THE KINKS, SOLITONS AND PERIODIC SOLUTIONS FOR A GENERALIZED KONOPELCHENKO-DUBROVSKY EQUATION

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Abstract. The tanh method, the cosh-sinh method and the exponential function method are employed to investigate a generalized Konopelchenko-Dubrovsky equation which possesses high order nonlinear terms. The kinks, solitons and periodic solutions for the equation are obtained under certain circumstances. The qualitative change in the physical structures of the solutions is emphasized.

Keywords. Konopelchenko-Dubrovsky equation, kinks, solitons, periodic solutions, high order nonlinear terms.

AMS (MOS) subject classification: 35K55, 35B40.

1　Introduction

Konopelchenko and Dubrovsky [1] studied the Konopelchenko and Dubrovsky (KD) model

$$\begin{cases} u_t - u_{xxx} - 6b_0 u u_x + \frac{3}{2}a_0^2 u^2 u_x - 3v_y + 3a_0 u_x v = 0, \\ u_y = v_x, \end{cases} \tag{1}$$

where a_0 and b_0 are real parameters. The inverse scattering transform method was employed to investigate Eq.(1). The F-expansion technique was applied in [2] to examine the KD equation. The main works in [1-2] are the solitary wave solutions.

In the field of solitary wave theory, it is known that four types of travelling wave solutions are of particular interest to scientists. As illustrated in [3], the solitary waves, which are located travelling waves that have the property of asymptotical zero at large distances, the periodic solutions, the kink waves which rise or descend from one asymptotic state to another. The fourth type is the compactons [4], which are solitons with compact spatial support such that each compacton is a soliton confined to a finite core. Moreover, Rosenau and Pikovsky [5] introduced a fifth type of travelling wave, called

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