Dynamics of Continuous, Discrete and Impulsive Systems
Series **B:** *Applications & Algorithms* **26 (2019)** 123-132

THE L^1 STABILITY TO A GENERALIZED BENJAMIN-BONA-MAHONY-BURGERS MODEL

Chong Lai[1*], Rui Li[1], Kexin Luo[2]

[1]Department of Mathematics and Statistics
Curtin University, Perth, Australia

[2]The School of Mathematical and Software Science
Sichuan Normal University, Chengdu, China

Abstract. We investigate the stability of solutions for a nonlinear equation which includes the classic Benjamin-Bona-Mahony-Burgers equation. Applying the Kruzkov's techniques of doubling the space variables and assuming that the initial data belong to the space $L^1(R) \cap H^1(R)$, we establish the $L^1(R)$ stability of the strong solutions for the nonlinear equation. Moreover, the uniqueness of strong solutions to the equation is acquired.

Keywords. A generalized $BBMB$ equation; Strong solutions; $L^1(R)$ stability; Uniqueness; Nonlinear equation.

AMS (MOS) subject classification: 35G25;35L05.

1 Introduction and main results

This work investigates the following nonlinear generalized Benjamin-Bona-Mahony-Burgers equation ($GBBMB$)

$$v_t - v_{txx} - av_{xx} + bv_x + v^p v_x + kv_{xxx} = 0, \quad \text{constant} \quad a > 0, \tag{1}$$

where constant b and k are arbitrary, and $p \geq 1$ is an integer. If $k = 0$, Eq.(1) is turned into the nonlinear Benjamin-Bona-Mahony-Burgers equation

$$v_t - v_{txx} - av_{xx} + bv_x + v^p v_x = 0. \tag{2}$$

Letting $a = 0, b = 1$, $p = 1$ and $k = 0$, Eq.(1) becomes the Benjamin-Bona-Mahony model

$$v_t - v_{txx} + v_x + vv_x = 0, \tag{3}$$

which is a long wave equation (see [1, 2]). Eq.(3) is usually regarded as an alternative model to the KdV equation which has dynamic properties of weakly long dispersive waves [3]. As pointed out in Mei [4], Eq.(2) is derived if the good predictive power is desired in the physical sense. The dispersive

*Corresponding author. Email address: laichong1991716@gmail.com