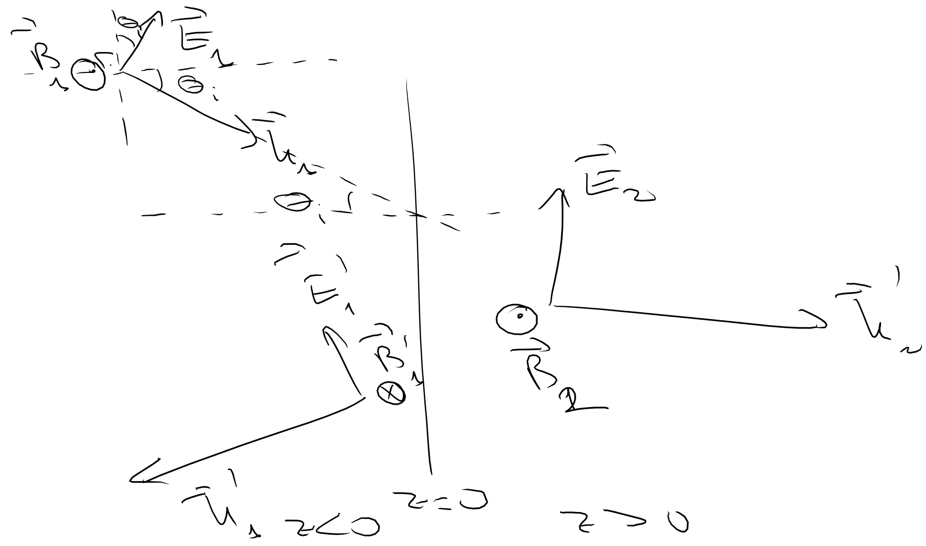
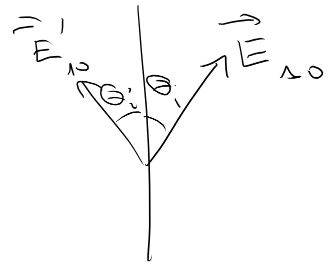


$$\vec{\nabla}\cdot\vec{D} = 0 \Rightarrow \vec{\nabla}\cdot(\varepsilon\vec{E}) = 0 \Rightarrow (\varepsilon\vec{E})_\perp \text{ is continuous.}$$

$$\vec{E}_i = \vec{E}_{i0}\, e^{i(\vec{k}_i\cdot\vec{r} - wt)}$$

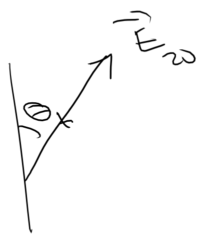
$$\vec{E}'_1 = \vec{E}'_{10}\, e^{i(\vec{k}'_1\cdot\vec{r} - wt)}$$

$z<0$



$$(\vec{E})^<_\perp = E_z = E_{10}\sin\theta_i - E_{10'}\sin\theta_i$$

$z>0$



$$(\vec{E}_\perp)^> = E_{20}\sin\theta_t$$

$$\boxed{\varepsilon_1(E_{10} - E_{10'})\sin\theta_i = \varepsilon_2 E_{20}\sin\theta_t}$$

$$\vec{\nabla}\cdot\vec{B} = 0 \Rightarrow (\vec{B})_\perp \text{ is continuous}$$

$$(\vec{B})_\perp = 0$$

$$\vec{\nabla}\times\vec{E} = -\frac{\partial\vec{B}}{\partial t} \Rightarrow E_\parallel \text{ is continuous}$$

$$\boxed{E'_{10}\cos\theta_i + E_{10}\cos\theta_i = E_{20}\cos\theta_t}$$

$$\vec{\nabla} \times \vec{H} = \frac{\partial \vec{D}}{\partial t} \qquad \left(\frac{\vec{B}}{\mu}\right)_n \quad \text{is continuous}$$

$$\vec{H} = \frac{\vec{B}}{\mu} \qquad B = \frac{E}{v} = \frac{E}{c} n$$

$$\boxed{\left(E_{10} n_1 - E'_{10} n_1\right) \frac{1}{\mu_1} = \frac{E_{20} n_2}{\mu_2}}$$

$$\varepsilon_1 \frac{\left(E_{10} - E_{10'}\right) \cancel{n_1 \sin \Theta_i}}{n_1} = \varepsilon_2 \frac{E_{20} \cancel{\sin \Theta_t \, n_2}}{n_2}$$

$$n_1 \sin \Theta_i = n_2 \sin \Theta_2 \qquad n = \sqrt{\frac{\varepsilon \mu}{\varepsilon_0 \mu_0}}$$

$$\boxed{\frac{\varepsilon_1}{n_1} \left(E_{10} - E_{10'}\right) = \frac{\varepsilon_2 E_{20}}{n_2}} \qquad \frac{n}{\mu} = \sqrt{\frac{\varepsilon}{\mu}} \left(\frac{1}{\sqrt{\varepsilon_0 \mu_0}}\right)$$

$$\frac{\varepsilon}{n} = \sqrt{\frac{\varepsilon}{\mu}} \sqrt{\varepsilon_0 \mu_0}$$

$$\frac{n}{\mu} = \frac{\varepsilon}{n} \left(\frac{1}{\varepsilon_0 \mu_0}\right)$$

$$\cancel{\varepsilon_0 \mu_0} \frac{n_1}{\mu_1} \left(E_{10} - E_{10'}\right) = \cancel{\varepsilon_0 \mu_0} \frac{n_2}{\varepsilon_0} E_{20}$$

$$\frac{n_1}{\mu_1} \left(E_{10} - E'_{10}\right) = \frac{n_2}{\mu_2} E_{20}$$

$$\left(E'_{10} + E_{10}\right) \cos \Theta_i = E_{20} \cos \Theta_t$$

$$E_{10} - E'_{10} = \frac{\mu_1}{\mu_2} \frac{n_2}{n_1} E_{20}$$

$$E_{10} + E'_{10} = \frac{\cos \Theta_t}{\cos \Theta_i} E_{20}$$

$$2 E_{10} = \left(\frac{\cos \Theta_t}{\cos \Theta_i} + \frac{\mu_1}{\mu_2} \frac{n_2}{n_1}\right) E_{20}$$

$$\boxed{E_{20} = \frac{2}{\frac{\cos\theta_t}{\cos\theta_i} + \frac{\mu_1}{\mu_2}\frac{n_2}{n_1}} E_{10}}$$

$$E_{10}' = \frac{\cos\theta_t}{\cos\theta_i} E_{20} - E_{10}$$

$$= \left[\frac{\cos\theta_t}{\cos\theta_i} \frac{2}{\frac{\cos\theta_t}{\cos\theta_i} + \frac{\mu_1}{\mu_2}\frac{n_2}{n_1}} - 1 \right] E_{10}$$

$$\boxed{E_{10}' = \frac{\frac{\cos\theta_t}{\cos\theta_i} - \frac{\mu_1}{\mu_2}\frac{n_2}{n_1}}{\frac{\cos\theta_t}{\cos\theta_i} + \frac{\mu_1}{\mu_2}\frac{n_2}{n_1}} E_{10}}$$

For what angle $E_{10}' = 0$?

$$\frac{\cos\theta_t}{\cos\theta_i} = \frac{\mu_1}{\mu_2}\frac{n_2}{n_1}$$

$$n_1 \sin\theta_i = n_2 \sin\theta_t$$

$$\sin\theta_t = \frac{n_1 \sin\theta_i}{n_2}$$

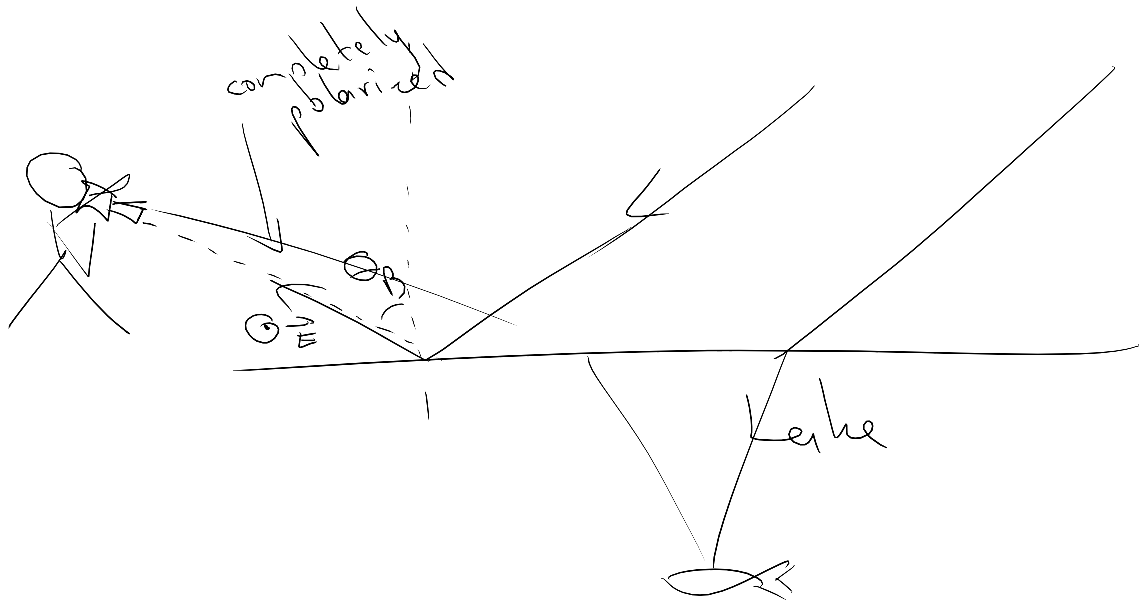
$$\frac{1 - \sin^2\theta_t}{1 - \sin^2\theta_i} = \left(\frac{\mu_1}{\mu_2}\frac{n_2}{n_1}\right)^2$$

$$\frac{1 - \frac{n_1^2}{n_2^2}\sin^2\theta_i}{1 - \sin^2\theta_i} = \left(\frac{\mu_1}{\mu_2}\frac{n_2}{n_1}\right)^2$$

$$1 - \frac{n_1^2}{n_2^2}\sin^2\theta_i = \left(\frac{\mu_1}{\mu_2}\frac{n_2}{n_1}\right)^2 - \left(\quad\right)^2 \sin^2\theta_i$$

$$1 - \frac{\mu_1}{\mu_2}\left(\frac{n_2}{n_1}\right)^2 = \left[\frac{n_1^2}{n_2^2} - \left(\frac{\mu_1}{\mu_2}\frac{n_2}{n_1}\right)^2\right] \sin^2\theta_i$$

Solution is called the Brewster angle.



completely polarized
Θ_B
$\odot \vec{E}$
Lake