

Soliton Solution Of Sine Gordon Model Dna

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Soliton Solution Of Sine Gordon

The 2-soliton solutions of the sine-Gordon equation show some of the characteristic features of the solitons. The traveling sine-Gordon kinks and/or antikinks pass through each other as if perfectly permeable, and the only observed effect is a phase shift .

Sine-Gordon equation - Wikipedia

(soliton) solution to the sine-Gordon, it can then be used to generate other soliton solutions. Using $u=0$ in the system above yields 1-soliton solutions of the form $\phi(x;t) = 4\arctan(\exp(\sqrt{1-u^2}(x-vt)))$, expressed in space-time coordinates, where $2 = 1 \pm 2v$. Taking the positive root for yields 1-soliton

Modeling Soliton Solutions to the Sine-Gordon Equation

We provide a direct method for constructing soliton solutions of the sine-Gordon equation in the laboratory coordinates on the half line in the presence of integrable boundary conditions derived in Sklyanin's classical work (Sklyanin, 1987). Explicit examples, including boundary bound states, are presented.

Soliton solutions of the sine-Gordon equation on the half ...

The particle-like behavior of solitons inspired the British physicist Tony Skyrme to suggest in 1961 that spatially localized solutions to nonlinear partial differential equations describing waves can be considered as particles. This idea was demonstrated by Skyrme for the sine-Gordon (sG) equation.

On Dynamics Of Sine-gordon Soliton Under External Forcing ...

The hierarchy of the sine-Gordon equation with self-consistent sources is derived by using the eigenfunctions of recursion operator. The bilinear form of the sine-Gordon equation with self-consistent sources is given and the N-soliton solutions are obtained through Hirota method and Wronskian technique, respectively.

The N -soliton solutions of the sine-Gordon equation with ...

The Sine Gordon Equation In[1]:=Clear@"Global ... One Soliton Solutions We display a soliton solution; first of all for the special case of no time dependence. We verify that the equation is satisfied by giving the command `sinogordoneq` and seeing that the result is True.

The Sine Gordon Equation - young.physics.ucsc.edu

2: Soliton Unperturbed sine-Gordon equation has exact solution: $\phi(x,t) = 4\arctan \exp(\pm \sqrt{1-u^2}(x-vt))$. This is a solitary wave or soliton. It can move with velocity $0 \leq u < 1$ (i.e. c^{-1}). Picture. Soliton is a kink which changes the Josephson phase from 0 to 2π (soliton) or from 2π to 0 (anti-soliton). The field of soliton is $h = \phi(x) = 2 \cosh(\sqrt{1-u^2}(x-vt))$.

Lecture 1: sine-Gordon equation and solutions

Soliton solution of a sine-Gordon model of DNA Assuming the wavefunction Ψ to be a function of x and t , then the sine-Gordon model of DNA can be written as follows: [3, p.7]

A Review of Soliton Solution of sine-Gordon model of DNA

This is the one-soliton solution of the Sine-Gordon equation (1), for arbitrary constants λ and $a \neq 0$. The solution with $a > 0$ is usually called the "kink" one-solution solution, and that with $a < 0$ is the "anti-kink" one-solution solution. Then, the two-soliton solution of (6a) can be obtained by using $1110 \ 0 \ e \ g = aXbT++\theta$, $2220 \ 1 \ e \ g = aXbT++\theta$, and

ANALYTICAL SOLUTIONS TO SINE-GORDON EQUATION WITH VARIABLE ...

Many exactly solvable models have soliton solutions, including the Korteweg-de Vries equation, the nonlinear Schrödinger equation, the coupled nonlinear Schrödinger equation, and the sine-Gordon equation. The soliton solutions are typically obtained by means of the inverse scattering transform, and owe their stability to the integrability of the field equations. The mathematical theory of these equations is a broad and very active field of mathematical research.

Soliton - Wikipedia

The breather soliton solution, which is also called a breather mode or breather soliton [21], is given by $u_B(x,t) = 4 \arctan \sqrt{1-\omega^2} \frac{\sin(\omega t) \omega \cosh(\sqrt{1-\omega^2} x)}{(5.7)}$ which is periodic for frequencies $\omega < 1$ and decays exponentially when moving away from $x = 0$. Now we are in the good position to look for numerical solutions Fig. 5.3 The breather so-

Chapter 5 Sine-Gordon Equation - uni-muenster.de

1 A Review of Soliton Solution of sine-Gordon model of DNA Victor Christianto 1 and Yunita Umniyati 2 Abstract There are many models of DNA, both the linear ones and the nonlinear ones.

A Review of Soliton Solution of sine-Gordon model of DNA

+ $\text{bsin}(\cdot, w)$. Sine-Gordon equation. It arises in differential geometry and various areas of physics. ... The first expression corresponds to a single-soliton solution. 2 ... For other exact solutions of the sine-Gordon equation, see the nonlinear Klein-Gordon equation with $f(w) = \text{bsin}(\cdot, w)$. 5 ...

Sine-Gordon Equation - EqWorld

ions in both physical and life sciences. In this paper, we review sine-Gordon solitons, kinks and breathers as models of nonlinear excitations in complex systems in physics and in living cellular structures, both intra-cellular (DNA, protein folding and micro-tubules) and inter-cellular (neural impulses and muscular contractions).

Sine-Gordon Solitons, Kinks and Breathers as Physical ...

The Sine Gordon equation is $\partial^2 y / \partial x^2 = 1/v^2 \partial^2 y / \partial t^2 + \zeta \sin(y)$ where $\sin(y)$ acts as both a nonlinear term and a dispersion term. The strength of the nonlinear term is given by ζ . Sines, cosines and exponentials are not solutions to this equation but there is an exact solution called a kink given by $y(x,t) = 4 \tan^{-1} (\exp \pm \zeta(x \dots$

Sine Gordon Soliton - pages.iu.edu

waves of the multi-soliton type of the one-dimensional sine-Gordon model with two identical impurities. First, with the help of perturbation theory, there was found a system of differential equations for harmonic oscillators with elastic link, which describes the dynamics of two bound, localized on impurities, nonlinear waves.

Dynamics of the multi-soliton waves in the sine-Gordon ...

Soliton Approach to the Conservation Laws and Solution for Sine-Gordon System A. Roy Chowdhury ~ and Chandana Ghosh 1 Received February 9, 1990 It is possible to generate an infinite number of conserved quantities and the most general soliton solution in an arbitrary background with the help of the Darboux-

Unified approach to the conservation laws and soliton ...

Sine-Gordon equation is generally posed as an initial value problem on \mathbb{R}^1 for $t \geq 0$. For example, suppose we specify an initial value w profile $u(x; 0)$ with the property that all of its derivatives, though not necessarily itself, approach 0 as $|x| \rightarrow \infty$. For such a problem, there are various possible soliton solutions ...

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