The strain tensor components of this background strain are

\[
\begin{align*}
E_{xx} &= u_0 \cos^2 \phi, \\
E_{yy} &= u_0 \sin^2 \phi, \\
E_{xy} &= \frac{1}{2} u_0 \sin 2\phi,
\end{align*}
\]

whilst the strain tensor corresponding to anomalous interlayer spacing in the lamella is simply

\[
e_{xx} = u.
\]

Following Fathers and Tanner (1973 a,b) and Tanner and Fathers (1974) we have, for the secular equation giving the refractive indices, \( n \),

\[
\begin{align*}
\frac{1}{n^2} - [\gamma_0 + b_1 (e_{xx} + E_{xx}) + b_2 \Delta] & - b_1 E_{xy} \\
- b_1 E_{xy} & + \frac{1}{n^2} - [\gamma_0 + b_1 E_{xy} + b_2 \Delta] = 0,
\end{align*}
\]

where \( \Delta = e_{xx} + E_{xx} + E_{yy} \gamma_0 \) is the inverse dielectric constant of the isotropic matrix, and \( b_1 \) and \( b_2 \) are the strain optic coefficients defined by eqn. (3) of Fathers and Tanner (1973 b). It follows that the normal modes are plane-polarized at an angle \( \theta \) to the \( x \) axis where

\[
\theta = \frac{1}{2} \tan^{-1} \left\{ \frac{-2E_{xy}}{e_{xx} + E_{xx} - E_{yy}} \right\}.
\]

The difference in refractive indices \( \Delta n \) of the two modes is

\[
\Delta n = \frac{3}{n^2} b_1 \left( (e_{xx} + E_{xx})^2 + 4E_{xy}^2 \right)^{1/2},
\]

where \( n \) is the average refractive index. As the normal modes are independent of distance \( z \) along the propagation direction \( Oz \), the phase shift between modes propagating through crystal thickness \( t \) is

\[
\delta = \frac{\pi t}{\lambda} \Delta n,
\]

and the normalized intensity transmitted through a crossed polarizer and analyser is

\[
I = \sin^2 \delta \sin^2 2(\alpha + \theta) \leq \delta^2 \sin^2 2(\alpha + \theta),
\]

where \( \alpha \) is the angle the polarizer makes with the \( y \) axis and is the same in magnitude and sense as the specimen rotation angle \( \alpha \) defined in § 2. Thus we have

\[
I = C[(u + u_0 \cos 2\phi) \sin 2\alpha + u_0 \sin 2\phi \cos 2\alpha]^2,
\]

where \( C = \pi^2 t^2 b_1^2 n_0^6 / 4\alpha^2 \). Remote from the fault, \( I \) reduces to the background intensity, \( I_0 \), given by

\[
I_0 = C u_0^2 \sin^2 2(\alpha + \phi).
\]

Experimentally, a minimum of \( I_0 \) was found at \( \alpha = 34^\circ \) (fig. 3 (a)). Choosing \( \phi \) in the range \( 0 < \phi < \pi/2 \) gives \( \phi = 56^\circ \). The differences \( \Delta I \), between the intensity \( I \) at the fault