ELECTROMAGNETIC WAVE SCATTERING BY PYRAMID-SHAPED PHOTONIC CRYSTAL FROM RESONANT MAGNETODIELECTRIC SPHERES

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The solution of the problem of scattering electromagnetic waves with a discrete convex polyhedron - a pyramid of resonant magnetodielectric spheres based on a complex rhombic crystal lattice is presented.

Here we consider the case equivalent to the X-ray optics of crystals, when $a/\lambda' << 1$ and can be a/λ_g ~1, $d,h,l/\lambda'$~1 where a is the radius of the spheres; λ',λ_g - the wavelength of the scattered wave outside and inside the spheres; d,h,l - the lattice constants. The solution of the problem is obtained on the basis of the integral equations of Fredholm electrodynamics of the 2nd kind, with non-local boundary conditions [1, 2, 3].

Expressions found in the work for a pyramid-shaped metacrystal can be used to study ras-seeded fields in the Fresnel and Fraunhofer zones, as well as to study its internal field.

The ratios obtained in the work can be used in studying the scattering of waves of various kinds by convex polyhedra, on their basis creating new types of limited metacrystals, including nanocrystals with resonant properties and in studying their behavior in various external media [4], and also when developing methods for modeling electromagnetic phenomena that can occur in real crystals in resonant regions in the optical and X-ray wavelength ranges [5].

References

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