

Chaotic dynamics of electromagnetic field in nonlinear Bragg gratings

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The results of numerical simulation of electromagnetic field propagation in dielectric wave guiding systems are presented. We used the direct solution of Maxwell's equations with the help of FDTD (finite difference time domain) method. Several models were studied: a homogeneous nonlinear layer of dielectric medium and a periodic nonlinear structure excited by a periodic input signal; and a nonlinear periodic structure interacting with an electron beam. In numerical simulation the parameters typical for real nonlinear Bragg gratings were chosen. Our research was focused mainly on complex regimes observed in discussed systems. We discussed routes to chaos existed in these systems and revealed the role of modulation instability in rise of complex dynamics.