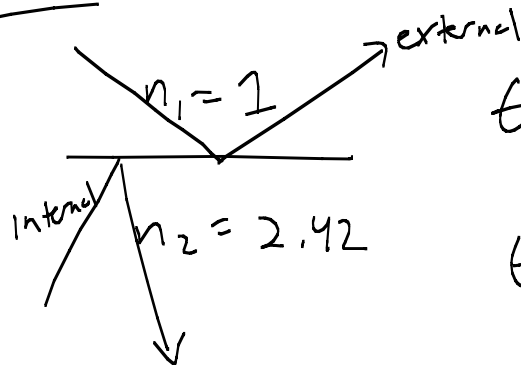


15-2



$$\theta_B = \tan^{-1} \frac{n_1}{n_2} = 0.39 \text{ rad} \sim 22.5^\circ \text{ (internal)}$$

$$\theta_B = \tan^{-1} \frac{n_2}{n_1} = 1.18 \text{ rad} \sim 67.5^\circ \text{ (external)}$$

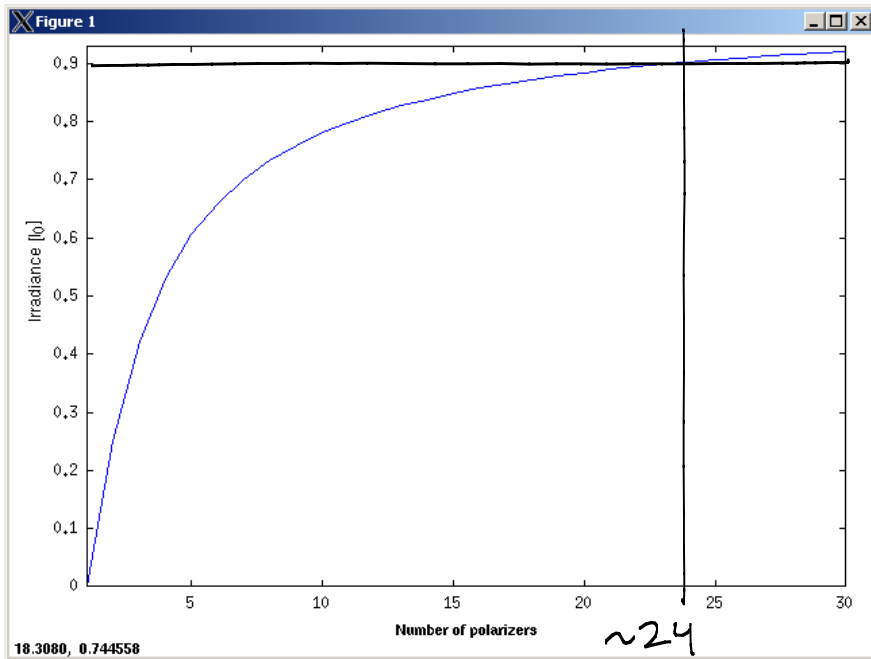
15-4

$$\Delta n = 1.599 - 1.594 = 0.005$$

$$\Delta n d = \frac{632 \text{ nm}}{2} = 316 \text{ nm}$$

$$d = 63.2 \text{ } \mu\text{m}$$

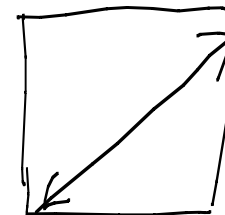
$$\frac{15-8}{\cos^{2N} \frac{\pi}{2N}} = 0.9$$



15-11 linear \rightarrow circular : QWP

$$\Delta n d = \frac{6 \times 10^5 \text{ cm}}{4}$$

$$\Delta n = \frac{6 \times 10^5 \text{ cm}}{4 \cdot 3 \times 10^{-3} \text{ cm}} = 5 \times 10^3$$



OA @ 45° deg
from linear pol,
axis.

15-13

(a) circular pol. light AND unpolarized light

(b) elliptically pol. light

15-24

$$\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} e^{i\pi/2} & 0 \\ 0 & -e^{i\pi/2} \end{bmatrix} \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

↑ linear pol. @ horizontal

↑ HWP, FA θ from vertical

↑ vertical pol. light

$$= \begin{bmatrix} -2\cos\theta\sin\theta \\ 0 \end{bmatrix} e^{i\pi/2} = e^{i\pi/2} \begin{bmatrix} -\sin 2\theta \\ 0 \end{bmatrix} \quad I = \sin^2 2\theta$$