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Dynamic Optical Bistability, Switching and Control of Self-Pulsations of Excitons and Biexcitons

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Abstract

The theory of dynamic optical bistability and self-pulsations in condensed media is elaborated. The nonlinearity is due to a process in which two excitons are bound into a biexciton by virtue of their Coulomb interaction. A computer experiment is used to study the switching times between the optical bistability branches. The scenario for the transition to the dynamical chaos mode is found. The action of external periodical force upon the system is investigated and the range of amplitude values and frequencies of external harmonic pump were found at which the chaotic regime becomes nonlinear periodic by transformation of strange attractor into a limit cycle. Finally, we discuss the possibility of detecting these phenomena in experiments.