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ҰЛТТЫҚ
УНИВЕРСИТЕТІ

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ТҰҢҒЫШ ПРЕЗИДЕНТІ - ЕЛБАСЫНЫҢ ҚОРЫ

«ҒЫЛЫМ ЖӘНЕ БІЛІМ – 2017»
студенттер мен жас ғалымдардың
XII Халықаралық ғылыми конференциясының
БАЯНДАМАЛАР ЖИНАҒЫ

СБОРНИК МАТЕРИАЛОВ
XII Международной научной конференции
студентов и молодых ученых
«НАУКА И ОБРАЗОВАНИЕ – 2017»

PROCEEDINGS
of the XII International Scientific Conference
for students and young scholars
«SCIENCE AND EDUCATION - 2017»

14th April 2017, Astana

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ БІЛІМ ЖӘНЕ ҒЫЛЫМ МИНИСТРЛІГІ
Л.Н. ГУМИЛЕВ АТЫНДАҒЫ ЕУРАЗИЯ ҰЛТТЫҚ УНИВЕРСИТЕТІ

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Жинаққа студенттердің, магистранттардың, докторанттардың және жас ғалымдардың жаратылыстану-техникалық және гуманитарлық ғылымдардың өзекті мәселелері бойынша баяндамалары енгізілген.

The proceedings are the papers of students, undergraduates, doctoral students and young researchers on topical issues of natural and technical sciences and humanities.

В сборник вошли доклады студентов, магистрантов, докторантов и молодых ученых по актуальным вопросам естественно-технических и гуманитарных наук.

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Proceeding as before, we obtain the next solution

$$U(x,t)=\frac{c+8k^{3}}{6k}-2k^{2}\cot^{2}(kx-ct), \qquad (14)$$

where k and c are left the as free parameters. The graphical representation of the solution (14) of the equation (2) is shown in Fig. 4.

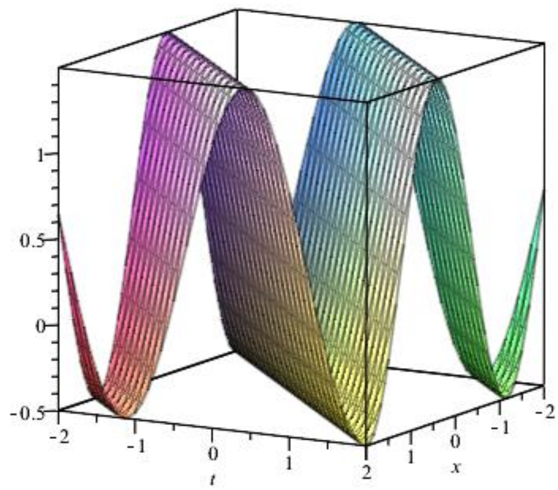

Figure 4:k=1, c=1, -2≤x≤2, -2≤t≤2.

Conclusion. In this paper, we examined the nonlinear the Korteweg-de Vries equation. Using the methods tanh, coth, tan, cot, we have constructed various exact wave solutions for this equation. The graphical representation of the obtained solutions is presented in the figures.

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UDC: 517.946

FIRST AND SECOND FUNDAMENTAL FORMS OF (1+1)- DIMENSIONAL MAXWELL AND BLOCH EQUATIONS

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1. Introduction

Lax representation is not just a tool to derive the exact solutions of corresponding equations, also can be the geometry object to find geometrical aspects of the equations [1]. In this paper, we show the first and second fundamental forms of the (1+1)-dimensional Maxwell and Bloch equations by using the Lax representation.

2. First and second fundamental forms of Maxwell and Bloch system

The Lax pair is not only the tools to derive the exact solution of corresponding equations, but also can be the geometrical objects. As C. Rogers et al. mentioned in their work [2] first and second fundamental forms can be derived in a simple way by using the Lax pair. Here we consider the (1+1)-dimensional hydrodynamic-type equations. First and second fundamental forms can be the form of equations (3) and (4) if a matrix valued function $\Phi \in SU(2)$ with problems

$$\Phi_{,\mu} = g_{\mu}\Phi, \tag{1}$$

where a vector of the soliton surface can be given by Sym-Tafel relation as following form[3]

$$r = \Phi^{-1}\Phi_{,\lambda}. \tag{2}$$

In this case the fundamental forms for the equation taken as

$$\mathrm{I} = -2\mathrm{Tr}(g_{\mu,\lambda} g_{\nu,\lambda}) dx^{\mu} dx^{\nu}, \tag{3}$$

$$\mathrm{II} = -\frac{1}{\det^{1/2}[g_{1,\lambda}, g_{2,\lambda}]}\mathrm{Tr}([g_{1,\lambda}, g_{2,\lambda}](g_{\mu,\nu,\lambda} + [g_{\mu,\lambda}, g_{\nu}]))dx^{\mu} dx^{\nu}. \tag{4}$$

Here we consider the equations as

$$q_t - 2p = 0, \tag{5}$$

$$p_x - 2q\eta - 2i\omega p = 0, \tag{6}$$

$$\eta_x + qp^* + q^* p = 0. \tag{7}$$

This system can be reduced from (1+1)-dimensional cmKdV-MB equations, and its Lax pair has the form [4]

$$A = i\lambda\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} + \begin{pmatrix} 0 & q \\ -q^* & 0 \end{pmatrix} = i\lambda\sigma_3 + A_0, \tag{8}$$

$$B = V_1\begin{pmatrix} \eta & -p \\ -p^* & -\eta \end{pmatrix} \tag{9}$$

where $V_1 = \frac{-i}{(\lambda - \omega)}$. The compatibility condition of the equation (5)-(7) is

$$A_t - B_x + [A, B] = 0. \tag{10}$$

Let us denote the $g_1 = A, g_2 = B$ and $\Phi_x = \Phi_1, \Phi_t = \Phi_2$ utilizing this expression and using the formula (3) and (4) we derive the first and second fundamental forms by next view

$$\mathrm{I} = \frac{8\eta}{(\lambda-\omega)^2}dxdt + 4dx^2 + (\frac{4\eta^2}{(\lambda-\omega)^4} + \frac{4pk}{(\lambda-\omega)^4})dt^2,$$

$$\mathrm{II} = \left(\frac{ipk_t}{\sqrt{|p|^2}(\lambda-\omega)^2} - \frac{ikp_t}{\sqrt{|p|^2}(\lambda-\omega)^2} - \frac{4ipk_t}{\sqrt{|p|^2}(\lambda-\omega)} - \frac{i\lambda}{(\lambda-\omega)^2} - \frac{ip\eta r}{\sqrt{|p|^2}(\lambda-\omega)^2} - ipr \right) dxdt$$

$$+ \left(\frac{ipk_x}{\sqrt{|p|^2}(\lambda-\omega)^2} - \frac{ikp_x}{\sqrt{|p|^2}(\lambda-\omega)^2} - \frac{2}{(\lambda-\omega)} \right) dt^2$$

$$-2\left(\frac{ipr}{\sqrt{|p|^2}} + \frac{ipq}{\sqrt{|p|^2}} \right) dx^2$$

3. Conclusion

In this paper, we constructed the first and second fundamental forms for the (1+1)-dimensional Maxwell and Bloch equation by using Sym-Tafel relation and Lax representation of corresponding equations.

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MULTI-DARK SOLITON SOLUTION OF THE MULTIVARIATE GENERALIZED NONLINEAR SCHRÖDINGER EQUATION

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1. Introduction. In the study of nonlinear wave propagation exactly solvable models play an exceptional role. There are many physically important integrable equations. Examples include small amplitude waves in shallow water where the Korteweg-de Vries (KdV) equation and its multidimensional analog, the Kadomtsev-Petviashvili equation arise; in generic weakly nonlinear dispersive systems in the quasimonochromatic limit the integrable cubic nonlinear Schrödinger equation is applicable. Furthermore, in nonlinear optics the integrable cubic nonlinear Schrödinger (NLS) equation is a key equation describing optical wave propagation in Kerr media. Indeed there are many physically significant integrable systems which apply to diverse problems in fluid mechanics, electromagnetics, gravitational waves, elasticity, fundamental physics, and lattice