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Editorial

Analytical and Numerical Methods for Solving Partial Differential Equations and Integral Equations Arising in Physical Models 2014

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Nowadays, partial differential equations (PDEs) have become a suitable tool for describing the natural phenomena of science and engineering models. Most of the phenomena arising in mathematical physics and engineering fields can be expressed by PDEs. Many engineering applications are simulated mathematically as PDEs with initial and boundary conditions. Most physical phenomena of fluid dynamics, gravitation, chemical reaction, dispersion, nonlinear optics, plasma physics, quantum mechanics, electricity, acoustics, solid mechanics, and many other models are controlled within their domain of validity by PDEs. Therefore, it becomes increasingly important to be familiar with all traditional and recently developed methods for solving PDEs and the implementations of these methods.

For many years the subject of functional equations has held a prominent place in the attention of mathematicians. In recent years this attention has been focused on a specific kind of functional equations, an integral equation, where the unknown function occurs under the integral sign. Such equations occur widely in diverse fields including continuum mechanics, potential theory, geophysics, electricity and magnetism, kinetic theory of gases, hereditary phenomena in physics and biology, renewal theory, quantum mechanics, radiation, optimization, optimal control systems, communication theory, mathematical economics, population genetics, queuing theory, medicine, mathematical problems of radiative equilibrium, the particle transport problems of astrophysics and reactor theory, acoustics, fluid mechanics, steady state heat conduction, fracture mechanics, and radiative heat transfer problems. They offer a powerful technique for solving a variety of practical problems.

This special issue is devoted to study the recent works in the above fields of partial differential equations and integral equations done by the leading researchers. Accordingly, various papers on partial differential equations and integral equations have been included in this special issue after completing a heedful, rigorous, and peer-review process. The issue contains eight research papers.

The $(2+1)$-dimensional nonlinear Schrödinger equations (NLS) are transformed into the standard $(1+1)$-dimension nonlinear Schrödinger equation by using appropriate transformation and then by using Exp-function method bisolitons and a series of breather solitons (rogue waves) solutions are obtained. Solutions of the $(2+1)$-dimensional nonlinear Schrödinger equations, which contain Akhmediev breather soliton, Ma breather soliton and Peregrine breather soliton