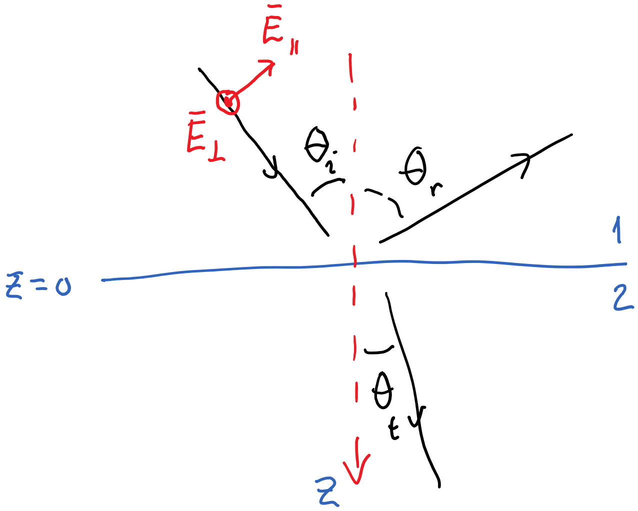


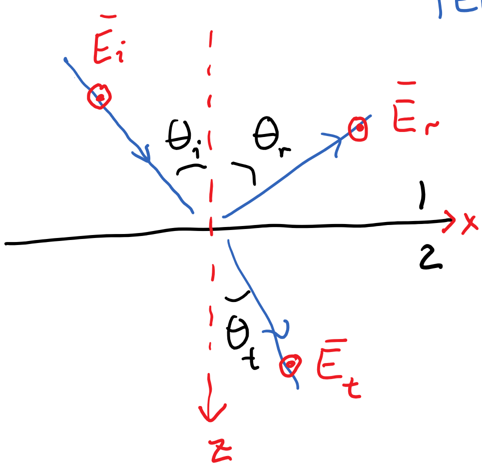
PARALLEL POLARIZATION

$\parallel$ (P, TM, V)

PERPENDICULAR POLARIZATION

$\perp$ (S, TE, H)

PERP. POL



$$\bar{E}_i = \bar{a}_y E_{io}\, e^{-jk_1(z\cos\theta_i + x\sin\theta_i)}$$

$$\bar{E}_r = \bar{a}_y E_{ro}\, e^{-jk_1(-z\cos\theta_r + x\sin\theta_r)}$$

$$\bar{E}_t = \bar{a}_y E_{to}\, e^{-jk_2(z\cos\theta_t + x\sin\theta_t)}$$

$$z=0 \Rightarrow \quad \bar{E}_i + \bar{E}_r = \bar{E}_t$$

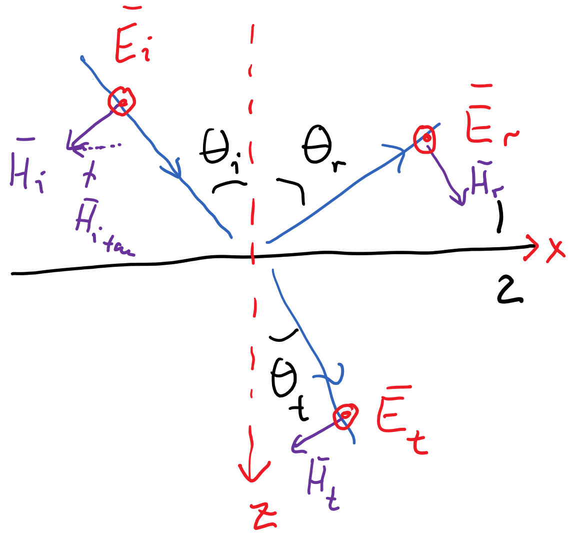
$$E_{io}\, e^{-jk_1 x\sin\theta_i} + E_{ro}\, e^{-jk_1 x\sin\theta_r} = E_{to}\, e^{-jk_2 x\sin\theta_t}$$

$$\cancel{k_1 x}\sin\theta_i = \cancel{k_1 x}\sin\theta_r \quad \Rightarrow \quad \theta_i = \theta_r = \theta_1$$

$$k_1 \sin\theta_1 = k_2 \sin\theta_t \qquad k = \omega\sqrt{\mu\varepsilon} = \omega\sqrt{\mu_0\varepsilon_0}\sqrt{\mu_r\varepsilon_r}$$

$$\underbrace{\sqrt{\mu_{r_1}\varepsilon_{r_1}}}_{n_1}\sin\theta_1 = \underbrace{\sqrt{\mu_{r_2}\varepsilon_{r_2}}}_{n_2}\sin\underbrace{\theta_t}_{\theta_2} \qquad \text{SNELL'S LAW}$$

$$E_{io} + E_{ro} = E_{to}$$



$$\bar{H}_i = \left(-\bar{a}_x \cos\theta_1 + \bar{a}_z \sin\theta_1\right) \frac{E_{io}}{\eta_1} e^{-jk_1(\cos\theta_1 z + \sin\theta_1 x)}$$

$$\bar{H}_r = \left(+\bar{a}_x \cos\theta_1 + \bar{a}_z \sin\theta_1\right) \frac{E_{ro}}{\eta_1} e^{-jk_1(-z\cos\theta_1 + x\sin\theta_1)}$$

$$\bar{H}_t = \left(-\bar{a}_x \cos\theta_2 + \bar{a}_z \sin\theta_2\right) \frac{E_{to}}{\eta_2} e^{-jk_2(\cos\theta_2 z + x\sin\theta_2)}$$

$$-\frac{E_{io}}{\eta_1}\cos\theta_1 + \frac{E_{ro}}{\eta_1}\cos\theta_1 = -\frac{E_{to}}{\eta_2}\cos\theta_2$$

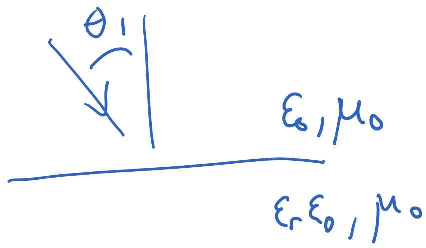
$$E_{io} + E_{ro} = E_{to}$$

$$\frac{E_{ro}}{E_{io}}$$

$$\Gamma_\perp = \frac{\eta_2/\cos\theta_2 - \eta_1/\cos\theta_1}{\eta_2/\cos\theta_2 + \eta_1/\cos\theta_1}$$

PARALLEL POLARIZATION

$$\Gamma_{\parallel} = \frac{\eta_2\cos\theta_2 - \eta_1\cos\theta_1}{\eta_2\cos\theta_2 + \eta_1\cos\theta_1}$$



$$\eta_1 = \eta_0$$

$$\eta_2 = \sqrt{\frac{\mu_0}{\varepsilon_r \varepsilon_0}} = \frac{\eta_0}{n}$$

$$n = \sqrt{\varepsilon_r}$$

$$\Gamma_{\parallel} = \frac{\eta_2 \cos\theta_2 - \eta_1 \cos\theta_1}{\eta_2 \cos\theta_2 + \eta_1 \cos\theta_1} = \frac{\cos\theta_2 - n\cos\theta_1}{\cos\theta_2 + n\cos\theta_1}$$

$$\Gamma_{\perp} = \frac{\eta_2/\cos\theta_2 - \eta_1/\cos\theta_1}{\eta_2/\cos\theta_2 + \eta_1/\cos\theta_1} = \frac{\cos\theta_1 - n\cos\theta_2}{\cos\theta_1 + n\cos\theta_2}$$