ABSTRACT

Approaches for solving some uncertain programming problems are presented in this thesis. Two types of uncertainties are considered - randomness and fuzziness. In some problems some or all the coefficients or parameters are considered as random variables with known probability distributions. Fuzzy equality type constraints are also considered in a problem. In another problem both randomness and fuzziness are considered. Traditional approaches are not always suitable for solving these problems.

To solve the uncertain programming problem involving random variables, generally the deterministic equivalent of the problem is derived and then it is solved by some mathematical programming techniques. But in reality, deriving the deterministic equivalent of the problem in some cases becomes very difficult and in some cases becomes impossible. To overcome this drawback, some genetic algorithm based approaches are proposed in which deriving the deterministic equivalent of the problem is not required. Stochastic simulation technique is also employed in the approaches to check the feasibility of the stochastic constraints.

Genetic algorithm based approach is also used to solve nonlinear programming problems having fuzzy equality type constraints. The constraints of the problem are converted to inequality type constraints by using a suggested conversion procedure. Then a fuzzy goal programming model of the problem is formulated and the solution of the given problem is obtained by solving the formulated model by a genetic algorithm.

The uncertain programming problem involving both randomness and fuzziness is solved by another genetic algorithm based approach. In this approach, stochastic simulation technique is slightly modified and combined with a genetic algorithm. The modification in the simulation technique is necessary to deal the stochastic fuzzy goals of the problem.

Keywords: Chance Constrained Programming, Multi-objective Chance Constrained Programming, Fuzzy Equality Type Constraint, Stochastic Fuzzy Constraint, Nonlinear Programming, Fuzzy Goal Programming, Stochastic Simulation, Genetic Algorithm.