Using Pattern Equation Method for solving the problem of EM scattering by thin dielectric cylinder

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At present, the Rayleigh approximation [1] is almost the only mathematical model used in solving the problem of scattering on small bodies. In the well-known monographs [1–3], this approach is described in sufficient detail especially for the cases when the solution of an auxiliary electrostatic problem can be obtained in an explicit form. In this paper, an alternative method is developed based on the Pattern Equation Method (PEM) [4–6]. When constructing a new approach to the analysis of scattering on small bodies, we used the high convergence of the PEM established in the above papers. Indeed, as shown by the calculations, to solve the problem of scattering on bodies whose characteristic size is comparable to the wavelength of the scattering field, it is sufficient to take into account, depending on the polarization of the incident field, from one to three terms in the expansion of the scattering pattern. This circumstance made it possible to obtain explicit formulas for the integral scattering characteristics applicable to scatterers of a complex shape.

References

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