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THE $\epsilon-$EFFICIENCY CONDITIONS FOR MULTIOBJECTIVE FRACTIONAL PROGRAMMING PROBLEMS

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Abstract. A class of parametric sufficient $\epsilon-$efficiency conditions and $\epsilon-$efficient solutions to multiobjective fractional programming problems based on $(\rho, \eta, \theta)-$invexity of higher orders are investigated. The obtained results present a greater degree of generality in nature, while unifying most of the results on the generalized invexities in the literature.

Keywords. Multiobjective fractional programming; Higher order invexity; $\epsilon-$efficient solutions; $\epsilon-$efficiency conditions.

AMS (MOS) subject classification: 49K50, 90C32.

1 Introduction

Consider a multiobjective fractional programming problem (based on the generalized $(\rho, \eta, \theta)-$invexity of higher order $(r \geq 1)$ for differentiable functions):

(P)

$$Minimize_{x\in X}\left(\frac{f_1(x)}{g_1(x)}, \cdots, \frac{f_p(x)}{g_p(x)}\right)$$

subject to $x \in X$ such that $h_j(x) \leq 0$ for $j = 1, \cdots, m$, where f_i, g_i, $i \in \{1, 2, \cdots, p\}$ are real-valued functions. Here X is an open convex subset of $\Re^n$ (the n-dimensional Euclidean space), while η, $\theta : \Re^n \times \Re^n \to \Re^n$ are two vector-valued functions.

We explore parametric and semiparametric sufficient conditions for $\epsilon-$efficient solvability of (P) based on the generalized $(\rho, \eta, \theta)-$invexity of higher order. Let $Q = \{x \in X : h_j(x) \leq 0, j = 1, \cdots, m\}$ denote the feasible set of (P). We observe that (P) is equivalent the parametric multiobjective non-fractional programming problem:

$(P\lambda)$

$$Minimize_{x\in X}\,(f_1(x) - \lambda_1 g_1(x), \cdots, f_p(x) - \lambda_p g_p(x)),$$