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DYNAMICS OF FREE AND CONTROLLED OSCILLATIONS IN COMPLEX CRYSTALLINE LATTICES

A nonlinear system describing acoustic and optical oscillations in a complex crystalline lattice consisting of two sublattices is studied. The system has nontrivial solutions representing movements of fronts, emergence of periodic structures and defects. Excitation of the optical mode by means of controlling torque applied to the ends of the lattice is examined. Energy-based speed-gradient control algorithm is proposed and analyzed numerically. Simulation results show elimination or reduction of the influence of initial conditions. An easily realizable nonfeedback version of control algorithm keeping similar properties is proposed.

Keywords: Complex crystalline lattice, sublattices, nonlinearity, bifurcations, oscillations and waves, control, speed-gradient.

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