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FLEXIBLE FUZZY SOFT M- STRUCTURES UNDER THE EXTENSIONS OF MOLODTSOV'S SOFT SETS THEORY

V. VANITHA[1], G. SUBBIAH[2*] AND M. NAVANEETHAKRISHNAN[3]

[1]Research scholar, Reg.No:11898, Department of Mathematics,
Kamaraj College, Thoothukudi-628 003, Tamil Nadu, India.

[2*]Associate Professor, Department of Mathematics,
Sri K. G. S. Arts College, Srivaikuntam-628 619, Tamil Nadu, India.

[3]Associate Professor, Department of Mathematics,
Kamaraj College, Thoothukudi-628 003, Tamil Nadu, India.

Manonmaniam Sundaranar University, Abishekapatti,
Tirunelveli – 627012, Tamil Nadu, India.

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ABSTRACT

In this paper, we introduce flexible fuzzy soft M-group structures by using Molodtsov's definition of soft sets and investigate their related properties with respect to α-inclusion of soft sets.

Keywords: *Soft set, flexible fuzzy soft set, flexible soft M-group ,flexible fuzzy soft M-group structure ,α-inclusion, pre-image and inverse image.*

SECTION-1: INTRODUCTION

Soft set theory was introduced by Molodtsov [26] for modeling vagueness and uncertainty and it has been received much attentionin the field of set theory. Maji *et.al* [23, 24] explains the applications of soft sets in decision making problems. Ali *et.al* [2] defined some new operations in soft set theory and Sezgin and Atagun [31] introduced and studied operations of soft sets. Soft set theory has also potential applications especially in decision making as in [31]. This theory has started to progress in the mean of algebraic structures, since Aktas and Cagman [3] defined and studied soft groups. Since then, soft substructures of rings, fields and modules [4], union soft substructures of near-rings and near-ring modules [32], normalistic soft groups [25] are defined and studied in detailed. The theory of G-modules originated in the 20th century. Representation theory was developed on the basis of embedding a group G in to a linear group GL(V).In 1999, Molodtsov's [26] proposed an approach for Modeling, Vagueness and uncertainty, called soft set theory, since its inception, works on soft set theory have been progressing rapidly with a wide range applications especially in the mean of algebraic structures as in [2-12]. The structures of soft sets , operations of soft sets and some related concepts have been studied by [14-19]. The theory of soft set continues to experience tremendous growth and diversification in the mean of soft decision making as in the following studies [20-23] as well. Atagun and Sezgin defined soft N-subgroups and soft N-ideals of an N-group, they studied their properties with respect to soft set operators in more detail. In this paper, we introduce flexible fuzzy soft M-Group by using Molodtsov's definition of soft sets and investigate their related properties with respect to α-inclusion of soft sets.

Corresponding Author: G. Subbiah[2]*
[2]Associate Professor, Department of Mathematics,*
Sri K. G. S. Arts College, Srivaikuntam-628 619, Tamil Nadu, India.

SECTION-2: PRELIMINARIES

Definition 2.1: Let $(\Gamma,+)$ be a group and μ: M x $\Gamma\to\Gamma(m,\nu)\to m\nu$, (Γ,μ) is called an M-group if x, y$\in$ M and $\forall\nu\in\Gamma$,

(i) $x(y\,\nu)=(xy)\,\nu$ and

(ii) $(x+y)\,\nu = x\,\nu + y\,\nu$. It is denoted by N^{Γ}.

Clearly M itself is an M-group by natural operation. A subgroup H of $\Gamma$with MH$\subseteq$ H is said to be an M-subgroup of Γ. Let $\Gamma$and ψ be two M- groups. Then f:$\Gamma\to\psi$ is called an M-homomorphism if $\forall\nu$, H $\in\Gamma$, $\forall$ m$\in$M

(i) $f(\nu + H) = f(\nu)+f(H)$ and

(ii) $f(m\nu) = mf(\nu)$

For all undefined concepts and notations, we refer to [27]. From now on U refers to initial universe, E is a set of parameters, 2^U is the power set of U and A, B, C $\subseteq$ E

Definition 2.2: Let U be any Universal set, E set of parameters and A$\subseteq$ E. Then a pair (ꝺ, A) is called soft set over U, where ꝺ is a mapping from A to 2^U , the power set of U.

Example 2.3: Let X=$\{c_1,c_2,c_3\}$ be the set of three cars and E={costly(e_1), metallic colour(e_2), cheap(e_3)}be the set of parameters, where A=$\{e_1,e_2\}\subset$ E. Then (ꝺ,A) ={ꝺ(e_1) =$\{c_1,c_2,c_3\}$,ꝺ(e_2) = $\{c_1,c_2\}$ } is the crisp soft set over X.

Definition 2.4 [Moltdosov]: Let U be an initial universe. Let P (U) be the power set of U, E be the set of all parameters and A⊆ E. A soft set (f_A, E) on the universe U is defined by the set of order pairs (f_A, E) = {(e, f_A (e)): e∈ E, f_A∈ P (U)} where f_A : E ⟶ P (U) such that f_A (e) = ϕ if e $\notin$A. Heref_A is called an approximate function of the soft set.

Example 2.5: Let U = $\{u_1, u_2, u_3, u_4\}$ be a set of four shirts and E = {white(e_1),red(e_2), blue (e_3)} be a set of parameters. If A = $\{e_1 ,e_2\}$ ⊆ E. Let $f_A(e_1)$ = $\{u_1, u_2 ,u_3, u_4\}$ and $f_A(e_2)$= $\{u_1,u_2,u_3\}$. Then we write the soft set (f_A , E)= {(e_1, $\{u_1, u_2 ,u_3, u_4\}$), (e_2,{ u_1,u_2,u_3})} over U which describe the "colour of the shirts" which Mr. X is going to buy. We may represent the soft set in the following form:

U	e_1	e_2	e_3
u_1	1	1	0
u_2	1	1	0
u_3	1	1	0
u_4	1	0	0

Definition 2.6: Let U be the universal set, E set of parameters and A$\subset$ E. Let ꝺ(X) denote the set of all fuzzy subsets of U. Then a pair (ꝺ,A) is called fuzzy soft set over U, where ꝺ is a mapping from A to ꝺ(U).

Example 2.7: Let U=$\{c_1,c_2,c_3\}$ be the set of three cars and E={costly(e_1),metallic colour (e_2), cheap(e_3)} be the set of parameters, where A=$\{e_1,e_2\}\subset$ E. Then (ꝺ,A) = {ꝺ(e_1) =$\{c_1/0.6,c_2/0.4,c_3/0.3\}$, ꝺ($e_2$) = $\{c_1/0.5,c_2/0.7,c_3/0.8\}$} is the fuzzy soft set over U denoted by F_A.

Definition 2.8: Let ꝺ$_A$ be a fuzzy soft set over U and α be a subset of U. Then upper α - inclusion of ꝺ$_A$ denoted by ꝺ$^{\alpha}_A$ = {x$\in$A /ꝺ(x) $\geq\alpha$ }.

Similarly ꝺ$^{\alpha}_A$ = {x$\in$ A / ꝺ(x) $\leq\alpha$ } is called lower α-inclusion of ꝺ$_A$.

Definition 2.9: Let ꝺ$_A$ and G_B be fuzzy soft sets over the common universe U and ψ: A $\to$ B be a function. Then fuzzy soft image of ꝺ$_A$ under ψ over U denoted by ψ(ꝺ$_A$) is a set-valued function, where ψ(ꝺ$_A$): B$\to$ 2^U defined by ψ(ꝺ$_A$) (b)={$\cup${ꝺ(a) / a$\in$A and ψ (a)=b} , if $\psi^{-1}(b)\neq\varphi$} for all b$\in$B, the soft pre-image of G_B under ψ over U denoted by $\psi^{-1}(G_B)$ is a set-valued function, where $\psi^{-1(}(G_B)$: A $\to$ 2^U defined by $\psi^{-1}(G_B)(b) = G(\psi(a))$ for all a $\in$ A. Then fuzzy soft anti-image of ꝺ$_A$ under ψ over U denoted by ψ(ꝺ$_A$ is a set-valued function, where ψ(ꝺ$_A$):B $\to$ 2^U defined by ψ^{-1}(ꝺ$_A$)(b)={$\cap$ {ꝺ(a) / a$\in$A and ψ (a)=b}, if $\psi^{-1}(b)\neq\varphi$ }for all b $\in$B.

Definition 2.10[Subbiah et.al]: Let X be a set. Then a mapping μ: X$\to$ $M^*([0, 1])$ is called flexible subset of X, where $M^*([0, 1])$ denotes the set of all non empty subset of [0, 1]

Definition 2.11 [Subbiah et.al]: Let X be a non empty set .Let μ and λ be two flexible fuzzy subsets of X. Then the intersection of μ and λ denoted by $\mu\cap\lambda$ and defined by $\mu\cap\lambda=\{\min\{a, b\}/ a\in\mu(x),b\in\lambda(x)\}$ for all $x\in X$. The union of μ and λ and denoted by $\mu\cup\lambda$ and defined by $\mu\cup\lambda=\{\max\{a,b\}/ a\in\mu(x),b\in\lambda(x)\}$ for all $x\in X$.

Definition 2.12 [Naim Cagman]: Let U be an initial universe, E be the set of all parameters and $A\subseteq E$. A pair (F, A) is called a flexible fuzzy soft set over U where F: $A \rightarrow \tilde{P}(U)$ is a mapping from A into $\tilde{P}(U)$, where $\tilde{P}(U)$ denotes the collection of all subsets of U.

Example 2.13: Consider the example 2.5, here we cannot express with only two real numbers 0 and 1, we can characterized it by a membership function instead of crisp numbers 0 and 1, which associate with each element a real number in the interval [0,1].Then

$(f_A, E) = \{f_A(e_1) = \{(u_1, 0.7), (u_2, 0.5), (u_3, 0.4), (u_4, 0.2)\},$
$f_A(e_2) = \{(u_1, 0.5), (u_2, 0.1), (u_3, 0.5)\}\}$

is the fuzzy soft set representing the "colour of the shirts" which Mr. X is going to buy.

Definition 2.14: Let H be an M-subgroup of Γ and ꝏ be a flexible fuzzy soft over Γ. If for all x, $y\in$ H and $m\in M$,

(i) max{ꝏ(x-y), φ} $\leq$ min {ꝏ(x) $\cup$ ꝏ(y), θ} and
(ii) max{ꝏ(mx), φ} $\leq$ min {ꝏ(x), θ}, then the flexible fuzzy soft set ꝏ is called a threshold flexible fuzzy soft M-subgroup of Γ and denoted by ꝏ$<_M\Gamma$

Example 2.15: Consider M={0,1,2,3} be a group with operation +

+	0	1	2	3
0	0	1	2	3
1	1	2	3	0
2	2	3	0	1
3	3	0	1	2

If we define a flexible fuzzy soft set G over Γ by

G(x) ={$y \in\Gamma$/ 3x=y} for all $x \in$ H.

Then G(0)={0} and G(2)={2} since G(2-2)=G(0) $\neq$ G(2),G is not a threshold flexible fuzzy soft M-subgroup of Γ.

Definition 2.16: The relative complement of the flexible fuzzy soft set ꝏ$_A$ over U is denoted by ꝏ$^r{}_A$ where ꝏ$^r{}_A$:$A\rightarrow 2^U$ is a mapping given as ꝏ$^r{}_A$(x) = U/ꝏ$_A$(x),for all $x \in A$.

SECTION-3: Characterization's of threshold flexible fuzzy soft M-group structures

In this section, we characterize the flexible fuzzy soft set through M-group structures.

Proposition 3.1: Let ꝏ$_A$ be a flexible fuzzy soft set over Γ and α be a subset of Γ. If ꝏ$_A$ is a flexible fuzzy soft M-subset of Γ, then upper α- inclusion of ꝏ$_A$ is an M-subgroup of Γ.

Proof: Since ꝏ$_A$ is flexible fuzzy soft M-subgroup of Γ. Assume x ,$y\in$ꝏ$_A{}^\alpha$ and $m\in M$, then ꝏ(x)$\geq\alpha$ and ꝏ(y) $\geq\alpha$. We need to show that x-y$\in$ꝏ$_A{}^\alpha$and m$\in$ꝏ$_A{}^\alpha$.Since ꝏ$_A$ is flexible fuzzy soft M-subgroup of Γ, it follows that max{ꝏ(x-y), φ} $\leq$ min{(ꝏ(x),ꝏ(y)), θ }= min{(α,α), θ}$\geq\alpha$ and max{ꝏ(mx), φ}$\leq$ min {α, θ} = α which completes the proof.

Proposition 3.2: Let ꝏ$_A$ be a flexible fuzzy soft set over Γ. Then ꝏ$_A$ is a threshold flexible fuzzy soft M-subgroup of Γ if ꝏ$_A{}^r$ is threshold flexible anti fuzzy soft M-subgroup of Γ.

Proof: Let ꝏ$_A$ be a threshold flexible fuzzy soft M-subgroup of Γ.Then for all x, $y \in A$ and $m\in M$.

max{ꝏ$_A{}^r$(x-y), φ} = Γ / max {ꝏ$_A$(x-y), φ}
$\geq \Gamma$/ min {ꝏ$_A$(x),ꝏ$_A$(y), θ}
= min{Γ / ꝏ$_A$ (x), Γ/ ꝏ$_A$(y), θ}
= min{ꝏ$_A{}^r$(x), ꝏ$_A{}^r$(y), θ}

max{ꝏ$_A{}^r$(mx), φ} = Γ / max{ꝏ$_A$(mx), φ}
$\geq \Gamma$ / min {ꝏ$_A$(x), θ}

max{ꝏ$_A{}^r$(mx), φ}= min {ꝏ$_A{}^r$(x), θ}.

Hence ꝏ$_A{}^r$ is threshold flexible anti fuzzy soft M-subgroup of Γ.

Proposition 3.3: Let $ↁ_A$: $X \to X^1$ be a soft homomorphism of M-subgroups. If $ↁ_A$ is threshold flexible fuzzy soft M-subgroup of X, then $ↁ_A$ is threshold flexible fuzzy soft M-subgroup of X^1.

Proof: Suppose $ↁ_A$ is threshold flexible fuzzy soft M-subgroup of X^1, then

(i) Let $x^1, y^1 \in X^1$, then exists x , y $\in$X such that
$f(x) = x^1$ and $f(y)=y^1$, we have

$$\max\{ↁ_A(x^1-y^1), \varphi\}= \min\{ↁ_A(f(x)-f(y)), \theta\}$$
$$\leq \min\{ↁ_A(f(x)),ↁ_A(f(y)), \theta\}$$
$$\max\{ↁ_A(x^1-y^1), \varphi\} = \min\{ↁ_A^1(x),ↁ_A^1(y), \theta\}$$

(ii) $\max\{ↁ_A(mx^1),\varphi\}= \min\{ↁ_A(mf(x)), \theta\} \leq \min\{ↁ_A^f(x), \theta\}$
$\max\{ↁ_A(mx^1), \varphi\}= \min\{ↁ_A^f(x), \theta\}$.
.: $ↁ_A$ is threshold flexible fuzzy soft M-subgroupX .

Proposition 3.4: Let $ↁ_A$ be threshold flexible soft M-sub group of X and $ↁ_A^\alpha$ be a flexible fuzzy soft set in X given by $ↁ_A^\alpha(x)=ↁ_A(x)+1-ↁ(1)$ for all x $\in$X. Then $ↁ_A^\alpha$ is threshold flexible fuzzy soft M-subgroup of X and $ↁ_A \subseteq ↁ_A^\alpha$.

Proof: Since $ↁ_A$ is threshold flexible fuzzy soft M-subgroup of X and $ↁ_A^\alpha(x)=ↁ_A(x)+1- ↁ_A(1)$ for x $\in$X. For any x, y $\in$ X, we have $ↁ_A(1)=ↁ_A(1)+1-ↁ_A(1)=1>ↁ_A^\alpha(x)$ and for all x ,y $\in$ X, we have

$$\max\{ↁ_A^\alpha (x-y), \varphi\} = \max\{ↁ_A(x-y)+1-ↁ_A(1), \varphi\}$$
$$\leq \min\{(ↁ_A(x),ↁ_A(y))+1-ↁ_A(1), \theta\}$$
$$= \min\{ↁ_A(x)+1-ↁ_A(1),ↁ_A(y)+1-ↁ_A(1),\theta\}$$
$$= \min\{ↁ_A^\alpha(x),ↁ_A^\alpha(y), \theta\}$$

$$\max\{ↁ_A^\alpha(mx), \varphi\} = \max\{ↁ_A(mx)+1-ↁ_A(1), \varphi\}$$
$$= \min\{ↁ_A(x)+1-ↁ_A(1), \theta\}$$
$$= \min\{ↁ_A^\alpha(x), \theta\}$$

Hence $ↁ_A^\alpha$ is threshold flexible fuzzy soft M-subgroup of X and $ↁ_A \subseteq ↁ_A^\alpha$.

Proposition 3.5: Let $ↁ_A$ and G_B two flexible fuzzy soft sets over Γ, where A and B are M- groups of Γ and ø: A $\to$ B is an M-homomorphism. If $ↁ_A$ is threshold flexible fuzzy soft M- subgroup of Γ, then so is ø ($ↁ_A$).

Proof: Let $\alpha_1, \alpha_2 \in$ B such ø is surjective, there exists $a_1,a_2 \in$A such that $ø(a_1)=\alpha_1$ and $ø(a_2)=\alpha_2$.Thus

$$\max\{ (ø\, ↁ_A)(\alpha_1 - \alpha_2), \varphi \} = \max\{ↁ(a)/A \in A, ø(A)=\alpha_1- \alpha_{2, \varphi}\}$$
$$= \max\{ↁ(a)/A\in A,A=ø^{-1}(\alpha_1 - \alpha_2), \varphi\}$$
$$= \max\{ↁ(a)/A\in A,A=ø^{-1}(ø(a_1- a_2))= A_1 - A_{2,} \varphi\}$$
$$= \max\{ↁ(a_1 - a_2)/\alpha_1,\alpha_2\in B, ø(a_i)= \alpha_i ,i =1,2, \varphi\}$$
$$= \min\{\max\{ↁ(a_1)/\alpha_1\in B,ø(a_1) = \alpha_1,\theta\}, \max\{ↁ(a_2)/\alpha_2\in B,ø(a_2)=\alpha_2, \theta\}\}$$
$$= \min\{ø(ↁ_A)(\alpha_1),ø(ↁ_A)(\alpha_2), \theta\}$$

Now let m$\in$M and $\alpha\in$ B. Since ø surjective, then exists $\bar{A}\in$A such that $ø(\bar{A})=0$. We have

$$\max \{ø(ↁ_A)(m\alpha), \varphi\} = \max\{ↁ(A)/A\in A, ø (A)=m\alpha, \varphi\}$$
$$= \max\{ↁ(A)/A\in A,A=ø^{-1}(m\alpha), \varphi\}$$
$$= \max\{ↁ(A)/A\in A,A=ø^{-1}(mø(\bar{A})), \varphi\}$$
$$= \max\{ↁ(A)/A\in A,A=ø^{-1}(ø(mA))=m\bar{A}, \varphi\}$$
$$= \max\{ↁ(m\bar{A})/\bar{A}\in A ,ø(\bar{A})=\alpha, \varphi\}$$
$$= \min\{ↁ(\bar{A})/\bar{A}\in A ,ø(\bar{A})=\alpha, \theta\}$$
$$= \min\{ø(ↁ_A)(\alpha), \theta \}.$$ Hence

Hence $Ø(ↁ_A)$ is threshold flexible fuzzy soft M-subgroup of Γ.

Proposition 3.6: Let $ↁ_A$:X$\to$Y be a soft homomorphism of M-subgroups. If $ↁ_A$ is threshold flexible fuzzy soft M-subgroup of Y, then $ↁ_A^f$ is threshold flexible fuzzy soft M-subgroup of X.

Proof: Suppose $ↁ_A$ is threshold flexible fuzzy soft M-subgroup of Y, then

i) For all x ,y $\in$ X ,we have

$$\max \{ↁ_A (x- y), \varphi \} = \max\{ↁ_A(f(x- y), \varphi\}$$
$$= \max\{ↁ_A (f(x)-f(y), \varphi\}$$
$$= \min\{ↁ_A(f(x)),ↁ_A(f(y)), \theta\}$$
$$= \min\{ↁ_A^f(x),ↁ_A^f(y), \theta\}$$

ii) $\max\{\text{Ꮚ}_A^f(mx), \varphi\} = \max\{\text{Ꮚ}_A(f(mx)), \varphi\} \leq \min\{\text{Ꮚ}_A(f(x)), \theta\}$
$= \min\{\text{Ꮚ}_A^f(x), \theta\}$.

Therefore Ꮚ_A^f is threshold flexible fuzzy soft M- subgroup of X.

Proposition 3.7: Let Ꮚ_A and G_B be flexible fuzzy soft sets over Γ, where A and B are M-subgroups of Γ. Let Ø be on M-homomorphism from A to B. If G_B is a threshold flexible fuzzy soft M-subgroup of Γ, then so is $Ø^{-1}(G_B)$.

Proof: Let $a_1, a_2 \in A$. Then

$$\begin{aligned} \max\{(Ø^{-1}(G_B))(a_1-a_2), \varphi\} &= \max\{G(Ø(a_1-a_2)), \varphi\} \\ &\geq \min\{G(Ø(a_1), Ø(a_2), \theta\} \\ &= \min\{(Ø^{-1}(G_B)(a_1), Ø^{-1}(G_B)(a_2), \theta\} \end{aligned}$$

Now let $m \in M$ and $A \in A$, then

$$\begin{aligned} \max\{(Ø^{-1}(G_B))(m_A), \varphi\} &= \max\{G(Ø(m_A)), \varphi\} \\ &= \min\{G(mØ(A)), \theta\} \\ &= \min\{G(Ø(A)), \theta\} \\ &= \min\{(Ø^{-1}(G_B))(A), \theta\}. \end{aligned}$$

Hence $Ø^{-1}(G_B)$ is a flexible fuzzy soft M-subgroup of Γ.

CONCLUSION

This paper summarized the basic concepts of flexible soft sets. By using these concepts we studied the algebraic properties of flexible fuzzy soft M-groups. This work focused on flexible fuzzy soft pre-image, flexible fuzzy soft image, flexible fuzzy soft anti image. To extend this work one could study the properties of flexible fuzzy soft M-groups in other algebraic structures such as rough set and vague set.

REFERENCES

1. Acar U, Koyuncu F and Tanay B (2010), Soft sets and soft rings Comput math Appl 59:3458-3463.
2. Ali MI, Feng F, Liu X, Min WK and Shabir M(2009), On some new operations in soft set theory. Comput math Appl 57:1547-1553.
3. Aktas H and Cagman N (2007), Soft sets and Soft groups, InformnSci 177:2726-2735.
4. AtagunAO and Sezgin A(2011), Soft structures of rings and fields and modules Comput math Appl 61(3) 592-601.
5. Aygunoglu A and Aygun H (2009), Introduction to fuzzy soft groups, Comput math Appl 58:1279-1286.
6. Cogman N and Enginoglu S (2010), Soft set theory and uni-int decision making, Eur J Oper Res 207:848-855.
7. Cogman N and Enginoglu S (2010), Soft matrix theory and its decision making, Comput math Appl 59:3308-
8. CagmanN,Citak F and Enginoglu S (2010), Fuzzy Parameterized fuzzy soft set theory and its applications. Turkish J Fuzzy Syst. 1:21-35.
9. CagmanN,Citak F and Enginoglu S (2011), Fuzzy soft set theory and its applications, Iran.J fuzzy syst 8(3):137-147.
10. Feng F, Liu X Y, Leoreanu-Fotea V and Jun Y B (2011), Soft sets and soft rough sets. Inform Sci 181(6): 1125-1137.
11. Feng F, Liu YM Leoreanu- FoteaV(2010), Application of Level soft sets in decision making based on interval-valued Fuzzy soft sets. Comput Math Appl60:1756-1767.
12. Feng F, Li C Davvaz B and Ali MI (2010), soft sets combined with fuzzy sets and rough sets: a tentative approach. Soft Compute 14(9): 899-911.
13. Feng F, Jun YB, Liu X and Li L(2010), An adjustable approach to fuzzy soft set based decision making. J Compute Appli Math 234:10-20.
14. Feng F, Jun YB and Zhao X (2008), Soft semi rings. Compute Math Appli 56:2621-2628.
15. Jun YB(2008), Soft BCK/BCI – Algebras. Comput Math Appli 56:1408-1413.
16. Y.B. Jun and C.H. Park, Applications of soft sets in ideal theory of BCK/BCI-algebras, Inform, Sci. 178 (2008), 2466-2475.
17. Jun YB, Kim H S and Neggers J (2009), Pseudo D – Algebras. Inform Sci 179:1751-1759.
18. Y.B. Jun, Lee K J and Zhan J (2009), Soft P-ideals of soft BCI-algebras, Compute. Math, Appl. 58:2060-2068.
19. Y.B. Jun, Lee K J and Khan A (2010), Soft ordered semi groups. Math Logic Q 56(1): 42-50.
20. Y.B. Jun, Lee K J and Park C H (2010), Fuzzy Soft set theory applied to BCK/BCI algebras. Compute Math appli 59: 3180-3192.
21. Kong Z, Gao L ,Wang L and Li S (2008), The Normal parameter reduction of soft sets and its algorithms. Compute Math. Appli 56:3029-3037.

22. Kovkov D V, Kolbanov V M and D. Molodtsov(2007), Soft sets theory based optimization. J Compute SystSciint 46(6):872-880.
23. P.K. Maji, A.R. Roy and R. Biswas, An application of soft sets in a decision making problem, Compute, Math. Appl. 44 (2002), 1077-1083.
24. P.K. Maji, R. Biswas and A.R. Roy, Soft set theory, Compute, Math, Appl. 45 (2003), 555-562.
25. Majumdgar B and Samanta SK (2010), Generalised fuzzy soft sets. Compute math Appli 59:1425-1432.
26. D. Molodtsov, Soft set theory - First results, Compute. Math, Appl. 37 (1999), 19-31.
27. D. Molodtsov, Lionov V Y, Kovkov D V (2006), Soft sets technique and its appli. NechetkieSystemi I MyakieVychisleniya 1(1) : 8-39.
28. Mushrif M M, Sengupta S and A. K Roy (2006) ,Texture classification using a novel, soft set theory based classification algorithm. Lect Notes Compute Science 3851:246-254.
29. C.H. Park, Y.B. Jun and Ozturk M A (2008), Soft WS-Algebras Commun Korean Math Soc 23(3): 313-324.
30. P.K. Maji and A.R. Roy, (2007), A fuzzy soft set theoretic approach to decision making problem, J Compute Math. Appli 203: 412-418.
31. Sezgin A and AtagunAO (2011), An operations of soft sets. Compute Math Appli 61(5):1457-1467.
32. Sezgin A, Atagun AO and Aygun E (2012) A Note on soft near rings and idealistic soft near rings. Filomat 25(1):53-68.
33. Xiao Z, Gong Kand Zou Y (2009) A combined forecasting approach based on fuzzy soft sets. J Compute Math Appli 228:326-333.
34. Zhan J and Jun Y B (2010), Soft BL Algebras based on fuzzy sets. Compute math. Appli.59:2037-2046.
35. Zou Y and Xiao Z (2008) Data analysis approaches of soft sets under incomplete information. Knowl-based Syst 21:941-945.

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