11. REAL AND IDEAL Crystals

11.6-4 X-RAY DIFFRACTION IN A FINITE CRYSTAL WITH A LINEAR LATTICE PERIOD VARIATION.

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In (**) (Chukhovskii F.N. et al. Acta Cryst., 1978, A34, 610) a dynamical theory of X-ray diffraction in a semi-infinite crystal with a constant deformation gradient has been presented. A kinematical theory for thin crystals with a linear onedimensional lattice constant variation has been developed in (**) (Kolpakov A.V. et al. Kristallografija, 1977, 22, 473).

The present report discusses a dynamical diffraction in a crystal of finite thickness with a linear angular in the interplanar spacing. For this case the amplitude of Bragg reflection $R$ (the notations see in (**)) is:

$$R(z-0) = \frac{\pi^2 \psi \psi D \psi D \psi (x) - D \psi D \psi (x)}{(x \psi D \psi (x) + 1) \psi D \psi (x)}$$

where $D$ - Weber's function of the $j$-th order.

The results for a thin or semi-infinite crystal follow from this general solution. We interpret the results by analogy with Fresnel construction (**). In particular, it is shown that the diffraction in finite and semi-infinite crystal with linear lattice period variation to be similar to Fresnel diffraction at the slit and screen edge, respectively. The intensity maxima of the one-sided oscillation profile of the reflection curve for a semi-infinite crystal correspond to the Bragg conditions for odd Fresnel layers in the crystal.

For the practical purposes we have developed a good convergent approximation.