analytical solution are examined: a) the case of mutually orthogonal eigen polarizations and b) the case of high resonant gamma-ray absorption. For these cases the boundary-value problem for a crystal in the form of the plane-parallel plate is solved and analytical expressions for intensity and polarization characteristics of diffracted beams are obtained.

The case of high resonant absorption (absorption length is much smaller than extinction length) is examined in details. In this case the polarization tensor of diffracted wave may be presented in the following form

\[ \nu_{ik} = \sum \frac{1}{\ell_m} \frac{P_{mnlm}}{P_{mnlm}} \left( \frac{1 + \frac{\rho}{\ell_m}}{1 + \frac{\rho}{\ell_m}} \right)^n \cdot \left( \frac{1 + \frac{\rho}{\ell_m}}{1 + \frac{\rho}{\ell_m}} \right)^m \cdot \left( \frac{1 + \frac{\rho}{\ell_m}}{1 + \frac{\rho}{\ell_m}} \right)^l \]

where \( \nu_{ik} \) is the polarization tensor of the incident wave, \( L \) is the crystal thickness.

Comparison of the developed approach with the results of kinematical (Belyakov & Bokun, Acta Cryst.1975 A31, 737) and dynamical (Belyakov & Belyakov, ZhETF (1980) 75, 863) theory is carried out. It is noted that the comparison of experimental data with the calculated in framework of the presented approach may be used for estimates of crystal perfection.

11.9.03 DETERMINATION OF FERROMAGNETIC DOMAIN STRUCTURE BY MEANS OF MOSSBAUER DIFFRACTION. By R. Ch. Bokun. All-Union Research Institute of Physical-Technical and Radiotechnical Measurements, Moscow, USSR.

The new neutron methods used for examination of magnetic domains in the crystalline volume (Semenkov V.A. et al.; Schlenker M. et al., 1972-1977) require of unique equipment and rather large specimen thicknesses>100nm. As it will be shown below, the Mossbauer diffraction of \( \gamma \)-quanta is usable for the less thicknesses of the magnetic crystals containing the isotope \(^{57}\)Fe.

Mossbauer diffraction by ferromagnetic plane-bounded crystal was considered in symmetric Bragg case. The simplifying assumptions were following: the crystalline plate is divided along its thickness into two 180° domains, which are magnetized parallel to the plate boundary and to domain wall; there is the mosaic crystal with 1 atom Fe per cell; Rayleigh scattering at the Bragg angle is negligible; incident \( \gamma \)-quanta are unpolarized. Mossbauer diffraction theory for mosaic crystals was applied here.

Mossbauer spectrum \( I_{\gamma}(E) \) of Bragg reflection at an angle \( \theta \) was calculated in the case of individual Fe-atom transition with \( \Delta E_0 \) (is a deviation of \( \gamma \)-quantum energy from resonant case).

The certain \( \gamma \)-quantum polarization distinguishing in different domains is not scattered by \(^{57}\)Fe-nucleus. As a result the intensity \( I_{\gamma}(E) \) depends on a depth \( t \sin \theta \) of the domain wall location. The effect of domain presence \( I_{\gamma}(E) = I_{\gamma}(E) \) is Mossbauer spectrum in a single domain case, is given by \( I_{\gamma}(E) = \exp(-2\mu_1 / \lambda - \exp(-2\mu_2 / \lambda \sin \theta) / \exp(-2\mu_2 / \lambda) \).

For the 100% isotope \(^{57}\)Fe crystal possessing \( t<30 \text{ nm} \) the maximal effect \( I_{\gamma} \) exceed 5% that is quite measurable. For the determination of a depth \( t \sin \theta \) it can be used both the dependencies of intensity (or \( I_{\gamma}(E) \)) on \( E \) and on \( \theta \). At the same time the polarization measurements of scattered \( \gamma \)-quanta can be used too.