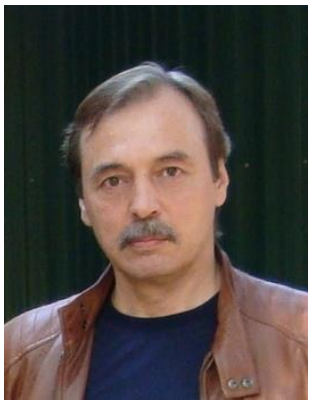

Dynamics of the GNLS Solitons in Nonstationary and Non-Uniform Media Including Fiber and Planar Optical Waveguides

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Investigation of dynamics of multidimensional electromagnetic (EM) waves in fiber and planar optical waveguides, 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 optical 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 in optical medium. 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 optical 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 media such as fiber and planar optical waveguides. Numerical simulation 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 optical medium make possible variation of character of nonelastic interaction at solitons attraction-repulsion.

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