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Soggetti	Physics Fourier analysis Operator theory Functions of complex variables Integral transforms Calculus, Operational Group theory Mathematical Methods in Physics Fourier Analysis Operator Theory Functions of a Complex Variable Integral Transforms, Operational Calculus Group Theory and Generalizations
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Nota di contenuto	1 Hilbert spaces -- 1.1 Complete sets, Fourier expansions -- 1.1.1 Preliminary notions. Subspaces. Complete sets -- 1.1.2 Fourier expansions -- 1.1.3 Harmonic functions; Dirichlet and Neumann Problems -- 1.2 Linear operators -- 1.2.1 Linear operators defined giving T en = vn, and related Problems -- 1.2.2 Operators of the form T x = v(w;x) and T x = ån vn(wn;x) -- 1.2.3 Operators of the form T f (x) = j(x) f (x) -- 1.2.4 Problems involving differential operators -- 1.2.5 Functionals -- 1.2.6 Time evolution Problems. Heat equation -- 1.2.7 Miscellaneous Problems -- 2 Functions of a complex variable --

2.1 Basic properties of analytic functions -- 2.2 Evaluation of integrals by complex variable methods -- 2.3 Harmonic functions and conformal mappings -- 3 Fourier and Laplace transforms. Distributions -- 3.1 Fourier transform in L1(R) and L2(R) -- 3.1.1 Basic properties and applications -- 3.1.2 Fourier transform and linear operators in L2(R) -- 3.2 Tempered distributions and Fourier transforms -- 3.2.1 General properties -- 3.2.2 Fourier transform, distributions and linear operators -- 3.2.3 Applications to ODE’s and related Green functions -- 3.2.4 Applications to general linear systems and Green functions -- 3.2.5 Applications to PDE’s -- 3.3 Laplace transforms -- vvi Contents -- Groups, Lie algebras, symmetries in physics -- 4.1 Basic properties of groups and representations -- 4.2 Lie groups and algebras -- 4.3 The groups SO3; SU2; SU3 -- 4.4 Other direct applications of symmetries to physics -- Answers and Solutions. .

Sommario/riassunto

This book presents exercises and problems in the mathematical methods of physics with the aim of offering undergraduate students an alternative way to explore and fully understand the mathematical notions on which modern physics is based. The exercises and problems are proposed not in a random order but rather in a sequence that maximizes their educational value. Each section and subsection starts with exercises based on first definitions, followed by groups of problems devoted to intermediate and, subsequently, more elaborate situations. Some of the problems are unavoidably "routine", but others bring to the forenontrivial properties that are often omitted or barely mentioned in textbooks. There are also problems where the reader is guided to obtain important results that are usually stated in textbooks without complete proofs. In all, some 350 solved problems covering all mathematical notions useful to physics are included. While the book is intended primarily for undergraduate students of physics, students of mathematics, chemistry, and engineering, as well as their teachers, will also find it of value. .