

## Applications of Fractional Calculus in Science and Engineering

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### EDITORIAL

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Fractional Calculus (FC) is a new mathematical concept that has a wide range of applicability in science and engineering. A few of the findings have been published in publications or relevant research papers. Nevertheless, we are only at the beginning of using this extremely powerful instrument in a variety of fields of study. At this time, proportional calculus has spread its wings even wider to include the dynamics of the actual world's complexities, and novel concepts are being applied and evaluated on real data. Numerous models have still to be proposed, explored, and implemented in real situations in many disciplines of science and engineering where highly anticipated is important. Even though many great discoveries have previously been published in landmark monographs and review articles, there is still a substantial range of non-phenomena that have yet to be uncovered. In certain circumstances, patents have been granted, making the FC tool very viable. Even though fractional calculus was presented over 300 years earlier and is used in many disciplines of research and engineering, the FC community continues to promote usage. To create this database more thoroughly, we encouraged numerous eminent FC application researchers to offer one or more implementation instances as well as a description of a particular scientific/engineering topic. There are nine parts to this study. We start with some significant FC results in physics, then move on to several implications in control theory, signal processing, and image processing. Mechanics and dynamical systems, biology, environmental sciences, and materials are the next major areas. We conclude our review paper by highlighting some of the most important findings from FC usage in multidisciplinary and other engineering domains. Each part includes many remarks from eminent researchers. Every submission includes a list of useful sources where the writers might learn more about the subjects under discussion.

The management of flexible linkages robots and thin-walled structures, mostly constructed of new sophisticated technologies including carbon composite materials, has piqued researchers' interest in Active Vibration Control (AVC) over the last few years. In some circumstances, patents have been granted, making the FC tool very viable. Even though fractional calculus was presented over 300 years ago and is used in many disciplines of research and engineering, the FC organization continues to promote applications. It's vital to give a quick overview of successful FC implementations in science and engineering. Furthermore, we must understand that FC is not general but that it has its particular set of applications; hence, presenting some of the most important existing effective FC applications might serve as a reference for future applied research. As a result, new elements of fractional modeling and applications are discovered year after year. The goal of this review paper is to give some concise descriptions made by eminent fractional calculus scientists. Anticipate that this partial, but crucial, knowledge will guide young researchers and beginners in seeing some of the most essential real-world applications and grasping this strong mathematical instrument, and also this collection will be beneficial to our neighborhood as well.