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ABSTRACT

SOLUTION CONCEPT FOR MULTIOBJECTIVE OPTIMIZATION PROBLEMS WITH FUZZY PARAMETERS AND ITS PROPERTIES

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In this paper, we consider the multiobjective optimization problems (MOP) where all the coefficients of the objective functions and the constraints are linear with respect to the decision variables and can be interpreted as L-R fuzzy numbers. In order to cope with the fuzziness in such MOP, we introduce a new solution concept called "τ-Pareto optimal solutions" which simultaneously reflects the fuzziness of both the objective functions and the constraints by extending the well-known concept of Pareto optimal solutions. τ-Pareto optimal solutions thus defined in this paper can be obtained corresponding to the Pareto optimal solutions for the MOP where the coefficients of the objective functions and the constraints are set at the most possible values. In order to clarify the properties of τ-Pareto optimal solutions, we consider the influence on the solution of the MOP caused by the fuzziness of the coefficients of the objective functions and the constraints. After deriving the reasonable conditions between the fuzziness of the coefficients and the solutions in the MOP, it is shown that τ-Pareto optimal solutions satisfy these conditions. Moreover, we give the trade-off rates between the spread parameters of the L-R fuzzy numbers which are used to express the fuzzy coefficients and τ-Pareto optimal solutions by applying the sensitivity theorem. Finally, the preferable features of τ-Pareto optimal solutions are illustrated by the numerical example.