

<<应用泛函分析 (第1卷)>>

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前言

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.

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内容概要

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章节摘录

I think that time is ripe for such an approach. From a general point of view, functional analysis is based on an assimilation of analysis, geometry, algebra, and topology. The applications to be considered concern the following topics: ordinary differential equations (initial-value problems, boundary-eigen-value problems, and bifurcation); linear and nonlinear integral equations; variational problems, partial differential equations, and Sobolev spaces; optimization (e.g., Chebyshev approximation, control of rockets, game theory, and dual problems); Fourier series and generalized Fourier series; the Fourier transformation, generalized functions (distributions) and the role of the Green function; partial differential equations of mathematical physics (e.g., the Laplace equation, the heat equation, the wave equation, and the Schrödinger equation); time evolution and semigroups; the N-body problem in celestial mechanics; capillary surfaces; minimal surfaces and harmonic maps; superfluids, superconductors, and phase transition (the Landau-Ginzburg model).

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