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Editorial

Study of Integrability and Exact Solutions for Nonlinear Evolution Equations

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Many problems in nonlinear science associated with mechanical, structural, aeronautical, ocean, electrical, and control systems can be summarized as solving nonlinear evolution equations which arise from important models with mathematical and physical significances. Investigating integrability and finding exact solutions to the discrete and continuous evolution equations have extensive applications in many scientific fields such as hydrodynamics, condensed matter physics, solid-state physics, nonlinear optics, neurodynamics, crystal dislocation, model of meteorology, water wave model of oceanography, and fibre-optic communication. The research methods for solving nonlinear evolution equations deal with the inverse scattering transformation, the Darboux transformation, the bilinear method and multilinear method, the classical and nonclassical Lie group approaches, the Clarkson-Kruskal direct method, the deformation mapping method, the truncated Painlevé expansion, the mixing exponential method, the function expansion method, the geometrical method, the dressing method, the bifurcation theory of planar dynamical system, the auxiliary equation method, the integral bifurcation method, and so forth. The special issue examines such topics as recent research advances based on the above methods and new investigation results on solving exact solutions. Knowledge and understanding of the integrability of system and dynamical behaviors (properties) of solutions for nonlinear evolutions have led to the development of nonlinear science and successfully explained all kinds of nonlinear dynamic phenomena appearing in many scientific fields.

This special issue contains thirteen papers. In the following, we briefly review each of the papers by highlighting the significance of the key contributions.

Two papers in our special issue are devoted to discuss the integrable Hamiltonian systems, and the Lax representations of these systems are both given although the problems of discussion and the method of application are very different. In the paper titled "*Two-component super AKNS equations and their finite-dimensional integrable super Hamiltonian system*" by J. Yu and J. Han, the authors constructed a two-component super AKNS system via the r-matrix Lie superalgebra and gave its Lax representation. In the paper titled "*Consecutive Rosochatius deformations of the Garnier system and the Hénon-Heiles system*" by B. Xia and R. Zhou, an algorithm of constructing infinitely many symplectic realizations of the generalized sl(2) Gaudin magnet is proposed by authors. Based on this algorithm, the consecutive Rosochatius deformations of integrable Hamiltonian systems are presented by authors. In this work, the consecutive Rosochatius deformations of the Garnier system and the Hénon-Heiles system as well as their Lax representations are obtained by authors.

Two papers in our special issue are concerned about limit solutions of long wave and breather soliton. Based on the Hirota bilinear method, the authors studied the