conferenceseries.com

6ᵗʰ International Conference on

Theoretical and Applied Physics

May 16-17, 2019 | Rome, Italy

Stability problem and simulation of interaction of the multidimensional NLS solitons in non-uniform and non-stationary media

Vasily Yu Belashov[1], Oleg A Kharshiladze[2] and **Jemal Rogava[2]**
[1]Kazan Federal University, Russia
[2]Tbilisi State University, Georgia

Investigation of dynamics of multidimensional electromagnetic (EM) waves in plasma, such as 2D and 3D envelop solitons, is very actual problem. The interaction sufficiently changes the characteristics of the waves and background EM field in the region of interaction. Problem of the dynamics and stability becomes more complicated if it is necessary to take into account an influence of different dispersive and nonlinear inhomogeneities and nonstationary parameters of medium on the soliton structure and evolution. In this case the problem reduces to the generalized nonlinear schrodinger (GNLS) equation for the amplitude of the EM field with coefficient functions having spatial and temporal inhomogeneities. The analysis of stability of the multidimensional GNLS solitons was based on the method of study of transformational properties of the Hamiltonian of the system developed by authors earlier for the BK class of the equations. As a result we have found the conditions of existence of the multidimensional stable GNLS soliton solutions. At simulation the Fourier splitting method for the GNLS equation was used taking into account the inhomogeneities of coefficient functions of the equation. Implicit scheme of finite-difference method was used for investigation of soliton propagation in non-uniform and nonstationary medium. Numerical modeling showed that inhomogeneity of medium changes the amplitudes of solitons and nonlinear EM waves, their velocities of propagation, their quantity that is caused by their nonelastic interaction in inhomogeneous medium. Nonstationary medium changes a form of impulse and affects its spectral features. Changes of modulation of the parameters of medium make possible variation of character of nonelastic interaction at solitons attraction-repulsion.
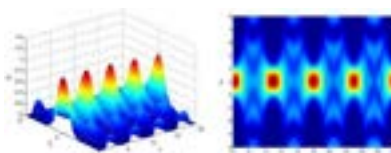

Figure 1: Strong stable pulsations of breather type in non-stationary medium with negative nonlinearity

Recent Publications

1. Belashov V Yu, Belashova E S and Kharshiladze O A (2018) Nonlinear wave structures of the soliton and vortex types in complex continuous media: theory, simulation, applications. Lecture Notes of TICMI. Tbilisi University Press 18:90.

2. 2. Belashov V Yu, Belashova E S and Kharshiladze O A (2018) Classification of multidimensional solitary solutions of the GKP equation by use of qualitative and asymptotic analysis. Journal of Physical Chemistry and Biophysics 8:38.

Biography

Vasily Yu Belashov has completed his PhD in Radio Physics and DSci in Physics and Mathematics. He is Chief Scientist and Professor at the Kazan Federal University. He was Coordinator of studies on the Intern. Program "Solar Terminator" (1987-1992), and took part in the Intern programs WITS/WAGS and STEP. He is author of 340 publications including 8 monographs. His main books are "Solitary Waves in Dispersive Complex Media. Theory, Simulation, Applications", "Solitons: Theory, Simulation, Applications".

vybelashov@yahoo.com

Journal of Astrophysics & Aerospace Technology
ISSN: 2329-6542

Applied Physics 2019
May 16-17, 2019

Volume 7

Page 29