Abstract

To the graduate work of Yu.G. Gladush, group 625,

“Propagation of self-induced transparency pulse in the special dispersion media”

This work describes the propagation of the self-induced transparency (SIT) pulse in the medium with spatial dispersion. The generalization of two-level system is suggested which describes coherent transfer of the excitations of the medium by exitons. The periodic and soliton solutions are found. They show that if a radiation pulse can create lightweight and mobile exitons in the medium, then two types of solitons appear, both of them having different characteristics. The first type exhibits the properties very close to the standard SIT soliton. At the same time the other type is completely different, i.e. for longer pulse duration times its velocity drops down to a particular minimum and then becomes a constant. The effects of spatial dispersion are estimated to magnify and be significant at resonance transition and sufficient pulse duration due to smaller propagation velocities under strong nonlinearity. It has been verified numerically that the effects revealed are likely to be observed experimentally.