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SECOND-ORDER OPTIMALITY CONDITIONS AND DUALITY THEOREMS FOR SET-VALUED SEMI-INFINITE PROGRAMMING PROBLEMS

Koushik Das

Department of Mathematics
Taki Government College, Taki, West Bengal 743429, India

Abstract. In this paper, we establish second-order sufficient Karush-Kuhn-Tucker (KKT) optimality conditions associated with a set-valued semi-infinite programming problem via second-order contingent epiderivative. We also investigate duality results of second-order Mond-Weir, Wolfe, and mixed types for the considered problem under second-order generalized cone convexity assumptions.

Keywords. Convex cone; Set-valued map; Contingent epiderivative; Optimality conditions; Duality.

AMS (MOS) subject classification: 26B25; 49N15.

1 Introduction

Throughout time, various types of optimization problems have been studied by authors like Hanson [22], Craven [7], Ben-Israel and Mond [3], Corley [6], Zalmai [38], Sheng and Liu [36] etc. Semi-infinite programming problem is one type of such optimization problems. In optimization theory, many authors like Hettich and Kortanek [23], Goberna and Lopez [21], Lopez and Still [29], Shapiro [35] etc. have studied the semi-infinite programming problems in the last few decades.

For general nonlinear programming problems, the dual of dual does not have to be the original primal. Duality is not defined uniquely. This has resulted in the development of new kinds of duals such as the Lagrangian, Mangasarian, Wolfe, and Mond-Weir types. The objective function of the Mond-Weir type dual is identical to that of the primal problem. The Mond-Weir and Wolfe dual problems are combined to develop the mixed type dual. Weir and Mond [37] used pseudo-convexity and quasiconvexity assumptions to derive duality results for weak minima of multi-objective optimization problems. Using the concept of right differentials of generalized d-type-I functions, Mishra et al. [30] established Mond-Weir type duality results. Under the suppositions of invexity, Sach and Craven [32] demonstrated Mond-Weir and Wolfe type duality theorems for set-valued optimization problems. With the help of generalized invexity and codifferential of set-valued maps, Sach