

DIFFRACTION ON TE AND TM
POLARIZATION OPTICAL WAVES
IN NON-ABSORPTIVE MEDIUMS
WITH PERIODICAL VARIATION OF THE
DIELECTRIC CONSTANT. 2. ANALYSIS
OF DIFFRACTION OF OPTICAL WAVES
BY NON-ABSORPTIVE VOLUME GRATINGS

V. M. Fitio, Ya. V. Bobitski

National University "Lvivska Polytechnika",
(12, Stepan Bandera Str., Lviv 79013, Ukraine)

S u m m a r y

We calculate the diffraction efficiency of phase gratings with any orientation of the grating vector for TE and TM polarization waves using a precise system of differential equations under precise boundary conditions, in which the dielectric constants of three media are taken into account. The calculations are based on the truncated system of equation, which includes 9 – 10 orders of diffraction, and non-uniform plane waves were taken into account. We show that, for reflection gratings, one can use a precise system of differential equations for electric and magnetic fields strengths which consists only of two equations and is equivalent to a certain infinite-dimensional system of equations for coupled waves. The dependences of the diffraction efficiency on hologram thickness and plane wave incident angle are obtained. For all orders of diffraction, the peaks are observed in the latter case where a plane uniform wave is transformed into a damped wave or vice versa in the first or third medium. Especially a strong change of diffraction efficiency can be observed for reflected waves even in the case of a straight grating.