

Control of interaction of millimeter waves with biological media

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<https://doi.org/10.1063/1.5090078>

Abstract

In this paper, we report studies on the dynamics of Bose-condensed dipole-active phonons and internal Fröhlich photons in biological media. The theoretical model is used to calculate the behavior of photons and phonons for different parameters of the system. Using the system of equations that describes the dynamics of nonlinear interaction of millimeter waves with phonons generated by the system of molecules, we study the time evolution of number of phonons, phase portrait and emission spectrum for different values detuning, phonon frequency, and optical feedback parameters. The mechanism of formation of optical phonons and their interaction with the generated field by the cell system are studied. It is shown that the system displays, under certain conditions, periodic and chaotic behaviours. For certain bifurcation parameter values of the molecular system Hopf and period doubling bifurcations may occur. Finally, we show the method of controlling the unstable dynamics of Bose-condensed dipole-active phonons and internal Fröhlich photons in biological media subject to delayed feedback.