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| | Nota di contenuto | 1 The Hahn-Banach Theorem Optimization Problems -- 1.1 The Hahn-Banach Theorem -- 1.2 Applications to the Separation of Convex Sets -- 1.3 The Dual Space C[a,b]* -- 1.4 Applications to the Moment Problem -- 1.5 Minimum Norm Problems and Duality Theory -- 1.6 Applications to ?ebyšev Approximation -- 1.7 Applications to the Optimal Control of Rockets -- 2 Variational Principles and Weak Convergence -- 2.1 The nth Variation -- 2.2 Necessary and Sufficient Conditions for Local Extrema and the Classical Calculus of Variations -- 2.3 The Lack of Compactness in Infinite-Dimensional Banach Spaces -- 2.4 Weak Convergence -- 2.5 The Generalized Weierstrass Existence Theorem -- 2.6 Applications to the Calculus of Variations -- 2.7 Applications to Nonlinear Eigenvalue Problems -- 2.8 Reflexive Banach Spaces -- 2.9 Applications to Convex Minimum Problems and |

Sommario/riassunto

A theory is the more impressive, the simpler are its premises, the more distinct are the things it connects, and the broader is its range of applicability. Albert Einstein There are two different ways of teaching mathematics, namely, (i) the systematic way, and (ii) the application-oriented way. More precisely, by (i), I mean a systematic presentation of the material governed by the desire for mathematical perfection and completeness of the results. In contrast to (i), approach (ii) starts out from the question "What are the most important applications?" and then tries to answer this question as quickly as possible. Here, one walks directly on the main road and does not wander into all the nice and interesting side roads. The present book is based on the second approach. It is addressed to undergraduate and beginning graduate students of mathematics, physics, and engineering who want to learn how functional analysis elegantly solves mathematical problems that are related to our real world and that have played an important role in the history of mathematics. The reader should sense that the theory is

being developed, not simply for its own sake, but for the effective solution of concrete problems. viii Preface Our introduction to applied functional analysis is divided into two parts: Part I: Applications to Mathematical Physics (AMS Vol. 108); Part II: Main Principles and Their Applications (AMS Vol. 109). A detailed discussion of the contents can be found in the preface to AMS Vol. 108.