



# **Fractional Calculus with Applications in Mechanics: Vibrations and Diffusion Processes (Mechanical Engineering and Solid Mechanics)**

*Teodor M. Atanackovic, Stevan Pilipovic, Bogoljub Stankovic, Dusan Zorica*

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This book contains mathematical preliminaries in which basic definitions of fractional derivatives and spaces are presented. The central part of the book contains various applications in classical mechanics including fields such as: viscoelasticity, heat conduction, wave propagation and variational Hamilton-type principles. Mathematical rigor will be observed in the applications. The authors provide some problems formulated in the classical setting and some in the distributional setting. The solutions to these problems are presented in analytical form and these solutions are then analyzed numerically. Theorems on the existence of solutions will be presented for all examples discussed. In using various constitutive equations the restrictions following from the second law of thermodynamics will be implemented. Finally, the physical implications of obtained solutions will be discussed in detail.

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