DUALITY AND ALGORITHMIC ASPECTS OF CERTAIN INTEGER NONLINEAR PROGRAMMING PROBLEMS

by

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ABSTRACT

This thesis entitled "Duality and Algorithmic Aspects of Certain Integer Nonlinear Programming Problems" is divided into six chapters, the contents of which are given below.

The first chapter is general introduction which contains preliminaries, review of related work and a summary of the thesis.

The second chapter is on duality in mixed integer linear and nonlinear fractional programming and integer nondifferentiable programming. This also includes a method for solving integer nondifferentiable programs based on the above duality theory.

The third chapter consists of a study of variable transformation methods for solving integer fractional programs. In this, the equivalence of integer fractional programs with certain related problems whose objective functions are no longer fractional, are established. The study also includes development of branch and bound methods for solving integer linear and nonlinear fractional programs based on these equivalence relations.

The fourth chapter is on parametric methods for solving fractional programs. Here, solvability of mixed integer linear fractional programs through a finite number

of mixed integer linear programs is established. It also contains procedures for solving integer linear fractional programs. Parametric methods for solving integer nonlinear fractional programs are also proposed.

The fifth chapter consists of a method for enforcing additional constraints to linear fractional programs and its applications in solving integer linear fractional programs by using cutting plane and branch and bound methods.

The sixth and the last chapter of the thesis consists of a finite all integer method for solving integer convex programs whose problem functions are polynomials with rational coefficients. The applicability of this in solving certain integer nonlinear fractional programs is also pointed out.

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