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Título: Fractional Calculus: An Introduction For Physicists

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Sinopsis

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Fractional calculus is undergoing rapid and ongoing development. We can already recognize, that within its framework new concepts and strategies emerge, which lead to new challenging insights and surprising correlations between different branches of physics.

This book is an invitation both to the interested student and the professional researcher. It presents a thorough introduction to the basics of fractional calculus and guides the reader directly to the current state-of-the-art physical interpretation. It is also devoted to the application of fractional calculus on physical problems, in the subjects of classical mechanics, friction, damping, oscillations, group theory, quantum mechanics, nuclear physics, and hadron spectroscopy up to quantum field theory.

Contents:

Functions

The Fractional Derivative

Friction Forces

Fractional Calculus

The Fractional Harmonic Oscillator

Wave Equations and Parity

Nonlocality and Memory Effects

Quantum Mechanics

Fractional Spin: A Property of Particles Described with the Fractional Schrödinger Equation

Factorization

Symmetries

The Fractional Symmetric Rigid Rotor

q-Deformed Lie Algebras and Fractional Calculus

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Fractors: Fractional Tensor Calculus

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Fractional Fields
Gauge Invariance in Fractional Field Theories
Outlook