

Abstract

The basic idea of the present thesis work is to establish various duality results of different types of optimization problems under generalized invexity assumptions. Specifically, the second and higher order duality for the nonconvex problems such as, symmetric mathematical programming problems, variational problems and control problems are studied. Many examples and counter examples have been discussed to support the work. The main findings of the thesis can be summarized as follows.

In Chapter 2, second order invex functions are defined and applied to second order symmetric duality in mathematical programming problems. In Chapter 3, under the higher order generalized $\rho - (\eta, \theta)$ -invexity assumptions, the weak, strong and converse duality results are established for the higher order symmetric dual mathematical programming problems. Chapter 4 describes $\rho - (\eta, \theta)$ -invex and generalized $\rho - (\eta, \theta)$ -invex functions for the variational problems. Under the generalized $\rho - (\eta, \theta)$ -invexity assumptions the second order duality results (weak, strong and converse duality) for the Mangasarian and Mond-Weir type variational problems are established. Chapter 5 discusses the higher order duality and higher order generalized invexity for the variational problems. Higher order weak, strong and converse duality results for the Mangasarian and Mond-Weir type variational problems are studied under the generalized higher order invexity assumptions. Chapter 6 describes $\rho - (\eta, \theta)$ -invex and generalized $\rho - (\eta, \theta)$ -invex functions for the control problems. Under the generalized $\rho - (\eta, \theta)$ -invexity assumptions the second order duality results (weak, strong and converse duality) for the Mangasarian and Mond-Weir type control problems are established. Chapter 7 discusses the higher order duality and higher order generalized invexity for the control problems. Higher order weak, strong and converse duality results for the Mangasarian and Mond-Weir type control problems are studied under the generalized higher order invexity. Chapter 8 deals with the notion of $\rho - (\eta, \theta)$ -invex function and generalized $\rho - (\eta, \theta)$ -invex function between Banach spaces. Second and higher order duality theorems for Mangasarian type, Mond-Weir type are established under the above said conditions.

It has also been observed that, in some particular cases our results reduce to the duality results, already existing in the literature. Which proves that our models are more general as compare to the existing models in the literature.

Keywords: Second and higher order duality; Mangasarian, Wolfe and Mond-Wier type duality; weak duality; strong duality; converse duality; symmetric mathematical programming problem; variational problem; control problem; generalized invexity