Application of the method of continuity boundary conditions to the problem of wave diffraction on fractal-like bodies of revolution

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The three-dimensional vector problem of diffraction of a plane wave on an ideal conducting body of revolution is solved. The technique proposed in the present work makes it possible to model the scattering characteristics, including the orientations averaged over the angles, for bodies of revolution of practically any geometry. The stated problem was solved using the method of continued boundary conditions [1]. The integral equation of the second kind with respect to some unknown function distributed on the surface of the scatterer is obtained. For the numerical solution of the integral equation, we used the expansion of the Green function and the right side into a Fourier series. To solve one-dimensional integral equations for the Fourier harmonics of the unknown function the Krylov–Bogolyubov method is used [2]. Formulas that make it possible to calculate the scattering pattern averaged over the angles of incidence of the plane wave are obtained.

A number of examples of solving problems of diffraction on different particles in particular fractal-like bodies of revolution [3] are given. The correctness of the method is confirmed by verifying the accuracy of the fulfilment of the optical theorem for various bodies and by comparison with the results of calculations obtained by the modified auxiliary current method [1,2].

References

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