Analysis of electromagnetic wave propagation through a layer with graded-index distribution of refraction index

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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. Cases of the linear, parabolic, sinusoidal, exponential and logarithmic refractive index profiles of the layer are investigated. The diffraction problem is reduced to an ordinary differential equation with appropriate boundary conditions. The problem for the linear profile is solved analytically; for the other profiles it is investigated numerically. The method of approximating an integral identity is applied to increase accuracy of the grid solution of the boundary value problem. Emphasis is given to the cases, in which wave energy, either reflected or transited, reaches maxima.