Editorial

Fractional Differential Equations 2011

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It is our pleasure to bring this special issue of the International Journal of Differential Equations dedicated to fractional differential equations (FDEs).

In recent years, a growing number of work by many authors from various fields of science and engineering deal with dynamical systems described by fractional partial differential equations. Due to the extensive applications of FDEs in engineering and science, research in this area has grown significantly all around the world.

This special issue of Fractional Differential Equations consists of 13 original articles covering various aspects of FDEs and their applications by some of the prominent researchers in the field. These papers could be broadly grouped into three categories, namely, numerical and approximate schemes to solve fractional dynamical models (1st to 5th paper), existence and uniqueness of solutions of fractional differential equations and other theoretical results (6th to 11th paper), and application of fractional differential equations in various fields (12th and 13th paper). Other papers could also have been considered in this last category. However, because of their emphasis, they have been included in the first two categories.

The first paper introduces a new modified step variational iteration method for solving biochemical reaction model. The second and third papers use homotopy analysis method for solving a space- and time-fractional foam drainage equation and nonlinear coupled equations with parameters derivative, respectively. The fourth paper develops a new application of Mittag-Leffler function method and extends the application of the method to fractional linear differential equations. The fifth paper proposes an explicit numerical method for the

fractional Cable equation together with a stability and convergence analysis of the numerical method by means of a kind of von Neumann method.

The sixth paper investigates Malliavin calculus of Bismut type for fractional powers of Laplacians in semigroup theory. The seventh paper derives a sufficient condition on asymptotical stability of nonlinear fractional differential system with Caputo derivative. The eighth paper studies existence and uniqueness theorem of fractional mixed Volterra-Fredholm integro-differential equation with integral boundary conditions. The ninth paper proves the existence of positive solution for fractional differential equation with nonlocal boundary consider. The tenth paper gives existence of solutions for a nonlinear fractional multipoint boundary value problem at resonance. The eleventh paper proves the uniqueness of the Gellerstedt problem by energy integral method and the existence by reducing it to the ordinary differential equations.

The twelfth paper studies slip effects on fractional viscoelastic fluids. The final paper addresses antisynchronization phenomena in nonidentical fractional-order chaotic systems using active control.

Thus, this special issue provides a wide spectrum of current research in the area of FDEs, and we hope that experts in this and related fields would find it useful.

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