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SET-VALUED SEMI-INFINITE PROGRAMMING PROBLEMS WITH τ-CONE ARCWISE CONNECTEDNESS OF HIGHER-ORDER

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Abstract. In this present study, exploring the notion of contingent epiderivative of higher-order of set-valued maps, we develop sufficient Karush-Kuhn-Tucker (KKT) conditions of higher-order of a set-valued semi-infinite programming problem (for short, SVSIPP). Under τ-cone arcwise connectedness suppositions of higher-order, we additionally construct duality results of higher-order for the Wolfe (WD), Mond-Weir (MWD), and mixed (MD) kinds of the problem (SP).

Keywords. Convex cone; Set-valued map; Contingent epiderivative; Duality; Arcwisely connectedness.

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1 Introduction

Many researchers, including Hanson [15], Craven [6], Corley [5], Zalmai [31], and others have investigated the analysis and applications of numerous optimization problems in recent years. Semi-infinite programming problem (in short, SIPP) is one of these optimization problems. A number of researchers have recently explored the criteria of optimality of SIPPs, including Goberna and Lopez [14], Shapiro [27] etc. Shapiro [26] examined the Lagrangian duality of SIPPs under the convexity assumption in 2005. In 2010, Kostyukova and Tchemisova [19] identified sufficient optimality requirements for convex SIPPs. The necessary optimality criteria of nondifferentiable SIPPs were developed in 2012 by Mishra and Jaiswal [24] exploring the generalized convexity assumption. They also developed Mond-Weir kind duality theorems. Through the use of dependent derivative of higher-order, Li et al. [22, 23] developed the required and sufficient optimality requirements. They also discussed the duality theorems under convexity presumptions and introduced the Mond-Weir dual of higher-order for SVOP.

As a generalization of convexity, Avriel [3] suggested the concept of arcwise connectedness in 1976. The idea of cone arcwisely connected set-valued maps (also known as SVMs) was later proposed as a prolongation of the class of convex SVMs by Fu and Wang [13] and Lalitha et al. [20]. With