

The BK System with Wave Field Stochastic Fluctuations

Vasily Yu. Belashov, Oleg A. Kharshiladze and Elena S. Belashova

Kazan (Volga Region) Federal University, Kazan, Russia

Iv. Javaxishvilis Tbilisi State University, Georgia

Kazan National Research Technical University named after A.N. Tupolev – KAI, Russia

Email: vybelashov@yahoo.com

Tel: +7(927)2457939

Abstract.

The soliton dynamics in complex continuous media with the wave field's stochastic fluctuations which is described by the generalized equations of the Belashov-Karpman (BK) system including the Kadomtsev-Petviashvili (GKP) and the nonlinear Schrodinger (GNLS) classes of equations is studied analytically and numerically. In our investigations we take into account the generalizations relevant to various complex physical media including space plasma, atmosphere, hydrosphere, optical fibers and waveguides and other complex dispersive media, where the stochastic fluctuations of wave field takes place always, on a level with the high-order dispersion effects, influence of dissipation and instabilities of different types. The results on influence of Gaussian noise on structure, stability and interaction dynamics of the multidimensional nonlinear waves and solitons are presented. The analysis of stability of solutions is based on study of transformational properties of the Hamiltonian of the corresponding system. The structure of possible multidimensional solutions and their collisional interaction is studied numerically. Some applications of obtained results in real physical media are presented.

Biography.

Vasily Yu. Belashov, Principal Researcher, Professor.

He has Diplomas: PhD in Radiophysics (1991), Senior Research Scientist in Theoretical Physics and Radiophysics (1994), Associate Professor in Mathematics (1996), Doctor of Science (Habilitation) in Physics and Mathematics (1998), and Professor (2005). He was Coordinator of studies on the Intern. Program “Solar Terminator” (1987-1992), and took part in the Intern. Programs WITS/WAGS and STEP. Presently he works at the Kazan Federal University. He is author of 388 publications including 8 monographs including books: Solitary Waves in Dispersive Complex Media. Theory, Simulation, Applications. Springer-Verlag GmbH, 2005; Solitons: Theory, Simulation, Applications. Kazan, Kazan Federal University Press, 2016.

