Extremely asymmetrical scattering of electromagnetic waves in arbitrary periodic arrays

S.N. Kurilkina

Department of Optics, Gomel State University
Sovyetskaya ul. 104, 246019 Gomel, Belarus
Fax: + 375–232–576557; E-mail: kurilkina@gsu.unibel.by

It has been investigated extremely asymmetrical scattering (EAS) of waves in periodic arrays. That is realized when the scattered wave propagates parallel or almost parallel to the boundary of a strip-like periodic array. EAS has great possibilities for practical applications in the development of narrow- band optical filters, resonators, switches, lasers, optical sensors and measurement techniques. In the report it has been analyzed the influence of slowly varying grating amplitude and anisotropy of media forming the periodic structure on the extremely asymmetrical scattering. Coupled wave equations describing EAS in anisotropic arrays with slowly varying grating amplitude are derived. The field structure in the scattered waves is determined inside and outside the array. It has been found the regions of variations in the grating amplitude for which the structure of scattered field isn't variable. It has been established essential dependence of pattern of EAS on polarization of incident light. The main features of EAS in such non-uniform anisotropic arrays were explained by the peculiarities of diffractional divergence of the scattered waves. The obtained results will be important for development of new EAS- based structures and devices in optical and acoustic signal- processing, communication and sensor design.