Peakons and Soliton Solutions of Newly Developed Benjamin-Bona-Mahony-Like Equations

Abdul-Majid Wazwaz

Department of Mathematics, Saint Xavier University, Chicago, IL 60655, USA

Abstract: This paper establishes a set of Benjamin-Bona-Mahony-like equations (BBM-like) equations. By means of an advection dispersion equation, we can develop several BBM-like equations. We show that these established equations share some of the solitary wave solutions of the BBM equation. We also show that these developed equations give paekon solutions, for specific values of the parameter included in these equations, although these equations are not of the Camassa-Holm type of equations. We also derive a variety of solitonic solutions.

1 Introduction

Nonlinear equations have been a subject of intensive study for decades in several areas of mathematics, physics, engineering and other sciences. The study of these nonlinear equations has been the topic of major research projects in nonlinear sciences. Another interesting class of excitations consists of establishing nonlinear equations with significant physical features [1–10].

The KdV equation reads

$$u_t + uu_x + u_{xxx} = 0. \tag{1}$$

This equation models a variety of nonlinear wave phenomena such as shallow water waves, acoustic waves in a harmonic crystal, internal gravity waves in oceans, blood pressure pulses, and ion-acoustic waves in plasmas [1–7]. The KdV equation is completely integrable and admits multiple-soliton solutions and exhibits an infinite number of conserved

---

* Corresponding author: `mailto:wazwaz@sxu.edu`