Geometric conditions for Kuhn-Tucker sufficiency of global optimality in mathematical programming

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Abstract

We present geometric criteria for a feasible point that satisfies the Kuhn-Tucker conditions to be a global minimizer of mathematical programming problems with or without bounds on the variables. The criteria apply to multi-extremal programming problems which may have several local minimizers that are not global. We establish such criteria in terms of underestimators of the Lagrangian of the problem. The underestimators are required to satisfy certain geometric property such as the convexity (or a generalized convexity) property. We show that the biconjugate of the Lagrangian can be chosen as a convex underestimator whenever the biconjugate coincides with the Lagrangian at a point. We also show how suitable underestimators can be constructed for the Lagrangian in the case where the problem has bounds on the variables. Examples are given to illustrate our results.

Author keywords

Bounds on the variables; Generalized convexity; Mathematical programming problems; Multi-extremal problems; Sufficient optimality conditions; Underestimators

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