

Electromagnetic wave transmission issue in cylindrical waveguide

Alexandrova I.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© Research India Publications. In this article we consider the diffraction and transmission issue for an electromagnetic waves in a cylindrical waveguide on a perfectly conducting thin screen. A waveguide is limited with an perfectly conducting surface, the screen is located in a cross section of the waveguide. The issue of transmission: there is an electromagnetic field on one side of the screen, the field is searched on the other side of it. The problem of transmission is a kind of an inverse problem to the problem of diffraction. First of all the solution of diffraction problem is presented, which is obtained by the method of an over determined boundary problem. It is shown how the problem of an electromagnetic wave on a thin screen can be reduced to the pair summatory functional equation concerning the coefficients of a required wave in a series according to eigenfunctions of a waveguide. The pair equation with the use an integral-summation identity is reduced to an infinite system of linear algebraic equations. Then, on the basis of diffraction problem solution to the transmission problem is solved. The task of transmission may also be reduced to an infinite system of linear algebraic equations for the expansion coefficients of a desired wave in a series according to eigenfunctions. At an approximate solution of linear algebraic equations infinite system it is proposed to use the method of truncation.

Keywords

Cylindrical waveguide, Electromagnetic waves, Inverse problem of diffraction, Transmission problem