Mathematics

Editorial

Advances in functional data analysis and difference-differential equations

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With the development of science and technique, the capacity of data collection has been improved continuously. And functional data that are in the form of curves and images have emerged in fields of economy, biomedicine, atmospheric science and so on. Due to the feature of infinite dimension for functional data, the traditional multivariate statistics methods are no longer applicable. Therefore, functional data analysis is challenging and has become one of the international hotspots and frontier issues in current academic research. The methods for functional data analysis can also be applied to system identification and inverse problems. Due to the impressive applications, functional data analysis has attracted much attention of many researchers. Difference-differential equations have important applications in physics, chemical, control system, signal processing and so on. Hence, it is interesting to study functional data analysis and theory and numerical algorithms for difference-differential equations.

Over fifty papers are invited to submit to this Special Issue "Advances in Functional Data Analysis and Difference-Differential Equations". And thirty papers has been published in this Special Issue. Shifted-Legendre orthonormal methods, efficient spectral-Galerkin methods and efficient spectral methods are proposed for solving differential equations and integral equations. The paper "Superconvergence for optimal control problems governed by semilinear parabolic equations", investigates optimal control problem for semilinear parabolic and introduces the standard $L_2(\Omega)$-orthogonal projection and the elliptic projection. In the paper "Functional data analysis: Application to daily observation of COVID-19 prevalence in France", the authors use the technique of functional data analysis to model daily hospitalized, deceased, Intensive Care Unit (ICU) cases and return home patient numbers along the COVID-19 outbreak, considered as functional data across different departments in France while our response variables are numbers of vaccinations, deaths, infected, recovered and tests in France. In the paper "A robust numerical method for single and multi-asset option pricing", the authors solve some different single and multi-asset European options

with the finite difference method. In the paper "Long time behavior of higher-order delay differential equation with vanishing proportional delay and its convergence analysis using spectral method", a higher-order numerical scheme is developed for the approximate solution of higher-order functional differential equations of pantograph type with vanishing proportional delays. Based on the differential game theory, the paper "Research on the data integration strategy of local governments and enterprises under central government subsidies", studies the cooperation strategy and cost-sharing of local government and enterprise data integration under central government subsidies.

Conflict of interest

The authors declare no conflicts of interest.

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