Scattering of Electromagnetic Wave by a Conducting Rectangular Cylinder with the Thickness of Dielectric Constant

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The scattering of electromagnetic waves by inhomogeneous dielectric grating in which the dielectric structures is either metallic or dielectric have been of considerable interest such as optical fibers, photonic bandgap crystals , frequency selective devices, and other applications by the development of manufacturing technology of optical devices.

Recently, many analytical and numerical methods which are applicable to the arbitrarily metallic and dielectric structure of rectangular cylinders have been proposed. However, most theoretical and numerical studies have considered the structure of rectangular cylinder is either metallic or dielectric.

In this paper, we proposed an atomic model method for the scattering of electromagnetic waves by a conducting rectangular cylinder with the thickness of dielectric constant. The difference with the conventional method, such as a method of moments(MoM) and finite element method(FEM) , are as follows: (1)The causality which is the electric field made with a wave source besides the atom when it is exciting , is clear, (2)Iit does not appear at the singular points like singular integral equations ,(3) The area which can be applied can cover the wide range from a dielectric to a perfect conductor, and (4)The diagonal element of the simultaneous equation is effects of atomism for information on the inhomogeneous structure both the dielectric and the conductor.

Main process also of our methods are as follows: (1) The metallic or dielectric structures are approximated by an atomic model of atomic impedance Z, (2) Taking each atomic model as an atomic impedance Z , the electromagnetic fields in inhomogeneous region are expanded appropriately by a two-dimensional Green's function $H_{0,}$ (3) The electromagnetic fields are matched at atomic body include the metallic and dielectric structure consist of other atomic impedance to get the exciting currents of rectangular cylinder.

Numerical results are given for the scattered fields for the case of incident angle of TE wave.