Application of the collocation method for solving the problem of diffraction of an electromagnetic wave by a rectangular metal plate. (English) Zbl 07369532
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Summary: The classical problem of the electromagnetic wave diffraction by a rectangular perfectly conducting metal plate is considered. The solution of the problem is reduced to the solving integral equations for the tangential components of the magnetic intensity vector on the metal surface. The collocation method is applied to the equation with the representation of the sought functions in the form of a series in the Chebyshev polynomials of the 1st and 2nd kind. Numerical experiments have been carried out for a different number of terms of the Fourier series of the sought functions and a different number of collocation points. Graphs comparing the results obtained for various parameters are presented. It is shown that an increase in the number of collocation points leads to a greater stability of the solution. It is concluded that there is no clear-cut convergence of the solution with this choice of collocation points.

MSC:
78A45 Diffraction, scattering
78M22 Spectral, collocation and related methods applied to problems in optics and electromagnetic theory
41A50 Best approximation, Chebyshev systems
65R20 Numerical methods for integral equations

Keywords:
electromagnetic wave diffraction; integral equations; collocation method; Chebyshev polynomials

Full Text: DOI

References:
[14] Kolundzija, B. M., Accurate solution of square scatterer as benchmark for validation of electromagnetic modeling of plate


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