DUALITY FOR MULTIOBJECTIVE OPTIMIZATION PROBLEM WITH VANISHING CONSTRAINTS

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Abstract. In this article, we continue the effort of Mishra et al. [S. K. Mishra, V. Singh, V. Laha and R. N. Mohapatra, On constraint qualifications for multiobjective optimization problems with vanishing constraints, Optimization Methods, Theory and Applications, Springer Berlin Heidelberg (2015), 95-135] to discuss duality results of two types of dual models for a multiobjective optimization problem with vanishing constraints. These duality conditions are illustrated by some non-trivial examples.

Keywords. Multiobjective optimization problem with vanishing constraints, efficient solution, duality.

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1   Introduction

The analysis of optimization problems with vanishing constraint has been the subject of much interest in the recent past due to important application in optimal topology design of mechanical structure. Vanishing constraint usually violates standard constraint qualifications, which gives rise to serious difficulties in theoretical and numerical treatment of these problems.

The idea of constraint qualification in multiobjective optimization problems, without a doubt, plays an important role for the existence of Lagrange multipliers so that Karush-Kuhn-Tucker necessary optimality conditions hold. The generalized Guignard type constraint qualification for the differentiable multiobjective optimization problem was introduced by Maeda [14]. Also, he derived the Karush-Kuhn-Tucker type necessary optimality conditions for efficiency ensuring the existence of positive Lagrange multipliers. Later, many authors also employed aforesaid concept to derived necessary optimality conditions and duality result for efficiency in multiobjective optimization problem (see, for example [2, 3, 11, 12, 18, 20]).

The first general theory for a special class of optimization problems with vanishing constraints (MPVC, for short) was introduced by Achtziger and