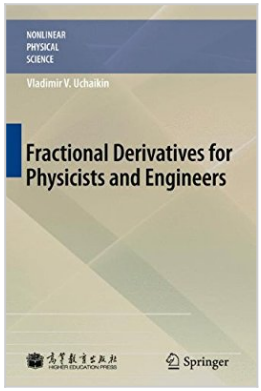

Fractional Derivatives for Physicists and Engineers: Volume I Background and Theory Volume II Applications (Nonlinear Physical Science)

By Vladimir V. Uchaikin

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The first derivative of a particle coordinate means its velocity, the second means its acceleration, but what does a fractional order derivative mean? Where does it come from, how does it work, where does it lead to? The two-volume book written on high didactic level answers these questions. Fractional Derivatives for Physicists and Engineers? The first volume contains a clear introduction into such a modern branch of analysis as the fractional calculus. The second develops a wide panorama of applications of the fractional calculus to various physical problems. This book recovers new perspectives in front of the reader dealing with turbulence and semiconductors, plasma and thermodynamics, mechanics and quantum optics, nanophysics and astrophysics.

The book is addressed to students, engineers and physicists, specialists in theory of probability and statistics, in mathematical modeling and numerical simulations, to everybody who doesn't wish to stay apart from the new mathematical methods becoming more and more popular.

Prof. Vladimir V. UCHAIKIN is a known Russian scientist and pedagogue, a Honored Worker of Russian High School, a member of the Russian Academy of Natural Sciences. He is the author of about three hundreds articles and more than a dozen books (mostly in Russian) in Cosmic ray physics, Mathematical physics, Levy stable statistics, Monte Carlo methods with applications to anomalous processes in complex systems of various levels: from quantum dots to the Milky Way galaxy.

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Editorial Review

Review

“The book is addressed to students, engineers, physicists and researchers working in the field of applied analysis and fractional calculus. The book is well written and references are provided at the end of each chapter. Both volumes yield a useful and interesting addition to the literature on fractional calculus.” (S. L. Kalla, zbMATH 1312.26002, 2015)

“The book is a kind of encyclopedia and will be of exceptional value for all researchers engaged in the application of singular integro-differential operators not only in physics and engineering, but also in other sciences such as chemistry, biology, ecology, and geology. … The book will be useful to engineers and physicists and to specialists in mathematical modelling, theory of probability and statistics, and numerical simulations, as well as to anybody interested in mastering the new mathematical methods and finding more and more applications.” (Paulius Miškinis, Mathematical Reviews, November, 2013)

From the Back Cover

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