

a) $\theta_r = \theta_e$

$$\frac{n_1}{n_2} = \frac{\sin \theta_1}{\sin \theta_e}$$

$$\theta_B = \arctan\left(\frac{n_2}{n_1}\right)$$

$$\theta_B = \arctan\left(\frac{n_2}{n_1}\right) = 56,31^\circ = \theta_e = \theta_r$$

$$\theta_t = \arcsin\left(\frac{n_1}{n_2} \sin \theta_e\right) = 33,69^\circ$$

b) Γ , T von Formelsammlung:

$$n = \frac{n_2}{n_1} = 1,5$$

$$\Gamma_{TM} = \frac{n^2 \cos(\theta_1) - \sqrt{n^2 - \sin^2(\theta_1)}}{n^2 \cos(\theta_1) + \sqrt{n^2 - \sin^2(\theta_1)}} = \frac{1,5^2 \cdot \cos(56,31^\circ) - \sqrt{1,5^2 - \sin^2(56,31^\circ)}}{1,5^2 \cdot \cos(56,31^\circ) + \sqrt{1,5^2 - \sin^2(56,31^\circ)}} \approx 0 = \Gamma_{TM}$$

Γ_{TM} wenn Brewster = 0

$$\Gamma_{TE} = -0,384$$

$$T_{TM} = \frac{2n \cos \theta_1}{n^2 \cos \theta_1 + \sqrt{n^2 - \sin^2(\theta_1)}} = 0,666$$

$$T_{TE} = 0,615$$

zirkular polarisiert: $\vec{E}_{e, TM} = \vec{E}_{e, TE} \rightarrow P$ teilt sich auf

$$P = \frac{E^2 \cdot A}{2\eta} \rightarrow E = \sqrt{\frac{P 2\eta}{A}}$$

$$\eta A = E$$

$$\eta_{\text{Luft}} \approx \eta_0$$

$P = 1 \text{ mW}$

$$E_0 = \sqrt{\frac{P \cdot 2\eta_e}{A_e}} = \sqrt{\frac{1 \text{ mW} \cdot 377}{2 \text{ m}^2}} = 434,166 \text{ V/m}$$

$$E_{t, TM} = T_{TM} E_0 = 289,154 \text{ V/m}$$

$$H_{t, TM} = E_{t, TM} / \eta_t = 1,304$$

$$E_{r, TM} = \Gamma_{TM} E_0 = 0$$

$$H_{r, TM} = E_{r, TM} / \eta_e = 0 \text{ A/m} ?$$

$$E_{t, TE} = T_{TE} E_0 = 267,01 \text{ V/m}$$

$$H_{t, TE} = E_{t, TE} / \eta_t = 1,112$$

$$E_{r, TE} = \Gamma_{TE} E_0 = -166,719 \text{ V/m}$$

$$H_{r, TE} = E_{r, TE} / \eta_e = -1,508$$

c) $\epsilon = 20 \log\left(\frac{b}{a}\right)$

$$\epsilon_r = 20 \log(1) = 0 \text{ dB}$$

$$\epsilon_t = 20 \log\left(\frac{1,197}{0,798}\right) =$$

$$b = \frac{b_i}{\cos(\theta_i)} \cdot \cos(\theta_t) = 1,197 \text{ mm}$$

$$= 3,52 \text{ dB}$$

