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SOME ASPECTS OF SENSITIVITY ANALYSIS IN FRACTIONAL PROGRAMMING

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PREFACE

The term fractional programming describes a class of optimization problems where a ratio of two functions (linear or nonlinear) is to be optimized. From this ratio of the functions, even if the numerator and the denominator are linear, it reveals as a nonlinear programming problem. In general, such a fractional programming problem possesses some properties say, e.g., in duality theory and in algorithms, which either differ or do not exist at all in other nonlinear programming problems. Also the ratio optimization leads to some kind of efficiency measure of a system. Therefore, these kinds of problems enable to give more insight into the system than the other programmings.

Multiple objective decision making problems arise in different engineering or nonengineering fields. Researchers have devoted considerable attention in developing methods for solving them. It is seen that the theory of multiple objective linear programming problems has been more developed and better represented in the literature. However, the theory of multiple objective fractional programming problem needs more attention.

The application of fuzzy set theory gives another approach which has become a powerful tool to the researchers. The basic aspects of this theory and its potentialities as a methodology for exploring various aspects deal with the imprecise nature of the real world situations incorporated in the programming problems. Although some attention has been given in

using the fuzzy set theory to multiple objective linear programming problems, the literature on its use in fractional programming problem which is a new area in optimization is scanty.

The sensitivity analysis and the parametric programming are two important aspects of mathematical programming problem. The work on sensitivity analysis in nonlinear programming problems, e.g., geometric programming, stochastic programming, quadratic programming, multiple objective nonlinear programming etc. has been given sufficient attention and investigated extensively. In fractional programming problem, however, though there exists some literatures on parametric analysis, the aspect of sensitivity analysis has not been investigated so well. It is this aspect that has motivated the present work. The basic objectives have been devoted to the investigation of

(a) sensitivity analysis in single objective linear fractional programming problem,

(b) sensitivity analysis and some related topics in single objective fuzzy linear fractional programming problem,

(c) methodology and sensitivity analysis in multiple objective linear fractional programming problems.

It is the hope of the author that the present work will add to and will give scope for some developments on the aspects of sensitivity analysis in fractional programming.