ADV MATH SCI JOURNAL
Advances in Mathematics: Scientific Journal **9** (2020), no.11, 9509–9521
ISSN: 1857-8365 (printed); 1857-8438 (electronic)
https://doi.org/10.37418/amsj.9.11.53

MBJW - FILTERS OF LATTICE WAJSBERG ALGEBRAS

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ABSTRACT. In this paper we define the $\mathcal{MBJ}$w – filters of Lattice wajsberg algebras and proved the properties of$\mathcal{MBJ}$w – filters. We derive some relation between fuzzy ideals, interval valued fuzzy ideals to neutrosophic ideals. Further we prove that cut sets of $\mathcal{MBJ}$– sets formed $\mathcal{MBJ}w$ – filter. Finally define the $\mathcal{MBJ}$w– lattice filters and proved every $\mathcal{MBJ}$w – filter is a $\mathcal{MBJ}$w – lattice filter and converse is not true.

1. INTRODUCTION

In 1935, [20] Wajsberg introduced the concept of wajsberg algebra. In 1984, [5] Front, Antonio and Torrens led the lattice wajsberg algebra and define filters, properties of filters. Ibrahim and Saravan [1] introduced the strong implicative filters of lattice wajsberg algebras and derived some properties B.Ahamed introduced [2] the concept of fuzzy implicative filter and obtained some properties of lattice wajsberg algebra. At first L. A. Zadeh introduced the Fuzzy sets to handle the real life problems with uncertainty. After that several researchers [2, 7, 8, 14, 15, 19] applied the fuzzy theory to different algebras, differential equations and derived some results. Later Gaw derived the vague set as a generalization of fuzzy set. Vague theory applied to several streams by researchers [3, 4, 12, 13]. After that Smarandache [6, 18]introduced the concept of neutrosophic sets. Later Monoranjan and Madhumangal [9] recall some

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2020 *Mathematics Subject Classification.* 16P70, 16D25.
Key words and phrases. Lattice wajsberg algebra, MBJ-neutrosophic sets, MBJW – filters and MBJW– lattice filters.

definitions and introduced the truth value basedneutrosophic sets and neutrosophic sets and define new operations with examples. S.T. Rao, S.B. Kumar, H.S. Rao [16, 17] studied the gamma neutrosophic soft sets. Y.B. Jun, R.A. Borzooei and M. Mohseni [11] introduced the MBJ-neutrosophic sets and BMBJ-neutrosophic sets and applied to BCK algebra.

In this paper we consider MBJ-neutrosophic sets(M_B^J) defined by Y.B. Jun and introduce the concept (M_B^J)W-filter of lattice wajsberg algebra and obtain some results on them. For further information of lattice wajsberg algebra refer the wajsberg algebra [5] by Front, Antonio and Torrens and for MBJ-neutrosophic sets refer the [10] MBJ-neutrosophic structures.

2. PRELIMINARIES

Definition 2.1. *[5] Let* $(w, \rightarrow, ', 1_m)$ *be a wajsberg algebra if it satisfies the following axioms for all* $x_m, y_m, z_m \in w$

(i) $1_m \rightarrow x_m = x_m$
(ii) $(x_m \rightarrow y_m) \rightarrow ((y_m \rightarrow z_m) \rightarrow (x_m \rightarrow z_m)) = 1_m$
(iii) $(x_m \rightarrow y_m) \rightarrow y_m = (y_m \rightarrow x_m) \rightarrow x_m$
(iv) $(x_m^{'} \rightarrow y_m^{'}) \rightarrow (y_m \rightarrow x_m) = 1_m$

Definition 2.2. *[5] The wajsberg algebra* W *is called a lattice wajsberg algebra with the bounds* $0_m, 1_m$ *if it satisfies the following axioms for all* $x_m, y_m \in W$*: A partial ordering* $\leq$ *on* W*, such that* $x_m \leq y_m$ *if and only if* $x_m \rightarrow x_m = 1_m$*,* $(x_m \vee y_m) = (x_m \rightarrow y_m) \rightarrow y_m$ *and* $(x_m \wedge y_m) = ((x_m^{'} \rightarrow y_m^{'}) \rightarrow y_m^{'})$.

Let I denote the family of all intervals numbers of [0, 1]. If$I_1 = [a_1, b_1]$, $I_2 = [a_2, b_2]$ are two elements of $I[0, 1]$, we call $I_1 \geq^* I_2$ if $a_1 \geq a_2$ and $b_1 \geq b_2$. we define the term rmax to mean the maximum of two interval as rmax $[I_1, I_2] = [\max(a_1, a_2), \max(b_1, b_2)]$. Similarly, me can define the term rmin of any two intervals.

Definition 2.3. *[10] A neutrosophic set* (N^s)*, if the structure* $A_m =< y_m, w_T^A(y_m), w_I^A(y_m), w_F^A(y_m) >$, $y_m \in x$ *where* (w_T^A) *is truth membership function,* (w_I^A) *is an indeterminate membership function and* (w_F^A)*is false membership function, on a nonempty set X.*

Definition 2.4. *[10] A MBJ neutrosophic set($M_B^J - set$) is of the structure $A_m = < y_m, M_T^A(y_m), B_I^A(y_m), J_F^A(y_m) >, y_m \in x$ where M_T^A is truth membership function, B_I^A is an indeterminate interval –valued membership function and J_F^A is false membership function, on a nonempty set X .The M_B^J set is simply denoted by $A_m = (M_T^A, B_I^A, J_F^A)$. Throughout this paper W denotes the lattice wajsberg algebra and M_B^J- set denotes the MBJ-neutrosophic set.*

3. M_B^J-FILTERS

Definition 3.1. *A M_B^J- set $A_m = (M_T^A, B_I^A, J_F^A)$ on W is called a $M_B^J w - filter$ if it satisfies for all $x_m, y_m \in W$,*

(3.1) $M_T^A(1_m) \geq M_T^A(x_m)$, $B_I^A(1_m) \geq^* B(x_m)$ and $J_F^A(1_m) \leq J_F^A(x_m)$.

(3.2) $M_T^A(y_m) \geq \min\left\{M_T^A(x_m \to y_m), M_T^A(x_m)\right\}$,
$B_I^A(y_m) \geq^*$ *rmin* $\left\{B_I^A(x_m \to y_m), B_I^A(x_m)\right\}$
and $F^A(y_m) \leq \max\left\{J_F^A(x_m \to y_m), J_F^A(x_m)\right\}$.

Example 1. *Let $W = \{0_m, x_m, y_m, 1_m\}$ with the binary operation $\to$ as follows: The M_B^J- set $A_m = (M_T^A, B_I^A, J_F^A)$ defined on W as follows is M_B^J -filter of W.*

TABLE 1. W-Algebra

Col1	Col2	Col3	Col4	col5
$\to$	0_m	x_m	y_m	1_m
0_m	1_m	1_m	1_m	1_m
x_m	y_m	1_m	y_m	1_m
y_m	x_m	x_m	1_m	1_m
1_m	0_m	x_m	y_m	1_m

Col1	Col2	Col3	Col4
	M_T^A	B_I^A	J_F^A
0_m	$.551$	$[.557, .7]$	$.451$
x_m	$.551$	$[.557, .7]$	$.41$
y_m	$.71$	$[.61, .72]$	$.231$
1_m	$.71$	$[.61, .72]$	$.231$

Example 2. *Let* $W = \{0_m, x_m, y_m, z_m.v_m, 1_m\}$ *with the binary operation* $\rightarrow$ *as follows:*

TABLE 2. W-Algebra

Col1	*Col2*	*Col3*	*Col4*	*col5*	*col6*	*col7*
$\rightarrow$	0_m	x_m	y_m	z_m	v_m	1_m
0_m	1_m	1_m	1_m	1_m	1_m	1_m
x_m	z_m	1_m	y_m	z_m	y_m	1_m
y_m	v_m	x_m	1_m	y_m	x_m	1_m
z_m	x_m	x_m	1_m	1_m	x_m	1_m
v_m	y_m	1_m	1_m	y_m	1_m	1_m
1_m	0_m	x_m	y_m	x_m	y_m	1_m

The M_B^J*- set* $A_m = (M_T^A, B_I^A, J_F^A)$ *defined on* W *as follows is* M_B^J *-filter of* W*.*

TABLE 3. MBJW-filter

Col1	*Col2*	*Col3*	*Col4*
	M_T^A	B_I^A	J_F^A
0_m	$.451$	$[.5, .557]$	$.51$
x_m	$.671$	$[.6, .641]$	$.445$
y_m	$.451$	$[.5, .557]$	$.51$
z_m	$.451$	$[.5, .557]$	$.51$
v_m	$.451$	$[.5, .557]$	$.51$
1_m	$.671$	$[.6, .641]$	$.445$

Theorem 3.1. *Let* $A_m = (M_T^A, B_I^A, J_F^A)$ *is* M_B^J *- set of W. If* (M_T^A, J_F^A) *is an intuitionistic fuzzy filter of W and* B_I^{A+} *and* B_I^{A-} *are fuzzy filters of W then* $A_m = (M_T^A, B_I^A, J_F^A)$ *is a* M_B^J*w - filter of W.*

Proof. For any $x_m, y_m \in W$, we have

$B_I^A(1_m) = [B_I^{A-}(1_m), B_I^{A+}(1_m)] \geq^* [B_I^{A-}(x_m), B_I^{A+}(x_m)] = B_I^A(x_m)$ and

$B_I^A(y_m) = [B_I^{A-}(y_m), B_I^{A+}(ym_)]$

$\geq^* [\min\left\{B_I^{A-}(x_m \rightarrow y_m), B_I^{A-}(x_m)\right\}, \min\left\{B_I^{A+}(x_m \rightarrow y_m), B_I^{A+}(x_m)\right\}$

= rmin $\left\{[B_I^{A-}(x_m \rightarrow y_m), B_I^{A+}(x_m \rightarrow y_m)], [B_I^{A-}(x_m), B_I^{A+}(x_m)\right\}$

=rmin $\left\{B_I^A(x_m \rightarrow y_m), B_I^A(x_m)\right\}]$.

Therefore $A_m = (M_T^A, B_I^A, J_F^A)$ is a M_B^Jw - filter of W. If $A_m = (M_T^A, B_I^A, J_F^A)$ is a M_B^Jw - filter of W, then for all $x_m, y_m \in W$,

$[B_I^{A-}(y_m), B_I^{A+}(y_m)] = B_I^A(y_m) \geq^*$ rmin $\left\{B_I^A(x_m \to y_m), B_I^A(x_m)\right\}$
$=$ rmin $\left\{[B_I^{A-}(x_m \to y_m), B_I^{A+}(x_m \to y_m)], [B_I^{A-}(x_m), B_I^{A+}(x_m)\right\}$
$= \min\left\{B_I^{A-}(x_m \to y_m), B_I^{A-}(x_m)\right\}, \min\left\{B_I^{A+}(x_m \to y_m), B_I^{A+}(x_m)\right\}$

It follows that
$B_I^{A-}(y_m) \geq \min\left\{B_I^{A-}(x_m \to y_m), B_I^{A-}(x_m)\right\}$ and
$B_I^{A+}(y_m) \geq \min\left\{B_I^{A+}(x_m \to y_m), B_I^{A+}(x_m)\right\}$.

Thus B_I^{A-} and B_I^{A+} are fuzzy filters of W. But (M_T^A, J_F^A) is need not to be an intuitionistic fuzzy filter of W.

For example the M_B^J - sets $A_m = (M_T^A, B_I^A, J_F^A)$ and $B_m = (M_T^B, B_I^B, J_F^B)$ in the example 3.3 are M_B^Jw - filters of W but (M_T^A, J_F^A) is an intuitionistic fuzzy filter of W and (M_T^B, J_F^B) is not an intuitionistic fuzzy filter of W. □

Theorem 3.2. *If $A_m = (M_T^A, B_I^A, J_F^A)$ is a M_B^Jw - filter of W then the sets*

$$(M_T^A, B_I^{A-}, J_F^A)(M_T^A, B_I^{A+}, J_F^A)$$

are Nw– filters of W.

Proof. Let $A_m = (M_T^A, B_I^A, J_F^A)$ is a M_B^Jw - filter of$W$. Then $B_I^A(1_m) \geq^* B(x_m)$ then clearly $B_I^{A-}(1_m) \geq B_I^{A-}(x_m) and B_I^{A+}(1_m) \geq B_I^{A+}(x_m) for all x_m \in W$. And
$B_I^A(y_m) \geq^*$ rmin $\left\{B_I^A(x_m \to y_m), B_I^A(x_m)\right\}$
that is
$B_I^{A-}(y_m) \geq \min\left\{B_I^{A-}(x_m \to y_m), B_I^{A-}(x_m)\right\}$,
$B_I^{A+}(y_m) \geq \min\left\{B_I^{A+}(x_m \to y_m), B_I^{A+}(x_m)\right\}$.
B_I^{A-} and B_I^{A+} satisfies the necessary conditions. So the sets (M_T^A, B_I^{A-}, J_F^A) and (M_T^A, B_I^{A+}, J_F^A) are Nw– filters of W. □

Theorem 3.3. *Let $A_m = (M_T^A, B_I^A, J_F^A)$ isM_B^Jw - filter of W. If $x_m \leq y_m$ then $\left\{M_T^A(x_m) \leq M_T^A(y_m), B_I^A(x_m) \leq^* B_I^A(y_m) and J_F^A(x_m) \geq J_F^A(y_m)\right\}$ for all $x_m, y_m \in W$.*

Proof. Since $x_m \leq y_m$, then $x_m \to y_m = 1$. By A_m is M_B^Jw -filter of W, We have
$M_T^A(y_m) \geq \min\left\{M_T^A(x_m \to y_m), M_T^A(x_m)\right\}$
$= \min\left\{M_T^A(1_m), M_T^A(x_m)\right\} = M_T^A(x_m)$,
$B_I^A(y_m) \geq^*$ rmin $\left\{B_I^A(x_m \to y_m, B_I^A(x_m)\right\}$
$= \min\left\{B_I^A(1_m), B_I^A(x_m)\right\} = B_I^A(x_m)$

and

$$J_F^A(y_m) \le \max\left\{J_F^A(x_m \to y_m), J_F^A(x_m)\right\}$$
$$= \max\left\{J_F^A(1_m), J_F^A(x_m)\right\} = J_F^A(x_m).$$
□

Theorem 3.4. *A M_B^J set $A_m = (M_T^A, B_I^A, J_F^A)$ isM_B^Jw- filter of W if and only if it holds (3.1) and for all $x_m, y_m, z_m \in W$,*

(3.3) $$M_T^A(x_m \to y_m) \ge \min\left\{M_T^A(y_m \to (x_m \to z_m), M_T^A(y_m)\right\},$$
$$B_I^A(x_m \to z_m) \ge^* \textit{rmin}\left\{B_I^A(y_m \to (x_m \to z_m), B_I^A(y_m)\right\}$$

and

$$J_F^A(x_m \to z_m) \le \max\left\{J_F^A(y_m \to (x_m \to z_m)), J_F^A(y_m)\right\}.$$

Proof. Let A_m is a M_B^Jw –filter of$W$, perceptibly it hold (3.1) and (3.3).

Conversely suppose that A_m is aM_B^J- set with (3.1) and (3.3). Taking $x_m = 1_m$ in (3.3), we get

$$M_T^A(1_m \to z_m) \ge \min\left\{M_T^A(y_m \to (1_m \to z_m)), M_T^A(y_m)\right\}$$
$$M_T^A(z_m) \ge \min\left\{M_T^A(y_m \to z_m)), M_T^A(y_m)\right\},$$
$$B_I^A(1_m \to z_m) \ge^* \text{rmin}\left\{B_I^A(y_m \to (1_m \to z_m)), B_I^A(y_m)\right\}$$
$$B_I^A(z_m) \ge^* \text{rmin}\left\{B_I^A(y_m \to z_m), B_I^A(y_m)\right\}$$
$$J_F^A(1_m \to z_m) \le \max\left\{J_F^A(y_m \to (1_m \to z_m)), J_F^A(y_m)\right\}$$
$$J_F^A(z_m) \le \max\left\{J_F^A(y_m \to z_m), J_F^A(y_m)\right\}.$$

Hence A_m is a M_B^Jw-filter of W. □

Theorem 3.5. *A M_B^J set $A_m = (M_T^A, B_I^A, J_F^A)$ is M_B^Jw- filter of W if and only if it hold (3.1) and*

(3.4) $$M_T^A((x_m \to (y_m \to z_m)) \to z_m) \ge \min\left\{M_T^A(x_m), M_T^A(y_m)\right\},$$
$$B_I^A((x_m \to (y_m \to z_m)) \to z_m) \ge^* \textit{rmin}\left\{B_I^A(x_m), B_I^A(y_m)\right\}$$

and

$$J_F^A((x_m \to (y_m \to z_m)) \to z_m) \le \max\left\{J_F^A(x_m), J_F^A(y_m)\right\},$$

for all $x_m, y_m, z_m \in W$.

Proof. Suppose that A_m is a M_B^Jw- filter of W and $x_m, y_m, z_m \in W$. Clearly

$$M_T^A((x_m \to (y_m \to z_m)) \to z_m)$$
$$\ge \min\left\{M_T^A((x_m \to (y_m \to z_m)) \to (y_m \to z_m)), M_T^A(y_m)\right\}$$

and

$((x_m \to (y_m \to z_m)) \to (y_m \to z_m) = (x_m(y_m \to z_m) \geq x_m$.
So, $M_T^A(((x_m \to (y_m \to z_m)) \to (y_m \to z_m)) \geq M_T^A(x_m)$.

From above we get,
$M_T^A((x_m \to (y_m \to z_m)) \to z_m) \geq \min\left\{M_T^A(x_m), M_T^A(y_m)\right\}$.
Clearly,
$B_I^A((x_m \to (y_m \to z_m)) \to z_m)$
$\geq \min\left\{B_I^A((x_m \to (y_m \to z_m)) \to (y_m \to z_m)), B_I^A(y_m)\right\}$
and
$B_I^A(((x_m \to (y_m \to z_m)) \to (y_m \to z_m)) \geq B_I^A(x_m)$.
From above we get
$B_I^A((x_m \to (y_m \to z_m)) \to z_m) \geq^*$ rmin $\left\{B_I^A(x_m), B_I^A(y_m)\right\}$.
Clearly
$J_F^A((x_m \to (y_m \to z_m)) \to z_m)$
$\leq \min\left\{J_F^A((x_m \to (y_m \to z_m)) \to (y_m \to z_m)), J_F^A(y_m)\right\}$
and
$J_F^A(((x_m \to (y_m \to z_m)) \to z_m) \leq J_F^A(x_m)$.
From above we get,$J_F^A((x_m \to (y_m \to z_m)) \to z_m) \leq \max\left\{J_F^A(x_m), J_F^A(y_m)\right\}$.

Conversely suppose that A_m is a M_B^J -set with (3.1) and (3.4).
$M_T^A(y_m) = M_T^A(1_m \to y_m) = M_T^A(((x_m \to y_m) \to (x_m \to y_m)) \to y_m)$
$\geq \min\left\{M_T^A(x_m \to y_m), M_T^A(x_m)\right\}$.
$B_I^A(y_m) = B_I^A(1_m \to y_m) = B_I^A(((x_m \to y_m) \to (x_m \to y_m)) \to y_m)$
$\geq^* \min\left\{B_I^A(x_m \to y_m), B_I^A(x_m)\right\}$.
$J_F^A(y_m) = J_F^A(1_m \to y_m) = J_F^A(((x_m \to y_m) \to (x_m \to y_m)) \to y_m)$
$\leq \max\left\{J_F^A(x_m \to y_m), J_F^A(x_m)\right\}$.

So, A_m is a M_B^Jw –filter of W. □

Theorem 3.6. *Every M_B^Jw- filter $A_m = (M_T^A, B_I^A, J_F^A)$ fulfills the following result: If $x_m \to (y_m \to z_m) = 1_m$ then for all $x_m, y_m, z_m \in W$,*
$M_T^A(z_m) \geq \min\left\{M_T^A(x_m), M_T^A(y_m)\right\}$*,* $B_I^A(z_m) \geq^*$ *rmin* $\left\{B_I^A(x_m), B_I^A(y_m)\right\}$
and $J_F^A(z_m) \leq \max\left\{J_F^A(x_m)), J_F^A(y_m)\right\}$

Proof. Suppose A_m is M_B^Jw - filter of W and $x_m \to (y_m \to z_m) = 1_m$ and $x_m, y_m, z_m \in W$.
We get
$M_T^A(z_m) \geq \min\left\{M_T^A(y_m \to z_m), M_T^A(y_m)\right\}$

$$\geq \min\left\{\min\left\{M_T^A(x_m), M_T^A(x_m \to (y_m \to z_m))\right\}, M_T^A(y_m)\right\}$$
$$\geq \min\left\{\min\left\{M_T^A(x_m), M_T^A(1_m)\right\}, M_T^A(y_m)\right\}$$
$$\geq \min\left\{M_T^A(x_m), M_T^A(y_m)\right\}$$

$$B_I^A(z_m) \geq^* \text{rmin}\left\{B_I^A(y_m \to z_m), B_I^A(y_m)\right\}$$
$$\geq^* \text{rmin}\left\{\min\left\{B_I^A(x_m), B_I^A(x_m \to (y_m \to z_m))\right\} B_I^A(y_m)\right\}$$
$$\geq^* \text{rmin}\left\{\min\left\{B_I^A(x_m), B_I^A(1_m)\right\}, B_I^A(y_m)\right\}$$
$$\geq^* \text{rmin}\left\{B_I^A(x_m), B_I^A(y_m)\right\}$$

and

$$J_F^A(z_m) \leq \max\left\{J_F^A(y_m \to z_m), J_F^A(y_m)\right\}$$
$$\leq \max\left\{\max\left\{J_F^A(x_m), J_F^A(x_m \to (y_m \to z_m))\right\}, J_F^A(y_m)\right\}$$
$$\leq \max\left\{\max\left\{J_F^A(x_m), J_F^A(1_m)\right\}, J_F^A(y_m)\right\}$$
$$\leq \max\left\{J_F^A(x_m), J_F^A(y_m)\right\}.$$

□

Lemma 3.1. *Every M_B^J set $A_m = (M_T^A, B_I^A, J_F^A)$ of W fulfills the following result for all $x((n_w), ----------, x(1_w), y_m \in W$:*

If $x(n_w) \to (x(n-1)_w) \to ------- (x(1_w) \to y_m)) = 1_m$ then

$M_T^A(y_m) \geq \min\left\{M_T^A(x(n_w)), -------, M_T^A(x(1_w))\right\}$,

$B_I^A(y_m) \geq^*$ *rmin* $\left\{B_I^A(x(n_w)), ------, B_I^A(x(1_w))\right\}$.

And $J_F^A(y_m) \leq \max\left\{J_F^A(x(n_w)), ------, J_F^A(x(1_w))\right\}$.

Theorem 3.7. *Let A_m and B_m are two M_B^Jw –filters of W, then $A_m \cap B_m$ is also a M_B^Jw-filter of W.*

Proof. Let x_m, y_m, $z_m \in W$ such that $x_m \leq (y_m \to z_m)$, then $x_m \to (y_m \to z_m) = 1_m$. Since A_m and B_m are twoM_B^Jw –filters of W, we have

$M_T^A(z_m) \geq \min\left\{M_T^A(x_m), M_T^A(y_m)\right\}$, $B_I^A(z_m) \geq^*$ rmin $\left\{B_I^A(xm), B_I^A(ym)\right\}$

and

$J_F^A(zm) \leq \max\left\{J_F^A(x_m)), J_F^A(y_m)\right\}$.

$M_T^B(z_m) \geq \min\left\{M_T^B(x_m), M_T^B(y_m)\right\}$,

$B_I^B(z_m) \geq^*$ rmin $\left\{B_I^B(x_m), B_I^B(y_m)\right\}$

and

$J_F^B(z_m) \leq \max\left\{J_F^B(x_m)), J_F^B(y_m)\right\}$.

$$M_T^(A \cap B)(z_m) = \min\left\{M_T^A(z_m), M_T^B(z_m)\right\}$$
$$= \min\left\{\min\left\{M_T^A(x_m), M_T^A(y_m)\right\}, \min\left\{M_T^B(x_m), M_T^B(y_m)\right\}\right\}$$
$$= \min\left\{\min\left\{M_T^A(x_m), M_T^B(x_m)\right\}, \min\left\{M_T^A(y_m), M_T^B(y_m)\right\}\right\}$$
$$= \min\left\{M_T^(A \cap B)(x_m), M_T^(A \cap B)(y_m)\right\}$$

$$\begin{aligned} B_I^(A \cap B)(z_m) &= \min\left\{B_I^A(z_m), B(z_m)\right\} \\ &= \min\left\{\min\left\{B_I^A(x_m), B_I^A(y_m)\right\}, \min\left\{B_I^B(x_m), B_I^B(y_m)\right\}\right\} \\ &= \min\left\{\min\left\{B_I^A(x_m), B_I^B(x_m)\right\}, \min\left\{B_I^A(y_m), B_I^B(y_m)\right\}\right\} \\ &= \min\left\{B_I^(A \cap B)(x_m), B_I^(A \cap B)(y_m)\right\}. \end{aligned}$$

$$\begin{aligned} J_F^(A \cap B)(z_m) &= \max\left\{J_F^A(z_m), J_F^B(z_m)\right\} \\ &= \max\left\{\max\left\{J_F^A(x_m), J_F^A(y_m)\right\}, \max\left\{J_F^B(x_m), J_F^B(y_m)\right\}\right\} \\ &= \max\left\{\max\left\{J_F^A(x_m), J_F^B(x_m)\right\}, \max\left\{J_F^A(y_m), J_F^B(y_m)\right\}\right\} \\ &= \max\left\{J_F^(A \cap B)(x_m), J_F^(A \cap B)(y_m)\right\}. \end{aligned}$$

So $A_m \cap B_m$ is a M_B^Jw – filter of W.

□

Theorem 3.8. *The M_B^J -set $A_m = (M_T^A, B_I^A, J_F^A)$ is M_B^Jw- filter of W if and only if its nonempty M_B^J cut sets $M_T^(A_\alpha)$ and $J_F^(A_\gamma)$ are implicative filters of W and $B_I^(A_\beta)$ is an intuitionistic fuzzy filter of W for all $\alpha, \gamma \in [0,1]$ and $[\beta_1, \beta_2] \in I$.*

Proof. Suppose $A_m$is M_B^Jw-filter of W and $\alpha, \gamma \in [0,1]$ and $[\beta_1, \beta_2] \in I$.

Let $M_T^(A_\alpha), B_I^(A_\beta)$ and $J_F^(A_\gamma)$ are nonempty. Obviously $1_m \in M_T^(A_\alpha)$, $1_m \in B_I^(A_\beta)$ and $1_m \in J_F^(A_\gamma)$. Let $x_1, x_2, y_1, y_2, z_1 and z_2 \in W$ such that $(x_1 \to x_2, x_1 \in M_T^(A_\alpha))$, $(y_1 \to y_2, y_1) \in B_I^(A_\beta))$ and $(z_1 \to z_2, z_1 \in J_F^(A_\gamma))$. Then:

$M_T^A(x_2) \geq \min\left\{M_T^A((x_1 \to x_2), M_T^A(x_1))\right\} \geq \alpha$ implies $x_2 \in M_T^(A_\alpha)$

$B_I^A(y_2) \geq^*$ rmin $\left\{B_I^A(y_1 \to y_2), B_I^A(y_1)\right\} \geq [\beta_1, \beta_2]$ implies $y_2 \in B_I^(A_\beta)$.

$J_F^A(z_2) \leq \max\left\{J_F^A(z_1 \to z_2), J_F^A(z_1)\right\} \leq \gamma$ implies $z_2 \in J_F^(A_\gamma)$.

So, $M_T^(A_\alpha)$ and $J_F^(A_\gamma)$ are implicative filters of W and $B_I^(A_\beta)$ is an intuitionistic fuzzy filter of W.

Conversely, suppose that $M_T^(A_\alpha)$ and $J_F^(A_\gamma)$ are implicative filters of W and $B_I^(A_\beta)$ is an intuitionistic fuzzy filter of W for all $\alpha, \gamma \in [0,1]$ and $[\beta_1, \beta_2] \in I$. For any $x_m, y_m, z_m \in W$ such that $M_T^A(x_m) = \alpha$, $B_I^A(y_m) = [\beta_1, \beta_2]$ and $J_F^A(z_m) = \gamma$. Then $x_m \in M_T^(A_\alpha)$, $y_m \in B_I^(A_\beta)$ and $z_m \in J_F^(A_\gamma)$, so$M_T^(A_\alpha), B_I^(A_\beta)$ and $J_F^(A\gamma)$ are nonempty.

For any $x_1, x_2 \in W$, let $\alpha = \min\{M_T^A(x_1 \to x_2), M_T^A(x_1)\}$, $[\beta_1, \beta_2] = \min\{B_I^A(x_1 \to x_2), B_I^A(x_1)\}$ and $\gamma = \{J_F^A(x_1 \to x_2), J_F^A(x_1)\}$.

Then clearly:

$M_T^A(x_2) \geq \alpha = \min\left\{M_T^A(x_1 \to x_2), M_T^A(x_1)\right\}$

$B_I^A(y_2) \geq^* [\beta_1, \beta_2] = \min\left\{B_I^A(x_1 \to x_2), B_I^A(x_1)\right\}$

and

$J^A_F(z_2) \leq \gamma = \max\left\{J^A_F(x_1 \operatorname{Re} x_2, J^A_F(x_1)\right\}.$

So, $A_m = (M^A_T, B^A_I, J^A_F)$ is a M^J_Bw – filter of W. □

Lemma 3.2. *If A_m is a M^J_Bw-filter of W then $M^(_T A_\alpha) \cap B^(_I A_\beta) \cap J^(_F A_\gamma)$ are implicative filters of W.*

Theorem 3.9. *Any implicative filter A of$w$ is a $(\alpha, [\alpha, \alpha], \alpha)$ cut- M^J_B of W.*

Proof. Let A is implicative filter of W and $\alpha \in [0, 1]$. Consider a M^J_B- set:

$A_m = (M^A_T(y_m), [B^{A-}_I(y_m)B^{A+}_I(y_m)],$

$J^A_F(y_m) = (\alpha, [\alpha, \alpha], \alpha)$ if $y_m \in A_m$ and

$A_m = (0_m, [0_m, 0_m], 0_m)$ if y_m not in A_m. Let $x_m, y_m \in W$. If $y_m \in A$ then

$M^A_T(y_m) = \alpha \geq min\left\{M^A_T(x_m \to y_m), M^A_T(x_m)\right\},$

$B^A_I(y_m) = [\alpha, \alpha] \geq^* \min\left\{B^A_I(x_m \to y_m), B^A_I(x_m)\right\}$

and

$J^A_F(y_m) = \alpha \leq \max\left\{J^A_F(x_m \to y_m), J^A_F(x_m)\right\}.$

Suppose $y_m notin A$ then $x$not in A or $x_m \to y_m$ not in A. So

$M^A_T(y_m) = 0_m = \min\left\{M^A_T(x_m \to y_m), M^A_T(x_m)\right\}$

$B^A_I(y_m) = [0_m, 0_m] = \min\left\{B^A_I(x_m \to y_m), B^A_I(x_m)\right\}$

and

$J^A_F(y_m) = 0_m = \max\left\{J^A_F(x_m \to y_m), J^A_F(_x m)\right\}$. So, A_m is M^J_Bw – filter of W. □

Theorem 3.10. *If A_m is M^J_Bw - filter of W then the set*

$A = \left\{x_m \in W/(M^A_T(y_m), B^A_I(y_m, y_m,), J^A_F(y_m) = (M^A_T(1_m), B^A_I[1_m, 1_m], J^A_F(1_m)\right\}$

is a implicative filter of W.

Proof. Clearly

$A = \left\{x_m \in W/(M^A_T(y_m), B^A_I(y_m, y_m,), J^A_F(y_m) = (M^A_T(1_m), B^A_I[1_m, 1_m], J^A_F(1_m)\right\},$

and $1_m \in A$. Let $x_m, y_m \in w$ such that $x_m, x_m \to y_m \in A$. Then

$M^A_T(x_m \to y_m) = M^A_T(x_m) = M^A_T(1_m),$

$B^A_I(x_m \to y_m) = B^A_I(x_m) = B^A_I[1_m, 1_m]$

and

$J^A_F(x_m \to y_m) = J^A_F(x_m) = J^A_F(1_m).$

So,

$M^A_T(y_m) \geq \min\left\{M^A_T(x_m \to y - m), M^A_T(x_m)\right\} = M^A_T(1_m),$

$B_I^A(y_m) \geq^* \text{rmin}\left\{B_I^A(x_m \to y_m), B_I^A(x_m)\right\} = B_I^A(1_m)$

and

$J_F^A(y_m) \leq \max J_F^A(x_m \to y_m), J_F^A(x_m) = J_F^A(1_m)$.

That is $y_m \in A$. So A a implicative filter of W. □

Definition 3.2. *A M_B^J set $A_m = (M_T^A, B_I^A, J_F^A)$ is on W is called a M_B^Jw -lattice filter if it satisfies for all $x_m, y_m \in W$,*

(3.5) $M_T^A(x_m \wedge y_m) \geq \min\left\{M_T^A(x_m), M_T^A(y_m)\right\}$, $B_I^A(x_m \wedge y_m)) \geq^*$ *rmin* $\left\{B_I^A(x_m), B_I^A(y_m)\right\}$ *and* $J_F^A(x_m \wedge y_m) \leq \max\left\{J_F^A(x_m), J_F^A(y_m)\right\}$

Example 3. *TheM_B^J set $A_m = (M_T^A, B_I^A, J_F^A)$ defined on W as follows is M_B^J -lattice filter of W.*

TABLE 4. MBJW-Lattice filter

Col1	*Col2*	*Col3*	*Col4*
	M_T^A	B_I^A	J_F^A
0_m	$.547$	$[.557, .6]$	$.451$
x_m	$.547$	$[.557, .6]$	$.451$
y_m	$.721$	$[.561, .64]$	$.331$
z_m	$.721$	$[.561, .64]$	$.331$
v_m	$.547$	$[.557, .6]$	$.451$
1_m	$.721$	$[.561, .64]$	$.331$

Theorem 3.11. *Every M_B^Jw -filter A_m of W is M_B^J -lattice filter of W.*

Proof. Let $A_m$is a M_B^Jw - filter of W.

$$\begin{aligned}
M_T^A(x_m \wedge y_m) &\geq \min\left\{M_T^A(x_m \to (x_m \wedge y_m)), M_T^A(x_m)\right\} \\
&= \min\left\{M_T^A(x_m \to y_m), M_T^A(x_m)\right\} \\
&\geq \min\left\{\min\left\{M_T^A(y_m \to (x_m \wedge y_m)), M_T^A(y_m)\right\}, M_T^A(x_m)\right\} \\
&\geq \min\left\{\min\left\{M_T^A(1_m), M_T^A(y_m)\right\}, M_T^A(x_m)\right\} \\
&= \min\left\{M_T^A(y_m), M_T^A(x_m)\right\} \\
B_I^A(x_m \wedge y_m) &\geq^* \min\left\{B_I^A(x_m \to (x_m \wedge y_m)), B_I^A(x_m)\right\} \\
&= \min\left\{B_I^A(x_m \to y_m), B_I^A(x_m)\right\} \\
&\geq^* \min\left\{min\left\{B_I^A(y_m \to (x_m \wedge y_m)), B_I^A(y_m)\right\}, B_I^A(x_m)\right\} \\
&\geq^* \min\left\{min\left\{B_I^A(1_m), B_I^A(y_m)\right\}, B_I^A(x_m)\right\}
\end{aligned}$$

$$
\begin{aligned}
&= \min\left\{B_I^A(y_m), B_I^A(x_m)\right\} \\
J_F^A(x_m \wedge y_m) &\leq \min\left\{J_F^A(x_m \to (x_m \wedge y_m)), J_F^A(x_m)\right\} \\
&= \min\left\{J_F^A(x_m \to y_m), J_F^A(x_m)\right\} \\
&\leq \min\left\{min\left\{J_F^A(y_m \to (x_m \wedge y_m)), J_F^A(y_m)\right\}, J_F^A(x_m)\right\} \\
&\leq \min\left\{min\left\{J_F^A(1_m), J_F^A(y_m)\right\}, J_F^A(x_m)\right\} \\
&= \min\left\{J_F^A(y_m), J_F^A(x_m)\right\}.
\end{aligned}
$$

So A_m of W is M_B^J -lattice filter of W. □

Remark 3.1. *The M_B^J -lattice filter of W is need not to be a M_B^J -filter of W. For example the M_B^J -lattice filter of A_m of W in example 3 is not a M_B^J - filter of W because $M_T^A(z_m) \leq \min\left\{M_T^A(y_m \to z_m), M_T^A(y_m)\right\}$.*

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