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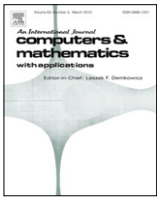

Editorial

Fractional differentiation and its applications I

Fractional calculus (FC) was originated from a genial idea of L'Hopital, who wrote Leibniz a letter dated September 30th, 1695, asking about a particular definition of the derivative of order $n = 1/2$.

FC means the theory of differentiation and integration of noninteger order and represents the generalization of the classical differential and integral calculus. Therefore, some of the properties of the fractional integral and derivatives differ from the classical ones in order to allow its adoption in a broader range of cases, which cannot be properly described by the classical integer-order calculus.

FC is presently considered to be a very powerful tool to help scientists explore the hidden properties of the dynamics of complex systems in all fields of sciences and engineering. In recent decades, FC played a key role of an efficient, convenient, and fundamental theoretical framework for more adequate modeling of complex dynamic processes. Therefore, we can see a growing reports applying FC in diffusion, control, modeling, signal processing, electromagnetism, mechanics, physics, biology, medicine, chemistry, bioengineering, and in many other areas.

It is particularly important to mention the series of conferences entitled "Fractional Calculus and its Application" that promoted FC during the last decade, namely organized in France, Portugal, Turkey, Spain and the 2012 edition organized in China, and encompassing a very large number of scientific topics.

Bearing these facts in mind, this special issue presents a collection of 33 in-depth studies that address the latest developments in FC theory and applications. The reported results will have a deep impact on solving real world problems formulated in terms of fractional ODEs and fractional PDEs.

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