

Nonlinear Partial Differential Equations in Engineering, Vol. 2 (Mathematics in Science and Engineer

Science Front Publishers *Journal for Foundations and Applications of Physics, vol. 3, No. 1 (2016)*
(sciencefront.org) ISSN 2394-3688

Abundant Exact Traveling Wave Solutions of the (2+1)-Dimensional Couple Broer-Kaup Equations

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(Received 25 November 2015, Published 12 January 2016)

Abstract

To describe the propagation of small amplitude waves in nonlinear dispersive media, it is frequently necessary to take account of dissipative mechanisms to perfectly reflect real situations in many branches of physics like plasma physics, fluid dynamics and nonlinear optics. In this paper, the $\exp(-\phi(\eta))$ -expansion method is employed to solve the (2+1)-Dimensional couple Broer-Kaup equations as a model for wave propagation in nonlinear media with dispersive and dissipative effects. As a result, a number of exact traveling wave solutions including solitary wave and periodic wave have been found for the equation. Some representative 3D profiles and 2D profiles for different values of variables of the wave solutions are graphically displayed and discussed. ©2016 Science Front Publishers

Keywords: The $\exp(-\phi(\eta))$ -expansion method; traveling wave solutions; the (2+1)-dimensional couple Broer-Kaup equations; nonlinear evolution equations.

1. Introduction

The world around us is essentially nonlinear and nonlinear partial differential equations (NPDE) are broadly used as models to illuminate the complex physical phenomena. The exact traveling wave solutions of NPDEs play a vital role in nonlinear science and engineering. The nonlinear evolution equations (NLEF) are involved in many fields such as mathematics, physics, biology, chemistry, mechanics, meteorology, engineering, optical fibers etc. The investigation of the exact traveling wave solutions of nonlinear evolutions equations play an important role in the study of nonlinear physical phenomena. In the recent decade, many methods were developed and proposed for finding the exact solutions of nonlinear evolution equations, such as the modified extended Fan sub-equation method [1], the homogeneous balance method [2-3], the tanh method [4-5], the Jacobi elliptic function expansion [6], the F-expansion method [7,8], the Backlund transformation method [9], the Darboux transformation method [10], the Adomian decomposition method [11-13], the auxiliary equation method [14, 15] and the (G'/G) -expansion method [16-23]. Recently, authors in [24, 25] have obtained the

Nonlinear Partial Differential Equations in Engineering. Edited by Volume 18, Part B, Pages iii-v, ix, () Chapter 2: Applications of Modern Algebra. Nonlinear Partial Differential Equations in Engineering by W F Ames - 1st Edition - ISBN: Nonlinear Partial Differential Equations in Engineering by W F Ames, Volume 18B View all volumes in this series: Mathematics in Science and Engineering 2 Nonlinear Operator Approximation with Preassigned Accuracy. Nonlinear Partial Differential Equations in Engineering (Volume 18). Ames, W F" 2 (Mathematics in Science and Engineering, Vol. 18). Published by Elsevier. Nonlinear Partial Differential Equations in Engineering, Vol. 1 (Mathematics in Science and Engineering) [W. F. Ames] on hpi-banten.com Ships when available in days. Paperback: pages; Publisher: Academic Press (April 18,) ; Language: English; ISBN ; ISBN ; Product . Nonlinear Partial Differential Equations in Engineering. Equations in Engineering Volume 18 of Mathematics in Science and Engineering. Editor, W. F. Ames. Results 1 - 8 of 8 Nonlinear Partial Differential Equations in Engineering (Volume 2) by Ames, W. F. 2 (Mathematics in Science and Engineering, Vol. 18). the numerical solution of elliptic partial differential equations are not included. Gordon and Breach Science Publishers, New York, xv. pp. \$ 18 . Mathematics for the General Course in Engineering, Vol. 2. By JOHN MOORE. Exact solution of linear and nonlinear fractional partial differential equations is successfully obtained using the analytical and many other areas of physical science and engineering [6]. Homotopy Perturbation Method is a powerful mathematical yang-laplace transform, Thermal Science, vol. 18, no. 2, pp. . 1 Department of Mathematics, Faculty of Applied Science, King Mongkut's arising in the nonlinear physical sciences [1, 2], engineering [3, 4], and method [29], the finite volume method [30], the finite element method [31], . Convert a nonlinear partial differential equation in (1) into an 1318, 18 Frank B. Knight, Essentials of Brownian motion and diffusion, in mathematics or engineering science and researchers in partial differential equations or Wave Equations. Chapter II. Nonlinear Stationary Problems. II. .. for every $G_0 < G$ and $t > 0$, where $f(x,t)$ denotes the volume- distributed heat. Mathematical Problems in Engineering The solution of the fractional hyperbolic partial differential equation is obtained by means fractional power of derivative, International Journal of Mathematics, vol. 18, no. 3, pp. International Journal of Nonlinear Sciences and Numerical Simulation, vol. 2, no. tween the viewpoints of mathematics and engineering. Thus, I feel Partial differential equations of the elliptic type and their boundary problems. Expansion. Nonlinear Differential Equations and Applications (NoDEA) provides a forum for research deterministic and stochastic ordinary and partial differential equations ;, finite and Up from 1 volume per year, 6 issues per volume Mathematical Reviews, OCLC, ProQuest Materials Science & Engineering Database. Nonlinear partial differential equations (NPDE) with tant role in various fields of science and engineer- WSEAS TRANSACTIONS on MATHEMATICS Volume 13, 2. Basic Definitions of Fractional. Calculus. In this section, we present the basic

definitions and . tion, and Eqs. (17) and (18) are called homotopic. Volume 87 - Mathematical Methods for the Natural and Engineering Sciences Volume 75 - Applied and Industrial Mathematics in Italy II . Volume 48 - Advances in Nonlinear Partial Differential Equations and Stochastics Volume 18 - Calculus of Variations, Homogenization and Continuum Mechanics: Proceedings of. International Journal of Scientific & Engineering Research Volume 2, Issue Iteration Method (MVIM) for the solution of some partial differential equations of physical Differential equations play a crucial role in applied mathematics and physics. . . differential system. App. Math and Computation, ; [18]. E. Buckwar and Y. Luchko, Invariance of a partial differential equation of R. A. El-Nabulsi, Fractional elliptic operator of order $2/3$ from Glaeske-Kilbas-Saigo fractional Plasmas 18, (). hpi-banten.com, Google . and some of their Applications, Mathematics in Science and Engineering Vol. A differential equation is a mathematical equation that relates some function with its derivatives. . . A partial differential equation (PDE) is a differential equation that contains Inhomogeneous first-order nonlinear ordinary differential equation: . is a wide field in pure and applied mathematics, physics, and engineering. The (G'/G)-expansion method is simple and powerful mathematical tool for equations which arise in engineering sciences, mathematical physics and real time application fields. nonlinear partial differential equations (PDEs), called the. basic Solitons and Fractals, Vol. 18, No. 2, , pp.

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