Available online at www.sciencedirect.com
ScienceDirect
Journal of the Franklin Institute 348 (2011) 1751–1768
Journal of The Franklin Institute
www.elsevier.com/locate/jfranklin

Exact solutions for the generalized KdV equation by using Backlund transformations

Hassan A. Zedan[1]

Mathematics Department, Faculty of Science, King Abdul Aziz University, P.O. Box 80203, Jeddah 21589, Saudi Arabia

Received 3 February 2010; received in revised form 3 June 2010; accepted 20 April 2011
Available online 14 May 2011

Abstract

In this paper, the Backlund transformations for the generalized KdV equation are constructed through Ablowitz–Kaup–Newell–Segur (AKNS) system in using Ricatti's form of the inverse method. The derived Backlund transformations are used to generate new classes of exact solutions. The technique developed here is based on the construction of wave functions which are the solutions of the associated AKNS. From known simple solutions we shall construct other solitons and wave solutions as well.

1. Introduction

In the recent years, noticeable progress has been made in the construction of the exact solutions for nonlinear partial differential equations, which has long been a major concern for both mathematicians and physicists.

The effort in finding exact solutions to nonlinear differential equation (NPDE), when they exist, is very important for the understanding of most nonlinear physical phenomena. For instance, the nonlinear wave phenomena observed in fluid dynamics, plasma and optical fibers are often modelled by the bell shaped sech solutions and the kink shaped tanh solution. Many powerful methods for finding soliton solutions are Darboux transformation [1], Hirota bilinear method [2], Lie group method [3], the homogeneous balance method [4], and the tanh method.

E-mail address: hassanzedan2003@yahoo.com
[1]Present address: Mathematics Department, Faculty of Science, Kafr El-Sheikh University, Kafr El-Sheikh, Egypt.

0016-0032/$32.00
doi:10.1016/j.jfranklin.2011.04.013