



General Simplex Method for Fully Fuzzy Linear Programming with the Piecewise Linear Fuzzy Number

M. Z. Tuffaha and M. H. Alrefaei *

Department of Mathematics and Statistics, Jordan University of Science and Technology, Irbid, Jordan

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Abstract: In this paper, we consider the fully fuzzy linear programming problem at which all the attributes and variables of the problem are fuzzy numbers represented by a piecewise linear fuzzy number. This type of fuzzy numbers is used due to its importance as a generalization of some other types of fuzzy numbers. We propose a fuzzy version of the simplex method to solve the problem, which is shown to be a generalization of the conventional simplex method. We represent the simplex method in a tabulated form and discuss whether a final solution exists, the problem is infeasible or it is unbounded. Finally, it is shown that the proposed method is more realistic than some of the existing methods.

Keywords: *piecewise linear fuzzy number; linear programming; fully fuzzy linear programming; polygonal fuzzy number.*

Mathematics Subject Classification (2010): 90C70.

1 Introduction

Linear programming has been an important mathematical tool to solve real life problems for a long time. If some of the data in a linear programming problem are vague, i.e., not precise due to unclear boundaries, then these data are usually represented by fuzzy numbers. This fuzzy representation of the data gives a more realistic manipulation of the problem under consideration since many real life problems contain fuzzy expressions such as “approximately”, “almost” or “about”. Ignoring such expressions and representing the data as crisp (unfuzzy) numbers cost losing some information about the resources, costs or variables. Many applications of fuzziness can be found in different mathematical fields [1, 9]. The literature is rich of applications of fuzzy linear programming problems see, for example, [2, 4, 6]. A more general case is to have a fully fuzzy linear programming

* Corresponding author: <mailto:alrefaei@just.edu.jo>