A Numerical Method for the Analysis of Electromagnetic Scattering by Three Dimensional Magnetodielectric Body

A. G. Dmitrenko and T. N. Pastuhova
Tomsk State University, Russia

It is of considerable interest for researchers to study scattering of radio waves by a homogeneous 3 D magnetodielectric body. This interest arises from the need to solve a number of important problems in radar, meteorology, biology and atmospherical optic (see for example [1]).

Today, the different methods for the analysis of considered problem are existing. These methods base on differential forms of Maxwell's equations or integral relations of electromagnetic theory. But computer codes realized these methods are extraordinary in expenses of computer resources, especially for nonaxisymmetric scatterers.

In the last years, the method of discrete sources named in West as generalized multipole technique was applied to solving problems of electromagnetic wave scattering by bodies of different physical nature [2]. In particular, in [2] (Chapter 8) the version of discrete sources method for analysis of electromagnetic scattering by arbitrary shaped magnetodielectric body was proposed. In this version a system of discrete sources in the form of pair electric dipoles was used. These dipoles were located inside and outside magnetodielectric body on auxiliary surfaces homothetic to the surface of the body and oriented tangentially to them.

In the planning report the generalized variant of [2] will be proposed. The generalization consist of addition pair tangentially oriented magnetic dipoles in each point of electric dipoles location. The mathematical formulation of the variant and briefly description of capabilities of the developed software package will be done. The advantages of using of combined (electric and magnetic dipoles) system of discrete sources will be discussed. Some results illustrated the influence of nonaxisymmetry of body on bistatic cross section will be reported.

REFERENCES

1. Havemann, S. and A. J. Baran, *J. Quant. Spectrosc. Radiat. Transfer*, Vol. 70, 139, 2001.
2. *Generalized Multipole Techniques for Electromagnetic and Light Scattering* (Ed. by T. Wriedt), Amsterdam, Elsevier Science, 1999.