THE FUZZY ARITHMETIC OPERATIONS FOR REVERSE ORDER HEPTADECAGONAL FUZZY NUMBERS USING ALPHA CUTS TO HANDLING UNCERTAINTY FLEXIBLE STRATEGY

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Abstract

In this paper introduces the new shape of fuzzy numbers is developed and named as Reverse order Heptadecagonal Fuzzy Numbers. This paper defines membership functions and Arithmetic Operations for Reverse order Heptadecagonal Fuzzy Numbers using an interval of Alpha cuts. Some prepositions for instance maximum and minimum Operations on Fuzzy equations; alpha cuts and Reverse order Fuzzy numbers have been introduced and proved. Numerical examples for this Arithmetic Operations are also given.

Keywords: Fuzzy Number, Heptadecagonal Fuzzy Number, Reverse Order Heptadecagonal Fuzzy Number, Fuzzy Arithmetic Operations, Alpha –cut.

I.INTRODUCTION

In modern world we may come across many uncertainty cases. The fuzzy set theory is to find out the best solution to the real-world problems where available data and information are not exact, in that situation fuzzy numbers can be applied in many fields such as control system, decision making and operation research etc

This paper introduces Reverse order Heptadecagonal, RoHDFN with its membership functions. It has got several applications in real life. In case of Heptadecagonal fuzzy number one is the maximum characterizing supporting interval but in case of decagonal we have a flat segment of ά=1which is the characterizing supporting interval. The classification of fuzzy number and properties related to it, have paved the way for developing new notions. . Vipin Bala, Jitender Kumar* and M. S. Kadyan introduces Heptadecagonal Fuzzy Numbers. In the beginning, Zadeh (1965) studied the idea of fuzzy set theory. Ruth Naveena and Rajkumar (2019) discussed reverse order pent decagonal, nanogonal and decagonal fuzzy numbers with their arithmetic operations.

The introduction section offers specification for the present work by addressing the limitations of traditional fuzzy number representations and the need for more nuanced and flexible approaches. It establishes the significance of introducing Reverse order Heptadecagonal Fuzzy Numbers and their utility in addressing complex and ambiguous uncertainty scenarios. This section also sets the stage for the innovative aspects of the research by highlighting the limitations of existing methods and the motivation for exploring new territory.

II. DEFINITIONS

Definition 2.1

A fuzzy set is characterized by a membership function maps elements of a given universal set X to the real numbers in [0,1].
A fuzzy set $\tilde{N}$ in universal set Y is defined as $\tilde{N} = \{(y, \Omega_{\tilde{N}}(y))/y \varepsilon Y\}$.
$\Omega_{\tilde{N}}: Y \rightarrow [0, 1]$. $\Omega_{\tilde{N}}(y)$ is called the membership value $y \varepsilon Y$ of in the fuzzy set $\tilde{N}$.

Definition 2.2

A Fuzzy number Ñ is a fuzzy set on the real line R, must satisfy the following conditions

i) $\Omega_{Ñ}(y)$ is piecewise continuous.
ii) There exist at least one y ε R such that $\Omega_{Ñ}(y)=1$
iii) Ñ must be normal and convex.

Definition 2.3

The α -cut of fuzzy set Ñ is a set consisting of those elements of the universe Y whose membership values exceeds the threshold level
Ñα ={y / $\Omega_{Ñ}(y) \geq \alpha$ }.

Proposition 2.4

Ñ is a Reverse Order Fuzzy Number iff the following conditions hold.

i) Ñ is down-normal.
ii) $Ñ^{>\alpha}$ is a union of two disjoint unbounded open intervals for each α ε [0,1).
iii) The level set $Ñ^{=1}$ is unbounded and $Ñ^{<1}$ is bounded.

Definition 2.5

Let $Ģ_{hd}$ and $Ķ_{hd}$ be any two fuzzy numbers. Then Min ($Ģ_{hd}$ $Ķ_{hd}$) and Max ($Ģ_{hd}$ $Ķ_{hd}$) are fuzzy numbers, defined by

Min ($Ģ_{hd}$ $Ķ_{hd}$)(y)=Sup{ Min {$Ģ_{hd}$ (p),$Ķ_{hd}$(q)}:z=Min(p,q)}.
Max ($Ģ_{hd}$ $Ķ_{hd}$)(y)=Sup{ Max {$Ģ_{hd}$ (p),$Ķ_{hd}$(q)}:z=Max (p,q)}.

Definition 2.6

Let $Ģ_{hd}$+Y= H , $Ģ_{hd}$ * Y= H ,where $Ģ_{hd}$ and $Ķ_{hd}$ are Fuzzy Numbers, and Y is an unknown Fuzzy Number for which either of the equations is to be satisfied.

Definition 2.7

It is a fuzzy number represented with three points as follows: A = (a_1, a_2, a_3).This representation is interpreted as membership functions (Fig)

$$\mu_A(x)=\begin{cases} 0 \quad , & x < a_1 \\ \frac{x-a_1}{a_2-a_1}, & a_1 \leq x \leq a_2 \\ \frac{a_3-x}{a_3-a_2} & , a_2 \leq x \leq a_3 \\ 0 \quad , & x > a_3 \end{cases}$$

Now if we get crisp interval by α −cut operation, interval A_α shall obtained as follows ∀ α ∈[0,1].

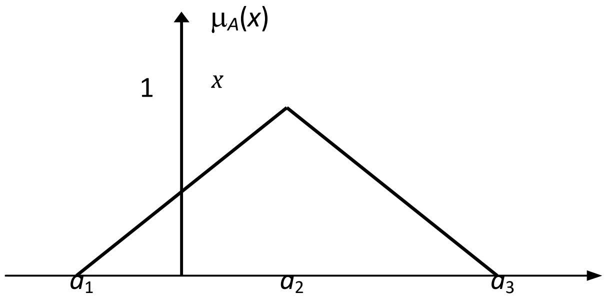

Fig. 1 Triangular fuzzy number $A = (a_1, a_2, a_3)$

$$\frac{a_1{}^{\alpha} - a_1}{a_2 - a_1} = \alpha \quad , \qquad \frac{a_3{}^{\alpha} - a_3}{a_3 - a_2} = \alpha$$

We get $a_1{}^{(\alpha)} = (a_2 - a_1)\ \alpha + a_1$

$$a_3^{(\alpha)} = -(a_3 - a_2)\alpha + a_3$$

$$A_\alpha = \left[a_1^{(\alpha)}, a_3^{(\alpha)}\right]$$

$$= [(a_2 - a_1)\alpha + a_1, -(a_3 - a_2)\alpha + a_3]$$

II.REVERSE ORDER HEPTADECAGONAL FUZZY NUMBER

Definition 3.1 Reverse orders Heptadecagonal Fuzzy Number:

Reverse orders Heptadecagonal Fuzzy Number HDFN$\mathcal{K}_{HD}$ is defined by $\mathcal{K}_{HD}$=($-Œ_8$, $-Œ_7$, $-Œ_6$, $-Œ_5$, $-Œ_4$, $-Œ_3$, $-Œ_2$, $-Œ_1$,**0** , $Œ_1$, $Œ_2$, $Œ_3$, $Œ_4$, $Œ_5$, $Œ_6$, $Œ_7$, $Œ_8$ **)** and membership function is

$$\Omega\mathcal{K}_{HD}(y)= \begin{cases} 1 & y \le -Œ_8 \\ \frac{-Œ_7 - y}{Œ_8 - Œ_7} & -Œ_8 \le y \le -Œ_7 \\ \frac{-Œ_6 - y}{Œ_7 - Œ_6} & -Œ_7 \le y \le -Œ_6 \\ \frac{-Œ_5 - y}{Œ_6 - Œ_5} & -Œ_6 \le y \le -Œ_5 \\ \frac{-Œ_4 - y}{Œ_5 - Œ_4} & -Œ_5 \le y \le -Œ_4 \\ \frac{-Œ_3 - y}{Œ_4 - Œ_3} & -Œ_4 \le y \le -Œ_3 \\ \frac{-Œ_2 - y}{Œ_3 - Œ_2} & -Œ_3 \le y \le -Œ_2 \\ \frac{-Œ_1 - y}{Œ_2 - Œ_1} & -Œ_2 \le y \le -Œ_1 \\ \frac{0 - y}{0 + Œ_1} & -Œ_1 \le y \le -Œ_0 \\ \frac{y}{Œ_1} & -Œ_0 \le y \le -Œ_1 \\ \frac{y - Œ_1}{Œ_2 - Œ_1} & -Œ_1 \le y \le -Œ_2 \\ \frac{y - Œ_2}{Œ_3 - Œ_2} & -Œ_2 \le y \le -Œ_3 \\ \frac{y - Œ_3}{Œ_4 - Œ_3} & -Œ_3 \le y \le -Œ_4 \\ \frac{y - Œ_4}{Œ_5 - Œ_4} & -Œ_4 \le y \le -Œ_5 \\ \frac{y - Œ_5}{Œ_6 - Œ_5} & -Œ_5 \le y \le -Œ_6 \\ \frac{y - Œ_6}{Œ_7 - Œ_6} & -Œ_6 \le y \le -Œ_7 \\ \frac{y - Œ_7}{Œ_8 - Œ_7} & -Œ_7 \le y \le -Œ_8 \\ 1 & y \ge -Œ_8 \end{cases}$$

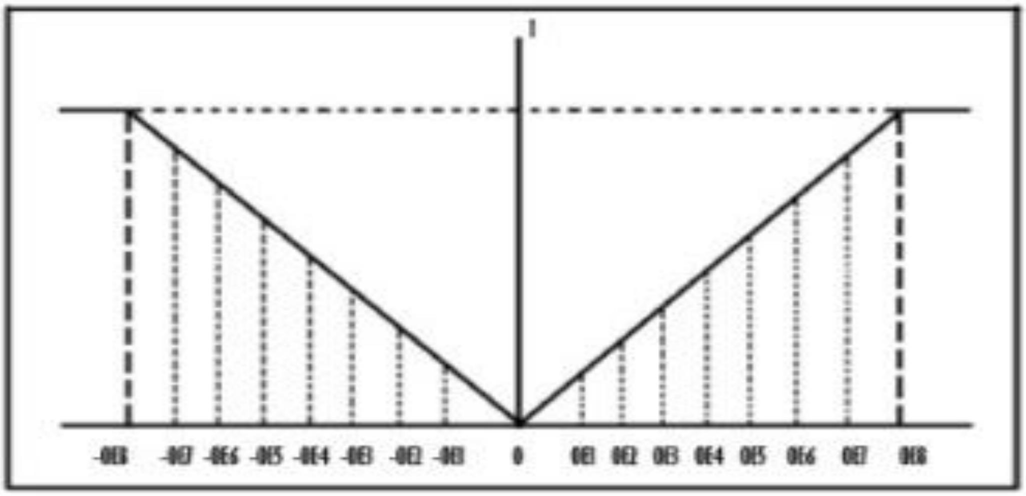

Fig 2: Reverse order Heptadecagonal Fuzzy Number

Example 3.2

Let the Reverse order Heptadecagonal Fuzzy Number $\mathcal{K}_{HD}$
$\Omega\mathcal{K}_{HD}(y)$=(-10,-9,-8,-7,-5,-4,-3,-2,0,1,3,4,5,7,8,9,10) and its membership function is given by

$$\Omega\mathcal{K}_{HD}(y)=\begin{cases} 1 & y \leq -10 \\ \frac{-9-y}{10-9} & -10 \leq y \leq -9 \\ \frac{-8-y}{9-8} & -9 \leq y \leq -8 \\ \frac{-7-y}{8-7} & -8 \leq y \leq -7 \\ \frac{-5-y}{7-5} & -7 \leq y \leq -5 \\ \frac{-4-y}{5-4} & -5 \leq y \leq -4 \\ \frac{-3-y}{4-3} & -4 \leq y \leq -3 \\ \frac{-2-y}{3-2} & -3 \leq y \leq -2 \\ \frac{-1-y}{2-1} & -2 \leq y \leq -1 \\ \frac{0-y}{0+1} & -1 \leq y \leq 0 \\ \frac{y}{1} & 0 \leq y \leq 1 \\ \frac{y-1}{3-1} & 1 \leq y \leq 3 \\ \frac{y-3}{4-3} & 3 \leq y \leq 4 \\ \frac{y-4}{5-4} & 4 \leq y \leq 5 \\ \frac{y-5}{7-5} & 5 \leq y \leq 7 \\ \frac{y-7}{8-7} & 7 \leq y \leq 8 \\ \frac{y-8}{9-8} & 8 \leq y \leq 9 \\ \frac{y-9}{10-9} & 9 \leq y \leq 10 \\ 1 & y \geq 10 \end{cases}$$

$$\Omega\mathcal{K}_{HD}(y)=\begin{cases} 1 & y \leq -10 \\ \frac{-9-y}{1} & -10 \leq y \leq -9 \\ \frac{-8-y}{1} & -9 \leq y \leq -8 \\ \frac{-7-y}{1} & -8 \leq y \leq -7 \\ \frac{-5-y}{2} & -7 \leq y \leq -5 \\ \frac{-4-y}{1} & -5 \leq y \leq -4 \\ \frac{-3-y}{1} & -4 \leq y \leq -3 \\ \frac{-2-y}{1} & -3 \leq y \leq -2 \\ \frac{-1-y}{1} & -2 \leq y \leq -1 \\ \frac{-y}{1} & -1 \leq y \leq 0 \\ \frac{y}{1} & 0 \leq y \leq 1 \\ \frac{y-1}{2} & 1 \leq y \leq 3 \\ \frac{y-3}{1} & 3 \leq y \leq 4 \\ \frac{y-4}{1} & 4 \leq y \leq 5 \\ \frac{y-5}{2} & 5 \leq y \leq 7 \\ \frac{y-7}{1} & 7 \leq y \leq 8 \\ \frac{y-8}{1} & 8 \leq y \leq 9 \\ \frac{y-9}{1} & 9 \leq y \leq 10 \\ 1 & y \geq 10 \end{cases}$$

3.3 Arithmetic Operations of Reverse order Heptadecagonal fuzzy Number (HoHDFN) on Alpha Cut and its Membership Function

A Reverse order Heptadecagonal fuzzy Numbers (HoHDFN) can be defined as

$$\frac{-9-y}{1} = \alpha \Rightarrow -y = \alpha + 9$$

$$\frac{-8-y}{1} = \alpha \Rightarrow -y = \alpha + 8$$

$$\frac{-7-y}{1} = \alpha \Rightarrow -y = \alpha + 7$$

$\frac{-5-y}{2} = \alpha \Rightarrow -y = 2\alpha + 5$ and so on.....

$\Omega\mathcal{K}_{HD}(y)$=[-($\alpha + 9$), -($\alpha + 8$), -($\alpha + 7$), -($2\alpha + 5$), -($\alpha + 4$), -($\alpha + 3$), -($\alpha + 2$), -($\alpha + 1$), -α, α , ($2\alpha + 1$) , ($\alpha + 3$) , ($\alpha + 4$), ($2\alpha + 5$), ($\alpha + 7$), ($\alpha + 8$), ($\alpha + 9$)].

When ($\alpha = 0.5$) we get $\Omega\mathcal{K}_{HD}(y)$=[-9.5,-8.5,-7.5,-6,-4.5,-3.5,-2.5,-1.5,- 0.5,0.5,2,3.5,4.5,5.5,7.5,8.5,9.5]

When ($\alpha = 0$) we get $\Omega\mathcal{K}_{HD}(y)$=[-10,-9,-8,-7,-5,-4,-3,-2,-1,0,1,2,3,4,5,7,8,9,10]

The graphical representation of α - cut of Reverse order Heptadecagonal Fuzzy Number for the above example is shown below

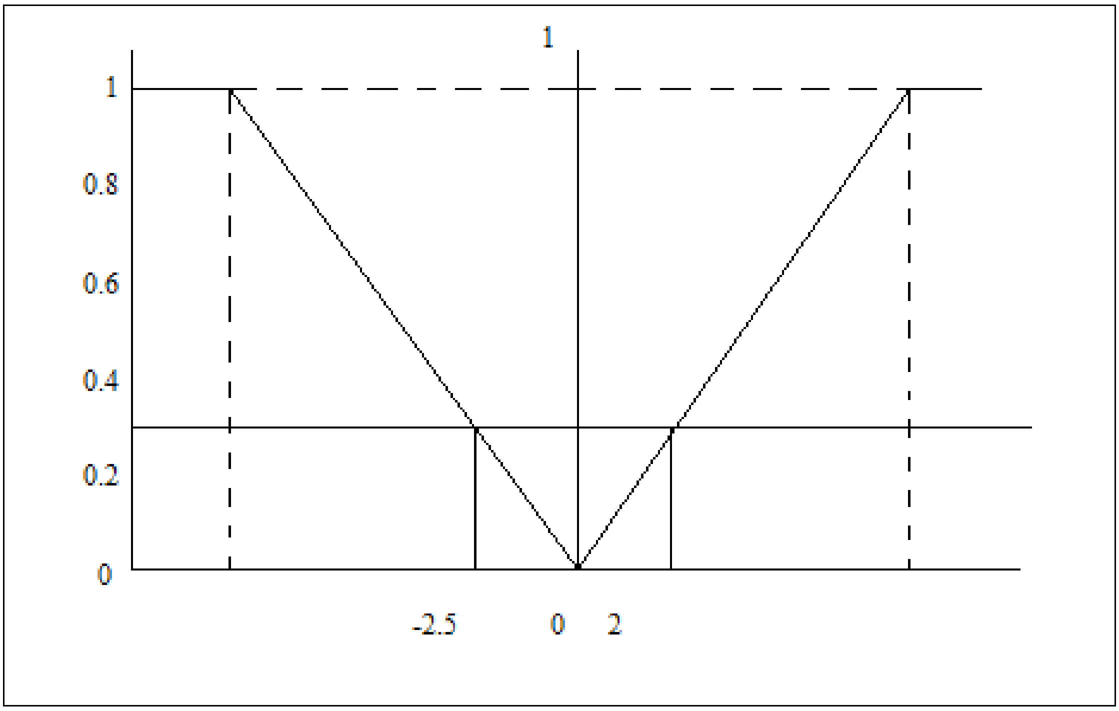

Fig 3 Graphical Representation of α -cut RoHDFN

3.4 Conditions on the Reverse order Heptadecagonal Fuzzy Number (RoHdFN)

The Condition for the Reverse order Heptadecagonal Fuzzy Number $\mathcal{K}_{HD}$:

1. In the interval [0, 1], $\Omega\mathcal{K}_{HD}(y)$ is continuous.
2. $\Omega\mathcal{K}_{HD}(y)$ is a decreasing strictly and the function is continuous on the interval $[-Œ_8,0]$.
3. $\Omega\mathcal{K}_{HD}(y)$ is a increasing strictly and the function is continuous on the interval $[0, Œ_8]$.

IV.ARITHMETIC OPERATIONS OF REVERSE ORDER HEPTADECAGONAL FUZZY NUMBER (RoHDFN)

4.1 Addition of two Reverse order Heptadecagonal Fuzzy Numbers

Consider two Reverse order Heptadecagonal Fuzzy Numbers

$$\check{C}_{HD} = \begin{Bmatrix} (-\check{c}_8),(-\check{c}_7),(-\check{c}_6),(-\check{c}_5),(-\check{c}_4),(-\check{c}_3),(-\check{c}_2),(-\check{c}_1),(0),(\check{c}_1),(\check{c}_2),(\check{c}_3), \\ (\check{c}_4),(\check{c}_5),(\check{c}_6),(\check{c}_7),(\check{c}_8) \end{Bmatrix}$$

$$\check{E}_{HD} = \begin{Bmatrix} (-\check{e}_8),(-\check{e}_7),(-\check{e}_6),(-\check{e}_5),(-\check{e}_4),(-\check{e}_3),(-\check{e}_2),(-\check{e}_1),(0),(\check{e}_1),(\check{e}_2),(\check{e}_3), \\ (\check{e}_4),(\check{e}_5),(\check{e}_6),(\check{e}_7),(\check{e}_8), \end{Bmatrix}$$

The addition of two Reverse order Heptadecagonal Fuzzy Numbers is given by

$$\check{C}_{HD} \oplus \check{E}_{HD} = \begin{Bmatrix} (-\check{c}_8 \oplus -\check{e}_8),(-\check{c}_7 \oplus -\check{e}_7),(-\check{c}_6 \oplus -\check{e}_6),(-\check{c}_5 \oplus -\check{e}_5), \\ (-\check{c}_4 \oplus -\check{e}_4),(-\check{c}_3 \oplus -\check{e}_3),(-\check{c}_2 \oplus -\check{e}_2),(-\check{c}_1 \oplus -\check{e}_1), \\ 0,(\check{c}_1 \oplus \check{e}_1),(\check{c}_2 \oplus \check{e}_2),(\check{c}_3 \oplus \check{e}_3),(\check{c}_4 \oplus \check{e}_4),(\check{c}_5 \oplus \check{e}_5), \\ (\check{c}_6 \oplus \check{e}_6),(\check{c}_7 \oplus \check{e}_7),(\check{c}_8 \oplus \check{e}_8), \end{Bmatrix}$$

Example 4.1

Let us consider two Reverse order Heptadecagonal fuzzy Numbers

$\check{C}_{HD}$=(-29,-28,-27,-26,-25,-23,-22,-21,0,10,11,12,13,14,17,18,19).

$\check{E}_{HD}$=(-19,-17,-15,-13,-11,-9,-7,-5,0,12,14,15,16,18,19,20,21).

$\check{C}_{HD} \oplus \check{E}_{HD}$=(-48,-45,-42,-39,-36,-32,-29,-26,0,22,25,27,29,32,36,38,40).

4.2 Subtraction of two Reverse order Heptadecagonal Fuzzy Numbers

Consider two Reverse order Heptadecagonal Fuzzy Numbers

$$\check{C}_{HD} = \begin{Bmatrix} (-\check{c}_8),(-\check{c}_7),(-\check{c}_6),(-\check{c}_5),(-\check{c}_4),(-\check{c}_3),(-\check{c}_2),(-\check{c}_1),(0),(\check{c}_1),(\check{c}_2),(\check{c}_3), \\ (\check{c}_4),(\check{c}_5),(\check{c}_6),(\check{c}_7),(\check{c}_8) \end{Bmatrix}$$

$$\check{E}_{HD} = \begin{Bmatrix} (-\check{e}_8),(-\check{e}_7),(-\check{e}_6),(-\check{e}_5),(-\check{e}_4),(-\check{e}_3),(-\check{e}_2),(-\check{e}_1),(0),(\check{e}_1),(\check{e}_2),(\check{e}_3), \\ (\check{e}_4),(\check{e}_5),(\check{e}_6),(\check{e}_7),(\check{e}_8), \end{Bmatrix}$$

The subtraction of two Reverse order Heptadecagonal Fuzzy Numbers is given by

$$\check{C}_{HD} - \check{E}_{HD} = \begin{Bmatrix} (-\check{c}_8 + \check{e}_8),(-\check{c}_7 + \check{e}_7),(-\check{c}_6 + \check{e}_6),(-\check{c}_5 + \check{e}_5), \\ (-\check{c}_4 + \check{e}_4),(-\check{c}_3 +),(-\check{c}_2 + \check{e}_2),(-\check{c}_1 + \check{e}_1), \\ 0,(\check{c}_1 - \check{e}_1),(\check{c}_2 - \check{e}_2),(\check{c}_3 - \check{e}_3),(\check{c}_4 - \check{e}_4),(\check{c}_5 - \check{e}_5), \\ (\check{c}_6 - \check{e}_6),(\check{c}_7 - \check{e}_7),(\check{c}_8 - \check{e}_8), \end{Bmatrix}$$

Example 4.2

Let us consider two Reverse order Heptadecagonal fuzzy Numbers

$\check{C}_{HD}$=(-9,-8,-7,-6,-5,-3,-2,-1,0,9,1,2,3,4,7,8,9).

$\check{E}_{HD}$=(-1,-7,-5,-3,-2,-9,-7,-5,0,2,4,5,6,8,9,2,3).

$\check{C}_{HD}$ - $\check{E}_{HD}$=(-8,-1,-2,-3,-3,6,5,4,0,7,-3,-3,-3,-4,-2,6,6).

4.3 Multiplication of two Reverse order Heptadecagonal Fuzzy Numbers

Consider two Reverse order Heptadecagonal Fuzzy Numbers

$$\check{C}_{HD} = \begin{Bmatrix} (-\check{c}_8),(-\check{c}_7),(-\check{c}_6),(-\check{c}_5),(-\check{c}_4),(-\check{c}_3),(-\check{c}_2),(-\check{c}_1),(0),(\check{c}_1),(\check{c}_2),(\check{c}_3), \\ (\check{c}_4),(\check{c}_5),(\check{c}_6),(\check{c}_7),(\check{c}_8) \end{Bmatrix}$$

$$\check{E}_{HD} = \begin{Bmatrix} (-\check{e}_8),(-\check{e}_7),(-\check{e}_6),(-\check{e}_5),(-\check{e}_4),(-\check{e}_3),(-\check{e}_2),(-\check{e}_1),(0),(\check{e}_1),(\check{e}_2),(\check{e}_3), \\ (\check{e}_4),(\check{e}_5),(\check{e}_6),(\check{e}_7),(\check{e}_8), \end{Bmatrix}$$

The subtraction of two Reverse order Heptadecagonal Fuzzy Numbers is given by

$$\check{C}_{HD} \otimes \check{E}_{HD} = \begin{Bmatrix} (-\check{c}_8 \otimes -\check{e}_8),(-\check{c}_7 \otimes -\check{e}_7),(-\check{c}_6 \otimes -\check{e}_6),(-\check{c}_5 \otimes -\check{e}_5), \\ (-\check{c}_4 \otimes -\check{e}_4),(-\check{c}_3 \otimes -\check{e}_3),(-\check{c}_2 \otimes -\check{e}_2),(-\check{c}_1 \otimes -\check{e}_1), \\ 0,(\check{c}_1 \otimes \check{e}_1),(\check{c}_2 \otimes \check{e}_2),(\check{c}_3 \otimes \check{e}_3),(\check{c}_4 \otimes \check{e}_4),(\check{c}_5 \otimes \check{e}_5), \\ (\check{c}_6 \otimes \check{e}_6),(\check{c}_7 \otimes \check{e}_7),(\check{c}_8 \otimes \check{e}_8), \end{Bmatrix}$$

Example 4.3

Let us consider two Reverse order Heptadecagonal fuzzy Numbers

$\check{C}_{HD}$=(-9,-8,-7,-6,-5,-3,-2,-1,0,9,1,2,3,4,7,8,9).

$\check{E}_{HD}$=(-1,-7,-5,-3,-2,-9,-7,-5,0,2,4,5,6,8,9,2,3).

$\check{C}_{HD} \otimes \check{E}_{HD}$=(9,56,35,18,10,27,14,5,0,18,4,10,18,32,63,16,27).

4.4 Division of two Reverse order Heptadecagonal Fuzzy Numbers

Consider two Reverse order Heptadecagonal Fuzzy Numbers

$$\check{C}_{HD} = \begin{Bmatrix} (-\check{c}_8),(-\check{c}_7),(-\check{c}_6),(-\check{c}_5),(-\check{c}_4),(-\check{c}_3),(-\check{c}_2),(-\check{c}_1),(0),(\check{c}_1),(\check{c}_2),(\check{c}_3), \\ (\check{c}_4),(\check{c}_5),(\check{c}_6),(\check{c}_7),(\check{c}_8) \end{Bmatrix}$$

$$\check{E}_{HD} = \begin{Bmatrix} (-\check{e}_8),(-\check{e}_7),(-\check{e}_6),(-\check{e}_5),(-\check{e}_4),(-\check{e}_3),(-\check{e}_2),(-\check{e}_1),(0),(\check{e}_1),(\check{e}_2),(\check{e}_3), \\ (\check{e}_4),(\check{e}_5),(\check{e}_6),(\check{e}_7),(\check{e}_8), \end{Bmatrix}$$

The division of two Reverse order Heptadecagonal Fuzzy Numbers is given by

$$\check{C}_{HD}/\check{E}_{HD} = \begin{Bmatrix} (-\check{c}_8/-\check{e}_8),(-\check{c}_7/-\check{e}_7),(-\check{c}_6/-\check{e}_6),(-\check{c}_5/-\check{e}_5), \\ (-\check{c}_4/-\check{e}_4),(-\check{c}_3/-\check{e}_3),(-\check{c}_2/-\check{e}_2),(-\check{c}_1/-\check{e}_1), \\ 0,(\check{c}_1/\check{e}_1),(\check{c}_2/\check{e}_2),(\check{c}_3/\check{e}_3),(\check{c}_4/\check{e}_4),(\check{c}_5/\check{e}_5), \\ (\check{c}_6/\check{e}_6),(\check{c}_7/\check{e}_7),(\check{c}_8/\check{e}_8), \end{Bmatrix}$$

Example 4.4

Let us consider two Reverse order Heptadecagonal fuzzy Numbers

$\check{C}_{HD}$=(-9,-8,-7,-6,-5,-9,-14,-10,0,10,12,25,36,40,18,8,9).

$\check{E}_{HD}$=(-1,-2,-7,-3,-5,-9,-7,-5,0,2,4,5,6,8,9,2,3).

$\check{C}_{HD}$ / $\check{E}_{HD}$=(9,4,1,2,1,1,2,2,0,5,3,5,6,5,2,4,3).

V APPLICATIONS OF FUZZY NUMBERS:

Triangular fuzzy numbers aids us finding solution and managing uncertainty in different real life applications. Below the examples tells us triangular fuzzy numbers how it is being applied in practical scenarios.

A. Wheather forecasting: We can predict and find out wheather forecasting Possibilities for temperature, Precipitins, wind speed and other meteorological variables, it can also supports meteorologists to analyze forecast un-certainty effectively.

B. Financial wise analysis: Triangular fuzzy numbers widely using in financial sectors and risk analysis to understand uncertain parameters like Interest rates, stock prices and exchange rates, also supports financial analysis, that making informed decisions in volatile mixed.

C. Environmental mentoring: Triangular fuzzy numbers also been using in environmental monitoring by collecting data's from environmental seasons to overcome uncertainty in measurements, it will gives us the accuracy in pollution levels water quality or any environmental variable.

D.Supply Chain Managements: In this management triangular fuzzy numbers supports demand forecasts and lead times which may be vary most of the time and it represents the variables in these parameters and provides better Inventory management and production planning.

E.Medical Diagnosis: In Medical diagnosis it helps in tests that associated with uncertainty , patient's symptoms or treatment effectiveness. This helps doctors for decision making and be cautious.

F.Traffic Management: Triangular fuzzy numbers can be used in traffic flow production and congestion management; It helps for route Planning and traffic control systems.

G. Energy Managements: It can be used in energy forecasting and optimization. It helps in uncertain factors such as energy demand, energy generation and fuel prices for effective energy distribution and management.

H. Quality Control: It helps in manufacturing products in delivering products quality because there may be uncertainty in quality measurements, assisting in quality control, and defeat detection.

I. Profit Managements: Uncertainty will be occurring in scheduling the profits and in resource allocation. Triangular method can help us profit timeliness and resources what we need effectively.

J. Market Research: There is a gap in Interpretation while conducting market research. Triangular method supports in surveying data, against uncertainty and making easy access to consumer's preferences and market trends.

VI. MODELLING RISKINESS IN SNOWFALL AND TEMPERATURE MEASUREMENTS WITH TRIANGULAR FUZZY NUMBERS

Let us create a clarified real-life numerical example using two Triangular Fuzzy Numbers $Č_{HD}$ and $Ě_{HD}$ to represent uncertain quantities .In this example, we will consider a summary involving snowfall and temperature measurements. We will use Triangular Fuzzy numbers to represents the riskiness in these estimation over a 17-days period value of Minimum to Maximum temperature.

Numerical Examples:

Let us consider Triangular fuzzy Number

$Č_{HD}$ = (-12.9,-12.8,-11.7,-11.2,-10.5,-9.3,-8.2,-7.1, 0, 11.2, 9.3, 8.4, 7.5, 6.2, 5.4, 5.1, 4.1).

This Triangular Fuzzy Number represents the daily snowfall in cm for a month .It indicates that, for each day, the lower bound of snowfall is -7.1 cm, and the upper bound is 11.2 cm.

Let us consider Triangular fuzzy Number

$Ě_{HD}$ = (-4.9,-4.8,-3.7,-3.5,-2.8,-2.4,-1.3,-1.2, 0, 19.2, 18.3, 17.3, 16.1, 15.2, 15, 14.1, 13.1).

This Triangular Fuzzy Number represents the daily temperature in degree Celsius for a month. It indicates that, for each day, the lower bound of temperature is -1.2 degree Celsius, and the upper bound is 19.2 degree Celsius.

Using Triangular Fuzzy Numbers allow us to represent the riskiness in daily snowfall and temperature measurements. For example, on a particular day, the actual snowfall could be anywhere within the range specified by $\check{C}_{HD}$, and the temperature could be within the range specified by $\check{E}_{HD}$.

VI. CONCLUSION

In this paper the new shape of Reverse order Heptadecagonal Fuzzy Numbers is developed and named as RoHDFN.This RoHDFN will be very useful for many researchers and helps in pertaining the solution to Real life Problems. The incorporation of Alpha cuts provides a Precise and systematic approach to quantify the degree of riskiness associated with these Fuzzy Numbers. The results indicate that Reverse order Heptadecagonal Fuzzy Numbers are not only compelling from a theoretical standpoint but are also highly practical for tackling real world issues across a wide range of domains. These tools offer a fresh perspective on decision support systems, significantly enhancing the accuracy of the decision-making process in scenarios characterized by uncertainty.

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