International Tables for Crystallography (2010). Vol. B, Figure 5.1.8.3, p. 642.

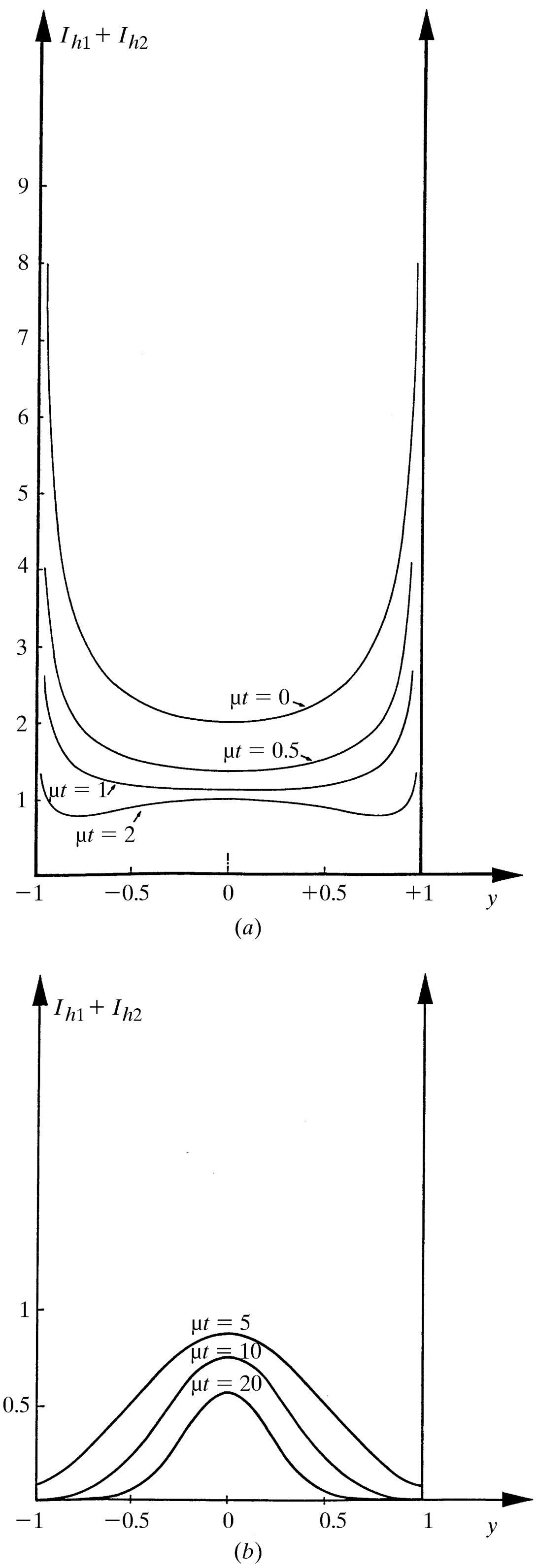

Fig. 5.1.8.3. Intensity distribution along the base of the Borrmann triangle. y is a normalized coordinate along BC. (*a*) Small values of μt. The interference (spherical-wave *Pendellösung*) between branch 1 and branch 2 is neglected. (*b*) Large values of μt.

between wavefields belonging to different branches of the dispersion surface.

Kato has shown that the intensity distribution at any point at the base of the Borrmann triangle is proportional to

$$\left\{J_o\left[A(x_o x_h)^{1/2}\right]\right\}^2,$$

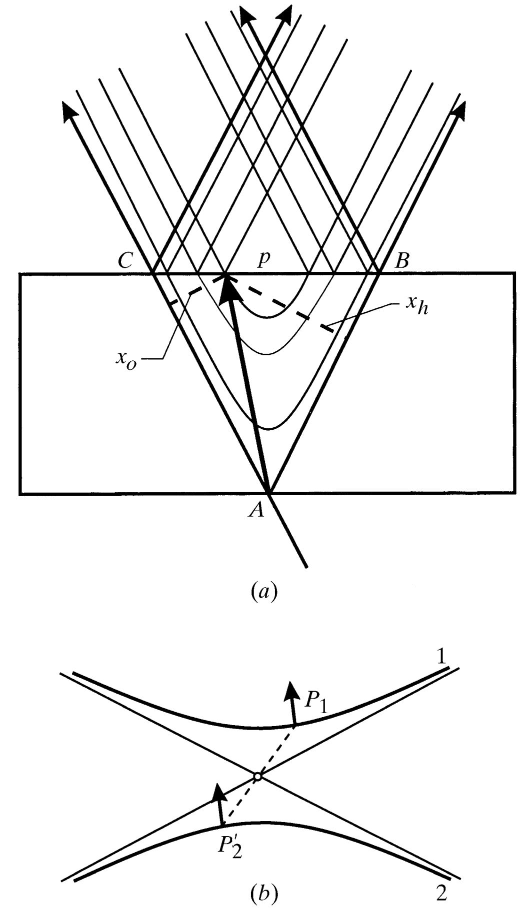

Fig. 5.1.8.4. Interference at the origin of the *Pendellösung* fringes in the case of an incident spherical wave. (*a*) Direct space; (*b*) reciprocal space.

where $A = 2\pi(\gamma_o\gamma_h)^{1/2}/(\Lambda_L \sin\theta)$ and x_o and x_h are the distances of p from the sides AB and AC of the Borrmann triangle (Fig. 5.1.8.4). The equal-intensity fringes are therefore located along the locus of the points in the triangle for which the product of the distances to the sides is constant, that is hyperbolas having AB and AC as asymptotes (Fig. 5.1.8.4*b*). These fringes can be observed on a section topograph of a wedge-shaped crystal (Fig. 5.1.8.5). The technique of section topography is described in *IT* C, Section 2.7.2.2. The *Pendellösung* distance Λ_L depends on the polarization state [see equation (5.1.3.8)]. If the incident wave is unpolarized, one observes the superposition of the *Pendellösung* fringes corresponding to the two states of polarization, parallel and perpendicular to the plane of incidence. This results in a beat effect, which is clearly visible in Fig. 5.1.8.5.

APPENDIX A5.1.1
Basic equations

A5.1.1.1. Dielectric susceptibility – classical derivation

Under the influence of the incident electromagnetic radiation, the medium becomes polarized. The dielectric susceptibility, which relates this polarization to the electric field, thus characterizes the interaction of the medium and the electromagnetic wave. The classical derivation of the dielectric susceptibility, χ, which is summarized here is only valid for a very high frequency which is also far from an absorption edge. Let us consider an electromagnetic wave,

$$\mathbf{E} = \mathbf{E_o} \exp 2\pi i(\nu t - \mathbf{k}\cdot\mathbf{r}),$$

