

Editorial

Functional Differential and Difference Equations with Applications

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This special issue may be viewed as a sequel to Recent Progress in Differential and Difference Equations edited by the four members of the present team and published by the Abstract and Applied Analysis in 2011. Call for papers prepared by the Guest Editors and posted on the journal's web page encouraged the submission of state-of-the-art contributions on a wide spectrum of topics such as asymptotic behavior of solutions, boundedness and periodicity of solutions, nonoscillation and oscillation of solutions, representation of solutions, stability, numerical algorithms, computational aspects, and applications to real-world phenomena. Our invitation was warmly welcomed by the mathematical community—more than one hundred manuscripts addressing important problems in the qualitative theory of functional differential and difference equations were submitted to the editorial office and went through a thorough peer-refereeing process. A thirty-eight carefully selected research articles for this special issue reflect modern trends and advances in functional differential and difference equations. Eighty-seven authors from seventeen countries (Bulgaria, China, Czech Republic, Egypt, Germany, Greece, Korea, Libya, Poland, Saudi Arabia, Slovak Republic, Spain, Thailand, Turkey, Ukraine, United Kingdom, and USA) have contributed to the success

of this thematic collection of papers dealing with various classes of delay differential equations, dynamic equations on time scales, partial differential equations, neutral functional differential equations, systems with p -Laplacian, stochastic differential equations, and related topics.

For many decades, the stability problems has attracted attention of researchers working with the qualitative theory of differential, functional differential, and difference equations. In this issue, the reader will find papers addressing stability of nonlinear differential systems with random parameters, robust stability of interval neural networks with discrete and distributed time delays, mean square exponential stability of stochastic-switched systems with interval time-varying delays, global exponential stability of periodic solutions to neural networks and impulsive neural networks with time-varying delays, and stability of impulsive stochastic functional differential systems.

Important directions in the modern qualitative theory of differential equations include periodicity, almost periodicity, oscillation, and nonoscillation of solutions to various classes of equations. This special issue contains papers that are concerned with the existence of periodic solutions to nonlinear dynamic equations on time scales, oscillation of second-order quasilinear neutral functional differential equations, existence of periodic solutions to difference systems with a p -Laplacian, interval oscillation criteria for second-order-mixed nonlinear impulsive differential equations with delay, existence of positive periodic solutions to first-order neutral functional differential equations with periodic delays, existence of almost periodic solutions to parabolic inverse Cauchy problems, bounded oscillation of forced nonlinear neutral differential equations, and existence of periodic solutions to Duffing-type p -Laplacian equations with multiple constant delays. Two papers in this collection deal with the asymptotic behavior of solutions to a class of two-dimensional differential systems with a finite number of nonconstant delays and with the properties of smooth solutions to a class of iterative functional differential equations.

It is for sure that existence of positive solutions is important for many applied problems. In this special issue, the reader can find contributions that address positivity of solutions to nonlinear two-dimensional difference systems with multiple delays, existence of positive bounded solutions to third-order discrete equations, partial difference equations with delays, Neumann boundary value problems for second-order impulsive differential equations in Banach spaces, neutral differential equations, existence and multiplicity of positive solutions to a class of nonlinear discrete fourth-order boundary value problems, and existence of positive monotonic solutions to nonlocal boundary value problems for a class of second-order functional differential equations. Estimates for positive solutions to discrete linear equations with a single delay are also established in one of the papers.

Several articles deal with important aspects of the theory of boundary value and initial value problems providing the analysis of a class of boundary value problems for a system of autonomous second-order linear partial differential equations of parabolic type with a single delay and Dirichlet problems with an indefinite and unbounded potential and concave-convex nonlinearities. In other papers included in this special issue, linear homogeneous partial differential equations with entire solutions represented by Laguerre polynomials are studied, monotone-iterative methods for initial value problems for differential equations with "maxima" and initial time differences are developed, necessary and sufficient conditions for the existence of solutions to a class of discrete second-order boundary value problems are derived, existence of one-signed solutions to some discrete second-order periodic boundary value problems is established, and optimal conditions for the existence and uniqueness of

solutions to a class of nonlocal boundary value problems for linear homogeneous second-order functional differential equations with piecewise constant arguments are obtained.

The last but not the least, this issue features a number of publications that report recent progress in the analysis of problems arising in various applications. In particular, dynamics of delayed neural network models consisting of two neurons with inertial coupling were studied, properties of a stochastic delay logistic model under regime switching were explored, and analysis of the permanence and extinction of a single species with contraception and feedback controls was conducted. Other applied problems addressed in this special issue regard Cohen-Grossberg BAM neural networks with time-varying delays, adaptive observer-based fault estimation for stochastic Markovian jumping systems, hematopoiesis models, Lotka-Volterra systems, and finite-time attractivity for diagonally dominant systems with off-diagonal delays.

It is certainly impossible to provide in this short editorial note a more comprehensive description for all articles in the collection. However, the team of the Guest Editors believes that results included in this volume represent significant contemporary trends in the qualitative theory of ordinary, functional, partial, impulsive, dynamic, stochastic differential, and difference equations and in applications. We hope that this special issue will serve as a source of inspiration for researchers working in related areas providing specialists with a wealth of new ideas, techniques, and unsolved problems.

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