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Multidimensional solitons in dispersive complex media: Structure and stability

This paper is devoted to one of the most interesting and rapidly developing areas of modern nonlinear physics and mathematics; the analytical and advanced numerical study of the structure and stability of two- and three-dimensional solitons in dispersive complex media described by the Belashov-Karpman (BK) system which includes the Kadomtsev-Petviashvili and derivative nonlinear Schrodinger classes of equations and takes into account the generalizations relevant to various complex physical media, associated with the effects of high-order dispersion corrections, influence of dissipation and instabilities. This is consistent representation of the both early known and new original results obtained by author and also some generalizations in theory and numerical simulation of the nonlinear waves and solitons in complex dispersive media. The analysis of stability of solutions is based on study of transformational properties of the Hamiltonian of the system. The structure of possible multidimensional solutions is investigated using the methods of qualitative analysis of proper dynamical systems and analysis of the solutions' asymptotics. Soliton interaction is studied numerically using especially developed numerical methods.

Biography

Vasily Yu Belashov has completed his PhD in Radiophysics and Doctor of Science in Physics and Mathematics. His main fields includes: theory and numerical simulation of the dynamics of multi-dimensional nonlinear waves, solitons and vortex structures in plasmas and other dispersive media. Presently, he is Professor in the Kazan Federal University. He was Coordinator of studies on the International Program Solar Terminator (1987-1992), and took part in Programs WITS/WAGS and STEP. He is author of 288 publications and books: "*Solitary Waves in Dispersive Complex Media: Theory, Simulation, Applications*", Springer-Verlag GmbH, 2005; "*The KP Equation and its Generalizations. Theory and Applications*", Magadan, NEISRI FEB RAS, 1997.

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