ_A(ℶ), μ_B(ℶ)} and $(\nu_A \cup \nu_B)$(ℶ) = upper{ν_A(ℶ), ν_B(ℶ)}
Let ℶ, δ ∈ ℶ, then
(i)$(\mu_E \cap \mu_F)(0)$= low{$\mu_E(0)$, $\mu_F(0)$}
= low{$\mu_E(0)$, $\mu_F(0)$}
≥ low{μ_E(ℶ), μ_F(ℶ)}
= $(\mu_E \cap \mu_F)$(ℶ)
⇒ $(\mu_E \cap \mu_F)(0) \geq (\mu_E \cap \mu_F)$(ℶ) (ii)$(\nu_E \cup \nu_F)(0)$ = upper{$\nu_E(0)$, $\nu_F(0)$}
= upper{$\nu_E(0)$, $\nu_F(0)$}
≤ upper{ν_E(ℶ), ν_F(ℶ)}
= $(\nu_E \cup \nu_F)$(ℶ)
⇒ $(\nu_E \cup \nu_F)(0) \leq (\nu_E \cup \nu_F)$(ℶ) (iii)$(\mu_E \cap \mu_F)$(ℶ) = low{$\mu_E$(ℶ), μ_F(ℶ)}
≥ low{μ_E(ℶ ∗ δ).μ_E(δ), μ_F(ℶ ∗ δ).μ_F(δ)}
≥ low{μ_E(ℶ ∗ δ), μ_F(ℶ ∗ δ)}.low{μ_E(δ), μ_F(δ)}}
= $(\mu_E \cap \mu_F)$(ℶ ∗ δ).$(\mu_E \cap \mu_F)$(δ)}}
⇒ $(\mu_E \cap \mu_F)$(ℶ) ≥ $(\mu_E \cap \mu_F)$(ℶ ∗ δ).$(\mu_E \cap \mu_F)$(δ)}}.
(iv) $(\nu_E \cup \nu_F)$(ℶ)
= upper{ν_E(ℶ), ν_F(ℶ)}
≤ upper{ν_E(ℶ ∗ δ) + ν_E(δ) –ν_E(ℶ ∗ δ).ν_E(δ), ν_F(ℶ ∗ δ) + ν_E(δ) –ν_E(ℶ ∗ δ).ν_E(δ)}
≤upper{ν_E(ℶ∗δ),ν_F(ℶ∗δ)}+upper{ν_E(δ),ν_F(δ)} − upper{ν_E(ℶ∗δ), ν_E(ℶ∗δ)}.upper{ν_E(δ), ν_F(δ)}. By Lemma 2
⇒ $(\nu_E \cup \nu_F)$(ℶ) ≤ $(\nu_E \cup \nu_F)$(ℶ ∗ δ) + $(\nu_E \cup \nu_F)$(δ) −$(\nu_E \cup \nu_F)$(ℶ ∗ δ).$(\nu_E \cup \nu_F)$(δ).
(v)$(\mu_E \cap \mu_F)$(ℶ ∗ δ) = low{μ_E(ℶ ∗ δ), μ_F(ℶ ∗ δ)}
≥ low{μ_E(ℶ), μ_F(ℶ)}.low{μ_E(δ), μ_F(δ)}
= $(\mu_E \cap \mu_F)$(ℶ)}.$(\mu_E \cup \mu_F)$(δ)}
⇒ $(\mu_E \cap \mu_F)$(ℶ ∗ δ) ≥ $(\mu_E \cap \mu_F)$(ℶ).$(\mu_E \cap \mu_F)$(δ)}.
(vi) $(\nu_E \cup \nu_F)$(ℶ ∗ δ)
= upper{ν_E(ℶ ∗ δ), ν_F(ℶ ∗ δ)}
≤ upper{ν_E(ℶ) + ν_F(δ) –ν_E(ℶ).ν_F(δ), ν_E(ℶ) + ν_E(δ) –ν_F(ℶ).ν_E(δ)}
By Lemma 2
⇒ $(\nu_E \cup \nu_F)$(ℶ ∗ δ) ≤ $(\nu_E \cup \nu_F)$(ℶ) + $(\nu_E \cup \nu_F)$(δ) −$(\nu_E \cup \nu_F)$(ℶ).$(\nu_E \cup \nu_F)$(δ).
Hence (A ∩ B) is also an IF dot d-ideal of ℶ.

Theorem 4. IF $C_{\zeta,\xi}$ (E) = {ℶ ∈ ℶ | μ_E(ℶ) ≥ ζ, ν_E(ℶ) ≤ ξ } is an ideal of ℶ, then E =< μ_E, ν_F > is an IF dot d-ideal of ℶ, where ζ, ξ ∈ [0, 1].

Proof. Let $C_{\zeta,\xi}$ (E) is an ideal. To prove E =< μ_E, ν_F > is an IF dot d-ideal of ℶ. In view of Theorem 1 it is enough to show that E =< μ_E, ν_F > is an IF d-ideal of ℶ.
Let ℶ ∈ ℶ such that μ_A(ℶ) = ζ. Also since 0 ∈ $C_{\zeta,\xi}$ (A).
Therefore $\mu_E(0)$ ≥ ζ = μ_E(ℶ).
Let ℶ ∗ δ, δ ∈ ℶ, such that μ_E(ℶ ∗ δ) = ζ, μ_E(δ) = ℶ where ζ ≤ ℶ.
Then (ℶ ∗ δ), δ ∈ $C_{\zeta,\xi}$ (E). Since $C_{\zeta,\xi}$ (E) is an ideal.
Therefore ℶ ∈ $C_{\zeta,\xi}$ (E), which implies
μ_E(ℶ) ≥ ζ = low{ζ, ℶ} = low{μ_E(ℶ ∗ δ), μ_E(δ)}.
Again let ℶ, δ ∈ ℶ such that μ_E(ℶ) = ζ, μ_E(δ) = ℶ where ζ ≤ ℶ Then ℶ, δ ∈ $C_{\zeta,\xi}$ (E) Since $C_{\zeta,\xi}$ (E) is an ideal Therefore
ℶ ∗ δ ∈ $C_{\zeta,\xi}$ (E), which implies

$\mu_E(ב * \delta) \geq \zeta = \text{low}\{\zeta, ב\} = \text{low}\{\mu_E(ב), \mu_E(\delta)\}$.
Similarly we can prove $\nu_E(0) \leq \nu_E(ב)$
$N_E(ב) \leq \text{upper}\{\nu_E(ב * \delta), \nu_E(\delta)\}$ and
$\nu_E(ב * \delta) \leq \text{upper}\{\nu_E(ב), \nu_E(\delta)\}$.

Conclusion

In this paper, we investigated IF H algebra and discovered a number of surprising results. As we have shown, the H-ideal is the intersection of any two IF dots. We may define IF dot H-ideals in a variety of algebraic systems using the same way. Model operator and are invariant IF dot H-ideals.

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