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Editorial

Recent Advances in Numerical Methods and Analysis for Nonlinear Differential Equations

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The construction and analysis of numerical schemes for nonlinear differential equations are very important. A well-designed numerical scheme not only may save computational costs for long-time simulations in the real-world problems, but also can give a better performance in the prediction of the mathematical models. Therefore, it is highly desirable to develop effective and efficient numerical schemes and their numerical analysis for nonlinear differential equations.

The paper authored by J. H. Al-Smail et al. studies the existence and uniqueness of weak solutions for the nonlinear parabolic equations and then presents a linearized finite element Galerkin method to numerically solve the model equations. The decay property of solutions is confirmed by the numerical results.

The paper by H. Qin et al. deals with the stability analysis of additive Runge-Kutta methods for delay-integrodifferential equations arising from some spatially discretized time-dependent partial differential equations. Such equations often own different stiff terms. In such cases, it is more effective in applying some split numerical schemes to approximate the systems. The given results imply that if the additive Runge-Kutta methods are algebraically stable, the perturbations of the numerical solutions are controlled by the initial perturbations from the system and the methods.

The paper of F. Wu et al. is concerned with the analysis of the two fully discrete numerical schemes for solving delay reaction-diffusion equation. Solvability and convergence of the fully discrete numerical schemes are studied. Besides, asymptotical stability of the fully discrete schemes is investigated extensively. Several examples are presented at last to confirm the theoretical results.

The paper by A. F. Nindjin et al. studies continuous nonlinear economic dynamics with a continuous delay. It is shown that the model is bounded and admits an attractor unit (set). In addition, the delay term can justify the bifurcation of an economic model of the stationary growth towards cyclic growth. Several numerical results are given to illustrate the given results.

The paper of M. A. Khan et al. presents an approximate solution for some well-known linear and nonlinear two-point boundary value problems by using the optimal homotopy asymptotic method. Numerical results are provided to show the effectiveness and reliability of the proposed method, and some comparisons are also given to show the advantages of the methods.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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