The asymptotic solution of the scalar wave equation

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Abstract

The paper considers asymptotic methods for solving the Helmholtz equation. It presents a new method for solving the problem of diffraction by one-dimensional diffractive optical elements with a band structure. The method uses special representations for the field and for the dielectric permittivity in the microrelief zone, which allows to reduce the problem of diffraction by the microrelief zones to the problem of diffraction by a system of diffraction gratings. The method generalizes the Kirchhoff approximation and is applicable for the asymptotic solution of Maxwell's equations.

Keywords: scalar wave equation, Helmholtz equation, one-dimensional diffractive optical element, diffraction grating, Kirchhoff approximation, Maxwell's equation.

Citation: Kharitonov SI, Doskolovich LL, Kazanskiy NL. The asymptotic solution of the scalar wave equation. Computer Optics 2003; 25: 49-53.

Access full text (in Russian)

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