

# Scattering properties of PT- symmetric layered periodic structures

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## Abstract

The optical properties of PT-symmetric periodic stacks of the layers with balanced loss and gain are examined. We demonstrate that the tunnelling phenomenon in periodic structures is connected with excitation of surface waves at the boundaries separating gain and loss regions within each unit cell and tunnelling conditions for periodic stacks can be reduced to the conditions for one period. Alternatively, it is shown that coherent perfect absorber laser states are mediated by excitation of surface modes localised at all internal boundaries of the structure. The effects of structure parameters, angles, direction of incidence on the resonant phenomena and spontaneous symmetry breaking transition are determined. It is shown that structural periodicity significantly increases the number of resonant phenomena, especially in stacks with high real and imaginary parts of dielectric permittivity of the layers.

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