

Peculiarities of electromagnetic wave propagation through layers with ridge-shaped refractive index distribution

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Abstract

The problem of plane electromagnetic harmonic wave diffraction on a graded-refractive-index layer of some thickness is considered. It is assumed that refractive index of a layer monotonically increases and then monotonically decreases, thereby forming a ridge-shaped curve. Cases of the linear, parabolic and exponential permittivity profiles of the layer are investigated. The diffraction problem is reduced to an ordinary differential equation with appropriate boundary conditions. The problem for one layer is solved analytically; for several layers it is investigated numerically. Numerical analysis for a stack consisting of three layers, each of which having its own distribution of refractive index is carried out. Results showed that changing the order in which layers 1 and 3 are arranged with respect to each other does not alter dependence of transited energy on wavelength. © 2012 IEEE.

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