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Editorial

Exact and Approximate Solutions for Nonlinear PDEs

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In the last few decades, due to the wide applications of nonlinear partial differential equations (NPDEs) in nonlinear science [1], the process of looking for exact or approximate solutions of the NPDEs has played an important and significant role in research of mathematicians, physicists, and engineers [2]. Solutions of NPDEs are useful in the study of the dynamics of nonlinear phenomena such as nonlinear waves in hydrodynamics [3], atmospheric dynamics [4], plasma physics [5], solid state physics [6], and optical fibers [7], and thus they may give more insight into the physical aspects of such problems. Up to now, many powerful methods for obtaining exact or approximate solutions of NPDEs have been presented, such as homotopy perturbation method [8], nonperturbative methods [9], homogeneous balance method [10], Darboux transformation method [11], extended tanh-function method [12], generalized Jacobi elliptic functions expansion method [13], improved general mapping deformation method [14], general algebraic methods [15], and many other methods [16–18].

The purpose of this special issue is to extend several relatively new approaches and theories on searching for the exact and approximate solutions of NPDEs and to see the latest developments in applications of these methods. The response to this special issue was beyond our expectation. We received thirty-nine submissions in total, and, based on valuable review reports, sixteen original high-quality peer-reviewed research articles have been accepted for inclusion within this special issue. These papers contain a variety of topics and approaches, including the variational iteration method, the spectral homotopy analysis method, the homotopy perturbation method, the first integral method, the generalized tanh-function expansion method, the Lie symmetry approach, the auxiliary equation method, and the regular perturbation method, along with several interesting applications. These articles contain some new, novel, and innovative techniques and ideas that may stimulate further research on both the theory and the application of NPDEs.

It is certainly impossible to provide in this short editorial a more comprehensive description of all articles published in this special issue. However, the team of the guest editors believes that the results included reflect some recent trends in research and outline new ideas for future studies of exact and approximate solutions for NPDEs and applications thereof.

Acknowledgments

We would like to express our sincere gratitude to the authors who have submitted papers for consideration in the special issue. We also thank the reviewers of these papers, whose comments were important for us when making the editorial decisions, for their thorough and timely reviews. Many thanks are also given to the editorial board members of this journal, in recognition of their great support and help in making this special issue possible. We hope that this

special issue will provide some motivation to stimulate future research on the theory and applications of NPDEs.

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