An Objective Fuzzy Nonlinear Programming Problem with Symmetric Trapezoidal Fuzzy Numbers

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Abstract:

In this paper, an objective fuzzy non linear programming problem with symmetric trapezoidal fuzzy numbers and proposed method are introduced .This method is easy to solve quadratic programming problem with non linear programming problem. The parameters of the objective function and constraints are fuzzy. The non linearity of the functions makes the solution of the problem much more involved compared to linear programming problem and there is no single algorithm like the simplex method. Finally numerical example is given by using ranking function of symmetric trapezoidal fuzzy numbers and proposed method.

Keywords: Ranking function, Symmetric trapezoidal fuzzy numbers, Objective fuzzy non linear programming, Modified Simplex method

1. Introduction

The fuzzy set theory is being applied in many fields these days. One of these is non-linear programming problems. Fuzzy non-linear programming problem is useful in solving problems which are difficult, impossible, subjective nature of problem formation or have an accurate solution. In this paper, the fuzzy NLPP is used in quadratic programming which has fuzzy parameters on objective function and constraints with fuzzy coefficients. Quadratic programming problem with fuzzy non linear programming problem of maximum objective function general form:

$$\text{Max } \tilde{z} = f(\tilde{x}) = \sum_{j=1}^{n} \tilde{c}_j \tilde{x}_j + \frac{1}{2}\sum_{j=1}^{n} \sum_{k=1}^{n} \tilde{c}_{jk}\tilde{x}_j\tilde{x}_k$$

Subject to the constraints

$$\sum_{j=1}^{n} \tilde{a}_{ij}\tilde{x}_j \leq \tilde{b}_i \quad , \quad \tilde{x}_j \geq 0 \quad (\text{I} = 1,2\ldots\ldots m \ , \ j = 1,2\ldots.n)$$

Where $\tilde{c}_{jk} = \tilde{c}_{kj}$ for all j , k and $\tilde{b}_i \geq 0$,i = 1,2…m. The quadratic form $\sum\sum \tilde{c}_{jk}\tilde{x}_j\tilde{x}_k$ be negative semi-definite. Terlaky's algorithm [9] proposed an algorithm which does not require the enlargement of the basis table as Frank-Wolfe[10]method. This proposed method is different from Terlaky, Wolfe etc. The simplex method for fuzzy variable linear programming problem discussed for single objective by [3]. In this paper we discuss an objective fuzzy non-linear programming model as given in [6], [8] in which the fuzzy parameters are involved in both objective function and also constraints. More over symmetric trapezoidal fuzzy numbers and the ranking procedure given by [2] are used. This paper outline is: In section 2, symmetric trapezoidal fuzzy numbers, ranking function and arithmetic operations of symmetric trapezoidal fuzzy numbers are discussed as in [2]. In section 3, objective fuzzy non linear programming problem. In section 4,Proposed method. In section 5, a numeric example is provided. In section 6, conclusion.

2. Preliminaries

In this section, we discuss the symmetric trapezoidal fuzzy numbers and their arithmetic operations as in [2]

2.1 Symmetric trapezoidal fuzzy number

Let us consider a symmetric trapezoidal fuzzy number

$\tilde{w} = (w_1, w_2, \text{h}, \text{h})$

$$\tilde{w}(x) = \begin{cases} \frac{m}{h} + \frac{h - w_1}{h}, & m \in [w_1\text{-h}, w_1] \\ 1, & m \in [w_1, w_1] \\ \frac{-m}{h} + \frac{w_2 + h}{h}, & m \in [w_2\text{-h}, w_2] \\ 0, & \text{otherwise} \end{cases}$$

Where $w_1 \le w_2$ and $h \ge 0$ in the real line R.

2.2 Ranking function

Let G(S) be the set of all symmetric trapezoidal fuzzy numbers. For $\tilde{w} = (w_1, w_2, h, h) \varepsilon$ G(S), we define a ranking function F: G(S) → R by

$$F(\tilde{w}) = \frac{(w_1 - h) + (w_2 + h)}{2} = \frac{w_1 + w_2}{2}$$ as in [2]

2.3 Arithmetic operations on symmetric trapezoidal fuzzy numbers

For $\tilde{m} = (m_1, m_2, h, h)$ and $\tilde{n} = (n_1, n_2, k, k)$ in F(S)

We define

Addition: $\tilde{m} + \tilde{n} = (m_1, m_2, h, h) + (n_1, n_2, k, k)$

$= ((F(\tilde{m}) + F(\tilde{n}))-s, (F(\tilde{m}) + F(\tilde{n}))+s, h + k, h + k)$

where $s = \frac{(n_2 + m_2) - (n_1 + m_1)}{2}$

Subtraction: $\tilde{m} - \tilde{n} = (m_1, m_2, h, h) - (n_1, n_2, k, k)$

$= ((F(\tilde{m}) - F(\tilde{n}))-s, (F(\tilde{m}) - F(\tilde{n}))+s, h + k, h + k)$

where $s = \frac{(n_2 + m_2) - (n_1 + m_1)}{2}$

Multiplication: $\tilde{m}\,\tilde{n} = (m_1, m_2, h, h)\,(n_1, n_2, k, k)$

$= ((F(\tilde{m}) + F(\tilde{n}))-s, (F(\tilde{m}) + F(\tilde{n}))+s, |m_2 h + n_2 k|, |m_2 h + n_2 k|)$

where $s = \frac{\beta - \alpha}{2}$

Division: $\frac{1}{(m_1, m_2, h, h)} = \left[\frac{1}{F(\tilde{m})} - s, \frac{1}{F(\tilde{m})} + s, h, h\right]$

where $s = \frac{1}{2}\left(\frac{1}{m_1} - \frac{1}{m_2}\right)$

Scalar multiplication:

$\lambda\tilde{m} = (\lambda m_1, \lambda m_2, \lambda h, \lambda h)$, for $\lambda \ge 0$

$(\lambda m_2, \lambda m_1, -\lambda h, -\lambda h)$, for $\lambda < 0$

3. Objective fuzzy non-linear programming problem

The objective fuzzy non-linear programming problem can be formulated as follows

Max $\sum_{j=1}^{n} \tilde{c}_{kj} \tilde{x}_j^{\alpha}$ k = 1, 2…p

Subject to the constrains

$\sum \tilde{a}_{ij} \tilde{x}_j \le \tilde{b}_i$ i = 1, 2….m where $\tilde{c}_{kj}, \tilde{a}_{ij}, \tilde{b}_i$ are fuzzy numbers.

4. Proposed Algorithm

Step1: Convert inequality constraints into equations by introducing slack variables $\tilde{x}_i^2$ (i = 1,2..m) in the ith Constraints and the slack variables $\tilde{x}_j^2$ (j=1, 2, 3…..n) in the jth constraints.

Step 2: Convert the Lagrangian function

$$L(\tilde{x}, \tilde{s}, \tilde{\lambda}, \tilde{\mu}) = f(\tilde{x}) - \sum_{i=1}^{m} \tilde{\lambda}_i \left[\sum_{j=1}^{n} \tilde{p}_{ij}\tilde{x}_j - \tilde{q}_i + \tilde{s}_i^2\right] - \sum_{j=1}^{n} \tilde{\mu}_j \left[-\tilde{x}_j + \tilde{s}_j^2\right].$$

Differentiating the Lagrangian function L($\tilde{x}, \tilde{s}, \tilde{\lambda}, \tilde{\mu}$)with respect to the components of $\tilde{x}, \tilde{s}, \tilde{\lambda}, \tilde{\mu}$ and equating the first order partial derivative to zero. Derive Kuhn tucker condition from the resulting equations.

Step 3: Introduce non- negative artificial variables $\tilde{y}_j$ (j=1,2…n)in the Kuhn tucker condition

$$\tilde{c}_j + \sum_{k=1}^{n} \tilde{c}_{jk}\tilde{x}_k - \sum_{i=1}^{m} \tilde{\lambda}_i \tilde{a}_{ij} + \tilde{\mu}_j = 0$$

for j=1,2…n and construct an objective function

$$\tilde{z} = \tilde{y}_1 + \tilde{y}_2 \ldots\ldots\ldots \tilde{y}_n$$

Step 4: Obtain an initial basic feasible solution to the LPP:

Min $\tilde{z} = \tilde{y}_1 + \tilde{y}_2 \ldots\ldots\ldots \tilde{y}_n$

subject to the constraints:

$$\sum_{k=1}^{n} \tilde{c}_{jk}\tilde{x}_k - \sum_{i=1}^{m} \tilde{\lambda}_i \tilde{a}_{ij} + \tilde{y}_j = -\tilde{c}_j \ ;(j=1,2\ldots n)$$

$$\sum_{j=1}^{n} \tilde{a}_{ij}\tilde{x}_j + \tilde{s}_i^2 = \tilde{q}_i \ ; \ (i=1,2\ldots m)$$

$$\tilde{\lambda}_{i,}, \ \tilde{\mu}_j, \tilde{x}_{j,} \tilde{y}_j, \tilde{a}_i \geq 0, \ (i = 1,2,\ldots.m)(j = 1,2,3\ldots..n)$$

and satisfying the slackness condition:

$$\tilde{\lambda}_i \tilde{s}_i = 0 \ \text{ and } \ \tilde{\mu}_j \tilde{x}_j = 0$$

Step 5: solve this LPP by above steps .Choose greatest coefficients .If greatest coefficient is unique, then variable corresponding to this column becomes incoming variable. If greatest coefficient is not unique, then use tie breaking technique.

Step 6: Compute the ranking function with $\tilde{x}_B$ (R.H.S).Choose minimum ranking, the variable corresponding to this row is Outgoing variable. If artificial variable is outgoing in the basis means corresponding artificial column also will be removed.

Step 7: Then proceed this table given by [6] and go to next step.

Step 8: Ignore corresponding row and column. Proceed to step5 for remaining elements and repeat the same procedure. Either an optimal solution is obtained or there is an indication of an unbounded solution.

Step 9: If all rows and columns are ignored, current solutions an optimal solution. Thus optimum solution is obtained

And which is the given solution of given QPP.

5. Numerical Example

We consider an objective fuzzy non-linear programming problem

Max $\tilde{z} = \tilde{2}\,\tilde{x}_1 + \tilde{3}\,\tilde{x}_2 - \tilde{2}\,\tilde{x}_1^2$

Subject to $\tilde{x}_1 + \tilde{4}\,\tilde{x}_2 \leq \tilde{4}$

$\tilde{x}_1 + \tilde{x}_2 \leq \tilde{2}$

$\tilde{x}_1, \tilde{x}_2 \geq 0$

1st we transform all the fuzzy coefficients into symmetric trapezoidal fuzzy numbers

Max $\tilde{z}$ = (0.25, 2.25, 2, 2) $\tilde{x}_1$ + (1.25, 3.25, 2, 2) $\tilde{x}_2$ - (0.25, 2.25, 2, 2) $\tilde{x}_1^2$

Subject to

(0.75, 1.25, 0.5, 0.5) $\tilde{x}_1$ + (2.25, 4.25, 2, 2) $\tilde{x}_2$ $\leq$ (2.25, 4.25, 2, 2)

(0.75, 1.25, 0.5, 0.5) $\tilde{x}_1$ + (0.75. 1.25, 0.5. 0.5) $\tilde{x}_2 \leq$ (0.25, 2.25, 2, 2)

We convert the inequality constraints into equations by introducing slack variables $\tilde{x}_3^2$ and $\tilde{x}_4^2$ respectively.

Considering $\tilde{x}_1 \geq 0$ and $\tilde{x}_2 \geq 0$ also as the inequality constraints, we convert then also into equations by introducing slack variables $\tilde{x}_5^2$ and $\tilde{x}_6^2$ in them. The problem thus becomes

Max $\tilde{z}$ = (0.25, 2.25, 2, 2) $\tilde{x}_1$ + (1.25, 3.25, 2, 2) $\tilde{x}_2$ - (0.25, 2.25, 2, 2) $\tilde{x}_1^2$

Subject to the constraints

(0.75, 1.25, 0.5, 0.5) $\tilde{x}_1$ + (2.25, 4.25, 2, 2) $\tilde{x}_2$ + (0.75, 1.25, 0.5, 0.5) $\tilde{x}_3^2$ = (2.25, 4.25, 2, 2)

(0.75, 1.25, 0.5, 0.5) $\tilde{x}_1$ + (0.75, 1.25, 0.5, 0.5) $\tilde{x}_2$ + (0.75, 1.25, 0.5, 0.5) $\tilde{x}_4^2$ = (0.25, 2.25, 2, 2)

- (0.75, 1.25, 0.5, 0.5) $\tilde{x}_1$ + (0.75, 1.25, 0.5, 0.5) $\tilde{x}_5^2$ = (0, 0, 0, 0)

- (0.75, 1.25, 0.5, 0.5) $\tilde{x}_2$ + (0.75, 1.25, 0.5, 0.5) $\tilde{x}_6^2$ = (0, 0, 0, 0)

Construct the Lagrangian function and equate the first order partial derivative of L with respect to the variables $\tilde{x}_1$, $\tilde{x}_2$, $\tilde{x}_3$, $\tilde{x}_4$, $\tilde{x}_5$, $\tilde{x}_6$, $\tilde{\lambda}_1$, $\tilde{\lambda}_2$, $\tilde{\lambda}_3$, $\tilde{\lambda}_4$. After simplification the problem becomes

(2.25, 4.25, 2, 2) $\tilde{x}_1$ + (0.75, 1.25, 0.5, 0.5) $\tilde{\lambda}_1$ + (0.75, 1.25, 0.5, 0.5) $\tilde{\lambda}_2$ - (0.75, 1.25, 0.5, 0.5) $\tilde{\lambda}_3$ = (0.25, 2.25, 2, 2)

(2.25, 4.25, 2, 2) $\tilde{\lambda}_1$ + (0.75, 1.25, 0.5, 0.5) $\tilde{\lambda}_2$ - (0.75, 1.25, 0.5, 0.5) $\tilde{\lambda}_4$ = (1.25, 3.25, 2, 2)

(0.75, 1.25, 0.5, 0.5) $\tilde{x}_1$ + (2.25, 4.25, 2, 2) $\tilde{x}_2$ + (0.75, 1.25, 0.5, 0.5) $\tilde{x}_3^2$ = (2.25, 4.25, 2, 2)

(0.75, 1.25, 0.5, 0.5) $\tilde{x}_1$ + (0.75, 1.25, 0.5, 0.5) $\tilde{x}_2$ + (0.75, 1.25, 0.5, 0.5) $\tilde{x}_4^2$ = (0.25, 2.25, 2, 2)

Where x_j j=1, 2 satisfying the complementary slackness conditions

(0.75, 1.25, 0.5, 0.5) $\tilde{\lambda}_1$ $\tilde{x}_3^2$ + (0.75, 1.25, 0.5, 0.5) $\tilde{\lambda}_2$ $\tilde{x}_4^2$ + (0.75, 1.25, 0.5, 0.5) $\tilde{x}_1$ $\tilde{\lambda}_3$ + (0.75, 1.25, 0.5, 0.5) $\tilde{x}_2$ $\tilde{\lambda}_4$ = (0, 0, 0, 0) where $\tilde{x}_1$, $\tilde{x}_2$, $\tilde{x}_3$, $\tilde{x}_4$, $\tilde{\lambda}_i > 0$

Now introducing the artificial variables to the given QPP:

Min $\tilde{z}$ = (0.75, 1.25, 0.5, 0.5) $\tilde{A}_1$ + (0.75, 1.25, 0.5, 0.5) $\tilde{A}_2$

Subject to the constrains

(2.25, 4.25, 2, 2) $\tilde{x}_1$ + (0.75, 1.25, 0.5, 0.5) $\tilde{\lambda}_1$ + (0.75, 1.25, 0.5, 0.5) $\tilde{\lambda}_2$ + (0.75, 1.25, 0.5, 0.5) $\tilde{\lambda}_3$ + (0.75, 1.25, 0.5, 0.5) $\tilde{A}_1$ = (0.25, 2.25, 2, 2)

(2.25, 4.25, 2, 2) $\tilde{\lambda}_1$ + (0.75, 1.25, 0.5, 0.5) $\tilde{\lambda}_2$ - (0.75, 1.25, 0.5, 0.5) $\tilde{\lambda}_1$ + (0.75, 1.25, 0.5, 0.5) $\tilde{A}_2$ = (0.25, 2.25, 2, 2)

(0.75, 1.25, 0.5, 0.5) $\tilde{x}_1$ + (2.25, 4.25, 2, 2) $\tilde{x}_2$ + (0.75, 1.25, 0.5, 0.5) $\tilde{x}_3$ = (2.25, 4.25, 2, 2)

(0.75, 1.25, 0.5, 0.5) $\tilde{x}_1$ + (0.75, 1.25, 0.5, 0.5) $\tilde{x}_2$ + (0.75, 1.25, 0.5, 0.5) $\tilde{x}_4$ = (0.25, 2.25, 2, 2)

$\tilde{x}_1$, $\tilde{x}_2$, $\tilde{x}_3$, $\tilde{x}_4$, $\tilde{A}_1$, $\tilde{A}_2$, $\tilde{\lambda}_i > 0$, i = 1, 2, 3, 4

C_J	B	R.H.S	$\tilde{x}_1$	$\tilde{x}_2$	$\tilde{x}_3^2$	$\tilde{x}_4^2$	$\tilde{\lambda}_1$	$\tilde{\lambda}_2$	$\tilde{\lambda}_3$	$\tilde{\lambda}_4$	$\tilde{A}_1$	$\tilde{A}_2$	F(Z)
(0.75 , 1.25, 0.5, 0.5)	$\tilde{A}_1$	(0.25, 2.25, 2, 2)	(2.25, 4.25, 2, 2)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0.75, 1.25, 0.5, 0.5)	(0.75, 1.25, 0.5, 0.5)	(-1.25, -0.75, 0.5, 0.5)	(0, 0, 0, 0)	(0.75 , 1.25, 0.5, 0.5)	(0, 0, 0, 0)	1.25
(0.75 , 1.25, 0.5, 0.5)	$\tilde{A}_2$	(1.25, 3.25, 2, 2)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(2.25, 4.25, 2, 2)	(0.75, 1.25, 0.5, 0.5)	(0, 0, 0, 0)	(-1.25, -0.75, 0.5, 0.5)	(0, 0, 0, 0)	(0.75 , 1.25, 0.5, 0.5)	2.25
(0, 0, 0, 0)	$\tilde{x}_3$	(2.25, 4.25, 2, 2)	(0.75, 1.25, 0.5, 0.5)	(2.25 , 4.25, 2, 2)	(0.75 , 1.25, 0.5, 0.5)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	3.25
(0, 0, 0, 0)	$\tilde{x}_4$	(0.25, 2.25, 2, 2)	(0.75, 1.25, 0.5, 0.5)	(0.75 , 1.25, 0.5, 0.5)	(0, 0, 0, 0)	(0.75 , 1.25, 0.5, 0.5)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	1.25
	Z		(1.44,5.06 , 4.62,4.62)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(2.5,7.5, 6.25,6.25)	(1,3,2.5,2.5)	(-1.5,0.5, 0.25,0.25)	(-1.5,0.5, 0.25,0.25)	(0, 0, 0, 0)	(0, 0, 0, 0)	

C_J	B	R.H.S	$\tilde{x}_1$	$\tilde{x}_2$	$\tilde{x}_3^2$	$\tilde{x}_4^2$	$\tilde{\lambda}_1$	$\tilde{\lambda}_2$	$\tilde{\lambda}_3$	$\tilde{\lambda}_4$	$\tilde{A}_2$	F(Z)
(0, 0, 0, 0)	$\tilde{x}_1$	(0.25, 2.25, 2, 2)	(2.25, 4.25, 2, 2)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0.75, 1.25, 0.5, 0.5)	(0.75, 1.25, 0.5, 0.5)	(- 0.25, -0.75, 0.5, 0.5)	(0, 0, 0, 0)	(0, 0, 0, 0)	1.25
(0.75, 1.25, 0.5, 0.5)	$\tilde{A}_2$	(1.25, 3.25, 2, 2)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(2.25, 4.25, 2, 2)	(0.75, 1.25, 0.5, 0.5)	(0, 0, 0, 0)	(- 0.25, -0.75, 0.5, 0.5)	(0.75, 1.25, 0.5, 0.5)	2.25
(0, 0, 0, 0)	$\tilde{x}_3$	(- 1.92.3.25, 5.62,5.62)	(-5.25, -0.75, 5.5, 5.5)	(2.25, 4.25, 2, 2)	(0.75, 1.25, 0.5, 0.5)	(0, 0, 0, 0)	(0.5, 1.5, 1.25, 1.25)	(0.5, 1.5, 1.25, 1.25)	(-0.5, -0.5, 0.25, 0.25)	(0, 0, 0, 0)	(0, 0, 0, 0)	0.6
(0, 0, 0, 0)	$\tilde{x}_4$	(-3.62,3.62 5.62,5.62)	(-5.25, -0.75, 5.5, 5.5)	(0.75, 1.25, 0.5, 0.5)	(0, 0, 0, 0)	(0.75, 1.25, 0.5, 0.5)	(0.5, 1.5, 1.25, 1.25)	(0.5, 1.5, 1.25, 1.25)	(1.5, 0.5, 0.25, 0.25)	(0, 0, 0, 0)	(0, 0, 0, 0)	0
	z		(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(1.44,5.06, 4.62,4.62)	(0.5, 1.5, 1.25, 1.25)	(0, 0, 0, 0)	(-1.5, -0.5, 0.25, 0.25)	(0.5, 1.5, 1.25, 1.25)	

C_J	B	R.H.S	$\tilde{x}_1$	$\tilde{x}_2$	$\tilde{x}_3^2$	$\tilde{x}_4^2$	$\tilde{\lambda}_1$	$\tilde{\lambda}_2$	$\tilde{\lambda}_3$	$\tilde{\lambda}_4$	$\tilde{A}_2$	F(Z)
(0, 0, 0, 0)	$\tilde{x}_1$	(0.25, 2.25, 2, 2)	(2.25, 4.25, 2, 2)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0.75, 1.25, 0.5, 0.5)	(0.75, 1.25, 0.5, 0.5)	(- 1.25, -0.75, 0.5, 0.5)	(0, 0, 0, 0)	(0, 0, 0, 0)	1.25
(0.75, 1.25, 0.5, 0.5)	$\tilde{A}_2$	(1.25, 3.25, 2, 2)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(2.25, 4.25, 2, 2)	(0.75, 1.25, 0.5, 0.5)	(0, 0, 0, 0)	(- 1.25, - 0.75, 0.5, 0.5)	(0.75, 1.25, 0.5, 0.5)	2.25
(0, 0, 0, 0)	$\tilde{x}_2$	(-1.92.3.25, 5.62,5.62)	(- 5.25, -0.75, 5.5, 5.5)	(2.25, 4.25, 2, 2)	(0.75, 1.25, 0.5, 0.5)	(0, 0, 0, 0)	(0.5, 1.5, 1.25, 1.25)	(0.5, 1.5, 1.25, 1.25)	(-1.5, - 0.5, 0.25, 0.25)	(0, 0, 0, 0)	(0, 0, 0, 0)	0.6
(0, 0, 0, 0)	$\tilde{x}_4$	(-7.06,5.46, 14.28,14.28)	(- 5.25, -5.25, 12, 12)	(- 5.25, -0.75, 5.5, 5.5)	(0.5, 1.5, 1.25, 1.25)	(0.75, 1.25, 0.5, 0.5)	(- 1.25, 1.25, 3.56, 3.56)	(- 1.25, 1.25, 3.56, 3.56)	(- 1.25, 1.25, 2.56, 2.56)	(0, 0, 0, 0)	(0, 0, 0, 0)	-0.8
	z		(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(1.44,5.06, 4.62,4.62)	(0.5, 1.5, 1.25, 1.25)	(0, 0, 0, 0)	(-1.5, - 0.5, 0.25, 0.25)	(0.5, 1.5, 1.25, 1.25)	

C_J	B	R.H.S	$\tilde{x}_1$	$\tilde{x}_2$	$\tilde{x}_3^2$	$\tilde{x}_4^2$	$\tilde{\lambda}_1$	$\tilde{\lambda}_2$	$\tilde{\lambda}_3$	$\tilde{\lambda}_4$
(0, 0, 0, 0)	$\tilde{x}_1$	(0.25, 2.25, 2, 2)	(2.25, 4.25, 2, 2)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0.75, 1.25, 0.5, 0.5)	(0.75, 1.25, 0.5, 0.5)	(- 1.25, - 0.75, 0.5, 0.5)	(0, 0, 0, 0)
(0, 0, 0, 0)	$\tilde{\lambda}_1$	(1.25, 3.25, 2, 2)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(2.25, 4.25, 2, 2)	(0.75, 1.25, 0.5, 0.5)	(0, 0, 0, 0)	(- 1.25, - 0.75, 0.5, 0.5)
(0, 0, 0, 0)	$\tilde{x}_2$	(-1.925.3.25, 5.62,5.62)	(-5.25, - 0.75, 5.5, 5.5)	(2.25, 4.25, 2, 2)	(0.75, 1.25, 0.5, 0.5)	(0, 0, 0, 0)	(0.5, 1.5, 1.25, 1.25)	(0.5, 1.5, 1.25, 1.25)	(-1.5, -0.5, 0.25, 0.25)	(0, 0, 0, 0)
(0, 0, 0, 0)	$\tilde{x}_4$	(-11.37,7.37, 32.5,32.5)	(-5.25, - 5.25, 12, 12)	(-5.25, - 0.75, 5.5, 5.5)	(0.5, 1.5, 1.25, 1.25)	(0.75, 1.25, 0.5, 0.5)	(-7.5, 7.5, 23.87, 23.87)	(-2.81, 2.81, 8.64, 8.64)	(- 1.25, 1.25, 2.56, 2.56)	(-1.56, 1.56, 5.07, 5.07)
	z		(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)	(0, 0, 0, 0)

The optimum solution is obtained at $\tilde{x}_1$ = (0.25, 2.25, 2, 2)

and $\tilde{x}_2$ = (-1.925.3.25, 5.625, 5.625)

Hence Max Z = (-15.42, 18.34, 62.15, 62.15), F (Z) = 1.46

6. Conclusion

We have considered an objective fuzzy non linear programming problem with all coefficients and variables of the objective function and constraints are considered as symmetric trapezoidal fuzzy numbers. The solution of objective fuzzy non linear is obtained by using proposed method and the ranking function as in [2].In this paper, we considered fuzzy objective non linear programming problem, in which the objective function is non linear, but the constraints are linear. This approach can be extended to problems When both objective function and constraints are non linear programming problem .This technique is useful to apply on numerical problems, save valuable time.

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