

9
-1
-1
0
0
0
0

N_LHS_C =

```
2.0000  0  0  0
  0 4.0000  0  0
-1.0000  0  0  0
  0 -1.0000  0  0
  0 0.2000 -1.0000  0
  0 -4.6000 1.0000  0
2.0000  0  0 -1.0000
-8.6000  0  0 1.0000
```

Optimization terminated.

The optimal objective function value :

z =
17.7250

5. CONCLUSIONS

The provided MATLAB codes use the α -Level sets method to transform the fuzzy LMOO problems to non-fuzzy LMOO problems and the weighting method to obtain an α -Pareto optimal solution to the non-fuzzy LMOO problems.

The hand solutions of the numerical examples by the hybrid algorithms and the solutions by the MATLAB codes are identical.

The scientists and the engineers can apply the presented codes and the hybrid algorithms to different practical fuzzy LMOO problems to obtain numerical solutions.

REFERENCES

- [1] Chankong V, Haimes YY. (1983). Multiobjective decision making: Theory and methodology. North-Holand. Series in Science and Engineering, New York.
- [2] Hwang CL, Masud ASM. (1979). Multiple objective decision making methods and applications. Springer-Verlag, New York, USA. <https://doi.org/10.1007/978-3-642-45511-7>
- [3] Zeleny M. (1982). Multiple criteria decision making. McGraw-Hill, New York.
- [4] Branch MA, Grace A. (1996). Optimization Toolbox, User's Guide. The MathWorks Inc.
- [5] Lopez CP. (2014). MATLAB Optimization Techniques. Apress Academic, Springer, New York, USA.
- [6] Math W. (2010). MATLAB Reference Guide. The MathWorks Inc., Natick.
- [7] Venkataraman P. (2009). Applied Optimization with MATLAB Programming. 2ed, John Wiley & Sons, Inc, New Jersey, USA.
- [8] Bellman RE, Zadeh LA. (1970). Decision-making in fuzzy environment. Management Science B 17: 141-164. <https://doi.org/10.1287/mnsc.17.4.B141>
- [9] Dubois D, Prade A. (1980). Fuzzy Sets and Systems: Theory and Applications, Academic Press, New York.
- [10] El-Sawy AA, El-Khouly NA, Abou-El-Enien THM. (2000). An algorithm for decomposing the parametric space in large scale linear vector optimization problems: A fuzzy approach. AMSE Journals, Advances in Modelling and Analysis C 55(2): 1-16.
- [11] Sakawa M, Yano H. (1989). Interactive decision-making for multiobjective programming problems with fuzzy parameters. Fuzzy Sets and Systems 29: 315-326.
- [12] Zimmermann HJ. (1987). Fuzzy Sets, Decision Making, and Expert Systems. Kluwer Academic Publishers, Boston, USA.
- [13] Sharma S, Bhattacharjee S, Bhattacharya A. (2015). Solution of multi-objective optimal DG placement problems using swine influenza model based optimization (SIMBO). AMSE Journals, Advances C 70(1): 46-70.