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Distributions in the Physical and Engineering Sciences

Volumes 1-3

- Illustrates how the theory of distributions can be applied to solve problems in the physical and engineering sciences
- Includes a robust selection of example problems that can arise in real-life industrial and scientific labs
- Will be a valuable resource for researchers and graduate students who would like more exposure to probabilistic methods

Distributions in the Physical and Engineering Sciences is a comprehensive exposition on analytic methods for solving science and engineering problems which is written from the unifying viewpoint of distribution theory and enriched with many modern topics which are important to practitioners and researchers. The goal of the books is to give the reader, specialist and non-specialist usable and modern mathematical tools in their research and analysis.

Volume 1 provides detailed coverage of asymptotic methods, including the stationary phase and steepest descent methods, for Fourier and other integral transforms from an application perspective. Other topics covered include fractional calculus, the uncertainty principle, wavelets, and multiresolution analysis. Volume 2 contains an analysis of the three basic types of linear PDEs - elliptic, parabolic, and hyperbolic - as well as chapters on first-order nonlinear PDEs and conservation laws. Nonlinear waves, Burger's equations, KdV equations, and the equations of gas dynamics and porous media are also covered. Volume 3 extends the scope to the use of distributional tools in the theory of generalized stochastic processes and fields, and in anomalous fractional random dynamics.