$$\bar{D} = \bar{\bar{\varepsilon}} + \left(\bar{\bar{\xi}} + \frac{\bar{k}\times\bar{\bar{I}}}{\omega}\right)\cdot\bar{\bar{\mu}}^{-1}\cdot\left(\frac{\bar{k}\times\bar{\bar{I}}}{\omega} - \bar{\bar{\zeta}}\right)$$

$$\bar{\bar{\varepsilon}} = \bar{\bar{\varepsilon}}_r\,\varepsilon_0\,, \quad \bar{\bar{\mu}} = \mu_0\,\bar{\bar{I}}\,, \quad \bar{\bar{\xi}} = 0\,, \quad \bar{\bar{\zeta}} = 0$$

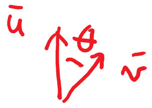
$$\bar{\bar{D}} = \varepsilon_0\,\bar{\bar{\varepsilon}}_r + \frac{1}{\omega^2\mu_0}\,\bar{k}\times(\bar{k}\times\bar{\bar{I}})$$

$$\bar{k} = k_0\, n\, \bar{v} \qquad \swarrow \bar{v}\cdot\bar{v} = 1$$

$$k_0 = \omega\sqrt{\mu_0\varepsilon_0}$$

$$= \varepsilon_0\,\underbrace{\left(\bar{\bar{\varepsilon}}_r + n^2\,\bar{v}\times(\bar{v}\times\bar{\bar{I}})\right)}_{\bar{\bar{B}}}$$

$$\bar{\bar{B}} = \overbrace{\varepsilon_\perp\bar{\bar{I}}_t + \varepsilon_\parallel\,\bar{u}\bar{u}}^{\bar{\bar{\varepsilon}}_r} + n^2\left(\bar{v}\bar{v} - \underbrace{\bar{\bar{I}}}_{\bar{\bar{I}}_t + \bar{u}\bar{u}}\right)$$



$$= (\varepsilon_\perp - n^2)\,\bar{\bar{I}}_t + (\varepsilon_\parallel - n^2)\,\bar{u}\bar{u} + n^2\,\bar{v}\bar{v}$$

$$\bar{\bar{I}}_t \overset{\times}{\times} \bar{\bar{I}}_t = 2\,\bar{u}\bar{u}$$

$$\bar{\bar{I}}_t \overset{\times}{\times} \bar{u}\bar{u} = \bar{\bar{I}}_t$$

$$\bar{\bar{I}}_t : \bar{v}\bar{v} = \sin^2\theta$$

$$\det\bar{\bar{B}} = \frac{1}{6}\,\bar{\bar{B}} \overset{\times}{\times} \bar{\bar{B}} : \bar{\bar{B}} \qquad \Rightarrow 27 \text{ terms!}$$

$$\bar{\bar{I}}_t \overset{\times}{\times} \bar{\bar{I}}_t : \bar{\bar{I}}_t = 0$$

$$\bar{\bar{I}}_t \overset{\times}{\times} \bar{\bar{I}}_t : \bar{u}\bar{u} = 2$$

$$\bar{\bar{I}}_t \overset{\times}{\times} \bar{\bar{I}}_t : \bar{v}\bar{v} = 2\cos^2\theta$$

$$\bar{\bar{I}}_t \overset{\times}{\times} \bar{v}\bar{v} : \bar{v}\bar{v} = 0 \qquad \left(= \bar{\bar{I}}_t : \overbrace{\bar{v}\bar{v} \overset{\times}{\times} \bar{v}\bar{v}}^{\bar{v}\times\bar{v}\ \bar{v}\times\bar{v} = 0}\right)$$

$$\bar{\bar{I}}_t \overset{\times}{\times} \bar{u}\bar{u} : \bar{u}\bar{u} = 0$$

$$\bar{\bar{I}}_t \overset{\times}{\times} \bar{u}\bar{u} : \bar{v}\bar{v} = \sin^2\theta$$

$$\bar{u}\bar{u} \overset{\times}{\times} \bar{v}\bar{v} : \bar{v}\bar{v} = 0$$

$$\bar{u}\bar{u} \overset{\times}{\times} \bar{u}\bar{u} : \bar{v}\bar{v} = 0$$

$$\bar{u}\bar{u} \overset{\times}{\times} \bar{u}\bar{u} : \bar{u}\bar{u} = 0$$

$$\det\bar{\bar{B}} = (\varepsilon_\perp - n^2)^2(\varepsilon_\parallel - n^2) + \cos^2\theta\,(\varepsilon_\perp - n^2)^2 n^2 + \sin^2\theta\,(\varepsilon_\perp - n^2)(\varepsilon_\parallel - n^2)\, n^2$$

$$\det \bar{\bar{B}} = (\varepsilon_\perp - n^2)^2(\varepsilon_\parallel - n^2) + \cos^2\theta\,(\varepsilon_\perp - n^2)\, n^4 + \sin^2\theta\,(\varepsilon_\perp \ldots$$

$$= (\varepsilon_\perp - n^2)\left(\varepsilon_\perp \varepsilon_\parallel - n^2 \varepsilon_\perp \sin^2\theta - n^2 \varepsilon_\parallel \cos^2\theta\right)$$

$$\Rightarrow \qquad n_o^2 = \varepsilon_\perp \qquad \text{(ORDINARY WAVE)}$$

$$n_x^2 = \frac{\varepsilon_\perp \varepsilon_\parallel}{\varepsilon_\perp \sin^2\theta + \varepsilon_\parallel \cos^2\theta} \qquad \text{(EXTRAORDINARY WAVE)}$$

REFRACTIVE INDEX IS THE SAME: $n_o = n_x = \sqrt{\varepsilon_\perp}$

FOR $\theta = 0$ ← PROPAGATION DIRECTION

(OPTICAL AXIS)