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Nota di contenuto	Distribution Theory; Contents; Preface; 1 Introduction to the Distribution Theory; 1.1 Short History; 1.2 Fundamental Concepts and Formulae; 1.2.1 Normed Vector Spaces: Metric Spaces; 1.2.2 Spaces of Test Functions; 1.2.3 Spaces of Distributions; 1.2.4 Characterization Theorems of Distributions; 1.3 Operations with Distributions; 1.3.1 The Change of Variables in Distributions; 1.3.2 Translation, Symmetry and Homothety of Distributions; 1.3.3 Differentiation of Distributions; 1.3.4 The Fundamental Solution of a Linear Differential Operator; 1.3.5 The Derivation of the Homogeneous Distributions 1.3.6 Dirac Representative Sequences: Criteria for the Representative Dirac Sequences 1.3.7 Distributions Depending on a Parameter; 1.3.8 Direct Product and Convolution Product of Functions and Distributions; 1.3.9 Partial Convolution Product of Functions; 2 Integral Transforms of Distributions; 2.1 Fourier Series and Series of Distributions; 2.1.1 Sequences and Series of Distributions; 2.1.2 Expansion of Distributions

into Fourier Series; 2.1.3 Expansion of Singular Distributions into Fourier Series; 2.2 Fourier Transforms of Functions and Distributions; 2.2.1 Fourier Transforms of Functions 2.2.2 Fourier Transform and the Convolution Product 2.2.3 Partial Fourier Transform of Functions; 2.2.4 Fourier Transform of Distributions from the Spaces  $S$  and  $D(R^n)$ ; 2.3 Laplace Transforms of Functions and Distributions; 2.3.1 Laplace Transforms of Functions; 2.3.2 Laplace Transforms of Distributions; 3 Variational Calculus and Differential Equations in Distributions; 3.1 Variational Calculus in Distributions; 3.1.1 Equations of the Euler-Poisson Type; 3.2 Ordinary Differential Equations; 3.3 Convolution Equations; 3.3.1 Convolution Algebras 3.3.2 Convolution Algebra  $D'$ : Convolution Equations in  $D'$ ; 3.4 The Cauchy Problem for Linear Differential Equations with Constant Coefficients; 3.5 Partial Differential Equations: Fundamental Solutions and Solving the Cauchy Problem; 3.5.1 Fundamental Solution for the Longitudinal Vibrations of Viscoelastic Bars of Maxwell Type; 3.6 Wave Equation and the Solution of the Cauchy Problem; 3.7 Heat Equation and Cauchy Problem Solution; 3.8 Poisson Equation: Fundamental Solutions; 3.9 Green's Functions: Methods of Calculation; 3.9.1 Heat Conduction Equation 3.9.2 Green's Function for the Vibrating String 4 Representation in Distributions of Mechanical and Physical Quantities; 4.1 Representation of Concentrated Forces; 4.2 Representation of Concentrated Moments; 4.2.1 Concentrated Moment of Linear Dipole Type; 4.2.2 Rotational Concentrated Moment (Center of Rotation); 4.2.3 Concentrated Moment of Plane Dipole Type (Center of Dilatation or Contraction); 4.3 Representation in Distributions of the Shear Forces and the Bending Moments; 4.3.1 Concentrated Force of Magnitude  $P$  Applied at the Point  $c$  in  $[a,b]$  4.3.2 Concentrated Moment of Magnitude  $m$  Applied at the Point  $c$  in  $[a,b]$

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#### Sommario/riassunto

In this comprehensive monograph, the authors apply modern mathematical methods to the study of mechanical and physical phenomena or techniques in acoustics, optics, and electrostatics, where classical mathematical tools fail. They present a general method of approaching problems, pointing out different aspects and difficulties that may occur. With respect to the theory of distributions, only the results and the principle theorems are given as well as some mathematical results. The book also systematically deals with a large number of applications to problems of general Newtonian mechanics.

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