Diploma thesis abstract

Frequency-angular spectra of terahertz and optical reflection of radiation from porous materials and metal nanogratings

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In this work diffraction of electromagnetic radiation on diffraction gratings with various geometry parameters – thick gratings with small damping coefficient (material of grating – nanostructured oxide of aluminium) and metal nanogratings (made of silver) is presented. Diffraction patterns are calculated by using two different methods: the first one is the analytical method with usage of numerical procedure at one stage, the second one – the numerical-analytical method. The first method bases on expression as series of outward-going plane waves (Rayleigh expansion) out of gratings. Directly in the grating the field is expressed as series of eigenmodes. Then the Helmholtz equation is being solved in all regions and the continuity conditions relating fields on the all sides of the interfaces are being used. The numerical-analytical method is based on the solution of Maxwell's equations in thin layer and using recurrent relations for the reflection and transmission coefficients in the neighbouring layers. Using these methods the total reflection and transmission coefficients from our structures are being found. Also these coefficients for various parameters of grating are being calculating. For one of our structures (made of nanostructured oxide of aluminium with geometrics 6.5*30*7.4 mm) both S- and P-polarized incident radiation is considered. For another structures only P-polarization is considered, because it's more interesting for applications in present geometry (when incident radiation is orthogonal to the grating) surface electromagnetic waves can exist only with P-polarization. The results we got can be used for the experiments for observation diffraction of light on investigated structures.

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