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Functional Analysis (Methods Of Modern Mathematical Physics)



Synopsis

This book is the first of a multivolume series devoted to an exposition of functional analysis methods in modern mathematical physics. It describes the fundamental principles of functional analysis and is essentially self-contained, although there are occasional references to later volumes. We have included a few applications when we thought that they would provide motivation for the reader. Later volumes describe various advanced topics in functional analysis and give numerous applications in classical physics, modern physics, and partial differential equations.

Book Information

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Customer Reviews

Books on mathematical methods "for physicists" are often criticized by their superficiality, a sacrifice deemed necessary for achieving completeness. This one is a glaring exception: the first of a set of 4 (!) volumes dealing with the finest tools for dealing with the delicate mathematical questions in quantum theory - namely, functional analysis. Of course, this sounds rather vague, since quantum physics makes use of functional-analytic tools as diverse as distributions, Hilbert, Banach and locally convex spaces, spectral theory, semigroup theory, operator algebras, etc. However, do not expect ready-brew formulae and cookbook recipes: this book gets his job done at least as well as Rudin, Yosida and Riesz-Sz.Nagy, just to mention the classics. Most theorems are rigorously proved, and although the book becomes more and more biased towards mathematical physics (i.e., methods for proving self-adjointness, analysis of spectra and scattering theory, as stated in the

section "Three Mathematical Problems in Quantum Mechanics". These methods occupy most of the three remaining volumes) as it proceeds - this bias becomes the true reason of being for the last two volumes - this particular volume has precisely the most useful stuff: metric, Banach, topological, locally convex, and Hilbert spaces, bounded and unbounded operators. A supplement extracted from the second volume with the basics of Fourier transforms makes it self-contained as a monograph. However, the best things, that make this book nearly unbeatable, are the several wisely chosen examples and counterexamples, the notes at the end of each chapter and the wonderful - and useful - exercises.

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