MODELING OF NONELASTIC INTERACTIONS OF OPTICAL SOLITONS

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Investigation of laser soliton propagation and interaction in optical fibber for the information transmission is very actual problem. This interaction sufficiently changes the characteristics of the light field and distorts transmitted information. For the control of the soliton shape, stability and dynamics, it is necessary to study an influence of fibber defects, dispersive and nonlinear inhomogeneities, and nonstationary parameters of medium on the character of soliton propagation. The problem reduces to the nonlinear Schrodinger (NLS) equation for the amplitude of the light field with coefficient functions having spatial and temporal inhomogeneities.

Fourier splitting method for the NLS equation was used at numerical modeling, and the inhomogeneities of coefficient functions were taken into account. The NLS equation is divided into linear and nonlinear parts, dispersive and nonlinear effects are considered separately, corresponding operators are assumed commutative. Implicit scheme of finite-difference method is used for investigation of soliton propagation in non-uniform and nonstationary environment.

Numerical modeling shows that inhomogeneity of medium changes the amplitudes of solitons and other light impulses, their velocities of propagation, their quantity that is caused by their nonelastic interaction in inhomogeneous fibber. 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.

References

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