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Generalized KKT optimality conditions in an optimization problem with interval-valued objective function and linear-fractional constraints

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Abstract

In this paper, we consider an optimimization problem in which some (all) parameters in the objective function intervals and constraints are linear fractional functions. Indeed, we investigate KKT conditions. A numerical example is carried out to show the efficiency of our method.

Keywords: KKT Condition, Interval Variables, Interval-Valued Objective Function, Linear-Fractional.
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1 Introduction

In conventional mathematical programming problems, system parameters or model coefficients. are usually determined as crisp values. However, in the real world prob- lems, these parameters are not exactly known. Generally, Interval, stochastic and fuzzy programming approaches are often used to describe imprecise and uncertain components existing in a real decision problem.

Interval programming assumes that the information about the range of variation of some (or all) of the parameters is available, which allows to specify a model with interval coefficients. Some pioneering works about intervals have been done by Moore [1,2]. Since then, a number of interval ordering definitions [3,4] have been developed in different ways. Moreover, there have been many studies about interval optimization problems. For instance, Inuguichi et al. [5] proposed a goal programming approach to solve the interval programming problem.

In this paper, we investigate KKT condition for an optimization programming with interval objective function and linear fractional constraints. Indeed, we investigate this condition for this kind of non-convex programming problems. Finally, using an example we show that the condition which we achieve works succesfully. [5,6]

2 Preliminaries

We consider the following interval-valued mimimization problem:

$$\begin{aligned} &min \quad f(x) = [f^L(x), f^U(x)] \qquad \textbf{(D)} \\ &s.t \quad x \in S = \{x:\ x \geqslant 0,\ \ g_i(x) = \frac{P_i(x)}{D_i(x)} = \frac{\sum_{j=1}^n {p_j}^i x_j + {p_0}^i}{\sum_{j=1}^n {d_j}^i x_j + {d_0}^i} \geqslant b_i\} \end{aligned}$$

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