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Perturbation analysis of optimization problems. (English) Zbl 0966.49001

Springer Series in Operations Research. New York, NY: Springer. xviii, 601 p. (2000).

The main goal of this book is to summarize and overview recent and not easily accessible developments on questions of how solutions of optimization problems behave under perturbations and on related, first and second order optimality conditions.

The second chapter of this book deals with the very basic results of functional analysis, differential calculus, and duality theory. The two main theories, on which the subsequent perturbation analysis is based, are the conjugate duality and stability analysis with the backgrounds in metric regularity theory.

The third chapter presents necessary or/and sufficient conditions for local optimality. Basic techniques, existence of Lagrange multipliers, first order sufficient optimality conditions, general second order necessary and standard second order sufficient optimality conditions are treated. Composite optimization problems, analysis of nonisolated optimal solutions, specific aspects of quadratic programming, reduction problems and exact penalty functions are also discussed here.

The next chapter offers a systematic development of a perturbation theory for optimization problems. General results on directional regularity and nondegeneracy, quantitative continuity properties of the optimal value function, of the set of optimal solutions, and of the Lagrange multipliers are presented.

Chapter 5 focuses on specific structures such as variational inequalities, nonlinear, semi-definite, and semi-infinite programming.

Optimal control problems are dealt with in the last chapter. Some model problems are carefully discussed. Results are obtained either by using the abstract theory or by extending the machinery developed in the previous chapters. Researchers and graduate students at advanced level in the fields of optimization, nonlinear programming, and optimal control will find this well-written textbook useful.

Reviewer: [Zsolt Páles \(Debrecen\)](#)

MSC:

[49-02](#) Research exposition (monographs, survey articles) pertaining to calculus of variations and optimal control

[49K40](#) Sensitivity, stability, well-posedness

Cited in **1** Review
Cited in **721** Documents

Keywords:

[sensitivity analysis](#); [optimization problems](#); [first and second order conditions](#); [optimal control problems](#)