



Optimization Theory with Applications (Dover Books on Mathematics)

Donald A. Pierre

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Optimization principles are of undisputed importance in modern design and system operation. They can be used for many purposes: optimal design of systems, optimal operation of systems, determination of performance limitations of systems, or simply the solution of sets of equations. While most books on optimization are limited to essentially one approach, this volume offers a broad spectrum of approaches, with emphasis on basic techniques from both classical and modern work.

After an introductory chapter introducing those system concepts that prevail throughout optimization problems of all types, the author discusses the classical theory of minima and maxima (Chapter 2). In Chapter 3, necessary and sufficient conditions for relative extrema of functionals are developed from the viewpoint of the Euler-Lagrange formalism of the calculus of variations. Chapter 4 is restricted to linear time-invariant systems for which significant results can be obtained via transform methods with a minimum of computational difficulty. In Chapter 5, emphasis is placed on applied problems which can be converted to a standard problem form for linear programming solutions, with the fundamentals of convex sets and simplex technique for solution given detailed attention. Chapter 6 examines search techniques and nonlinear programming. Chapter 7 covers Bellman's principle of optimality, and finally, Chapter 8 gives valuable insight into the maximum principle extension of the classical calculus of variations.

Designed for use in a first course in optimization for advanced undergraduates, graduate students, practicing engineers, and systems designers, this carefully written text is accessible to anyone with a background in basic differential equation theory and matrix operations. To help students grasp the material, the book contains many detailed examples and problems, and also includes reference sections for additional reading.

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