

SUPRATRANSMISSION IN WAVEGUIDE ARRAYS WITH SATURABLE NONLINEARITY

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INTRODUCTION.

A semi-infinite discrete nonlinear Schrödinger equation with saturable nonlinearity driven at one edge by a driving force is considered. The equation models the dynamics of coupled photorefractive waveguide arrays. It has been reported that when the frequency of the driving force is in the forbidden band, energy can be transmitted along the lattices provided that the driving amplitude is above a critical value. This nonlinear tunneling is called supratransmission. Here, the source of supratransmission is explained using geometric illustrations.

MATHEMATICAL MODEL.

The discrete Vinetskii-Kukhtarev equation, also known as the nonlinear Schrödinger equation with saturable nonlinearity is adopted [1].

RESULT.

Stationary solutions are sought and it is obtained that the threshold amplitude for supratransmission corresponds to roots disappearance in a saddle node bifurcation.

CONCLUSIONS.

Occurrence of supratransmission is visible by comparing the dynamics of the equation by taking the driving amplitude below and above the critical threshold value.

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