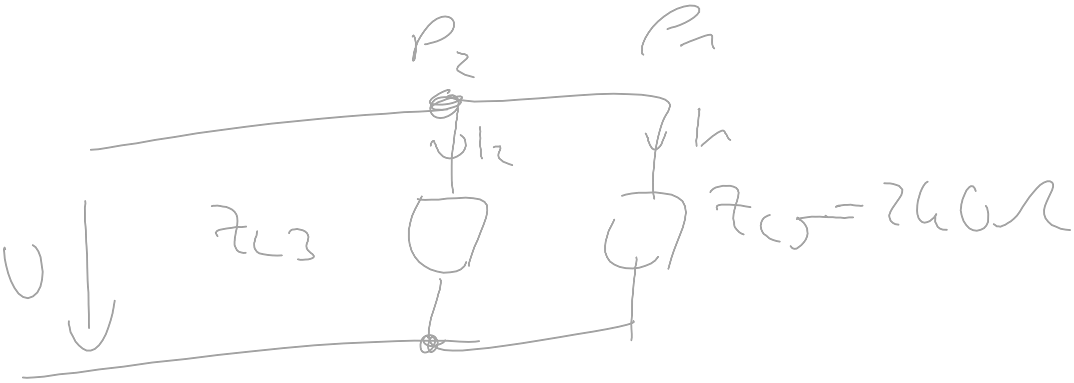
KGÜ 8

Dienstag, 31. Mai 2011
10:16

Hausaufgabe 8

3.1) $Z_{C5} = R_{V1} = 240\,\Omega$

3.2) $\frac{P_2}{P_1} = \frac{3}{1} = \frac{Z_{L3}}{Z_{C5}} =$



$$I_2 = U \cdot \frac{Z_{C5}}{Z_{L3} + Z_{C5}}$$

$$P_2 = U^2 \cdot \left(\frac{Z_{C5}}{Z_{L3} + Z_{C5}}\right)^2 \cdot Z_{L3}$$

$$P_1 = U^2 \left(\frac{Z_{L3}}{Z_{L3} + Z_{C5}}\right)^2 \cdot Z_{C5}$$

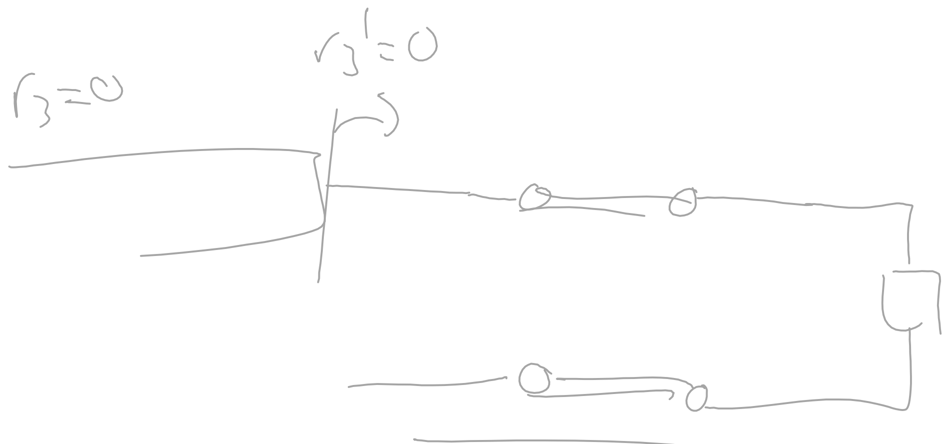
$$\frac{P_2}{P_1} = 3 = \left(Z_{C5}\right)^2 \quad Z_{L3}$$

$$\frac{P_2}{P_1} = 3 = \left(\frac{Z_{L5}}{Z_{L3}}\right)^2 \cdot \cancel{\frac{Z_{L3}}{Z_{L5}}}$$

$$3 \cdot Z_{L3} = Z_{L5}$$

$$Z_{L3} = \frac{Z_{L5}}{3} = \frac{240\,\Omega}{3} = 80\,\Omega$$

3.3)



$$Z_{L4} = \sqrt{Z_{L3} \cdot R_{V1}} = 120\,\Omega$$

3.1) $\underline{r}_5' = \underline{r}_5 \, e^{+2j\beta L_5}$

$\overset{!}{=} 0$

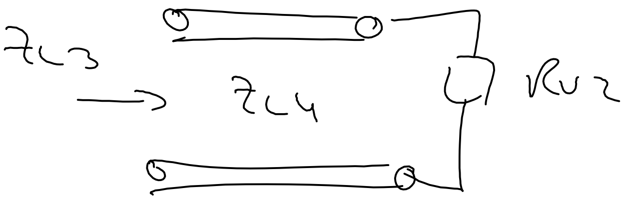
$$\Rightarrow \underline{r}_5' = \frac{R_{V1} - Z_{L5}}{R_{V1} + Z_{L5}} = 0 \Rightarrow Z_{L5} = R_{V1} = 240\,\Omega$$

3.2) $P_1 = \frac{1}{2} \mathrm{Re}\{U \cdot I_5^*\} = \frac{|U|^2}{2 \cdot Z_{L5}}$

$$P_2 = \frac{|U|^2}{2 \cdot Z_{L3}}$$

$$\frac{P_2}{P_1} = \frac{Z_{L5}}{Z_{L3}} \overset{!}{=} 3 \Rightarrow Z_{L3} = 80\,\Omega$$

3.3) Z_{L3}, R_{U2} reell und $Z_{L3} \neq R_{U2} \Rightarrow$

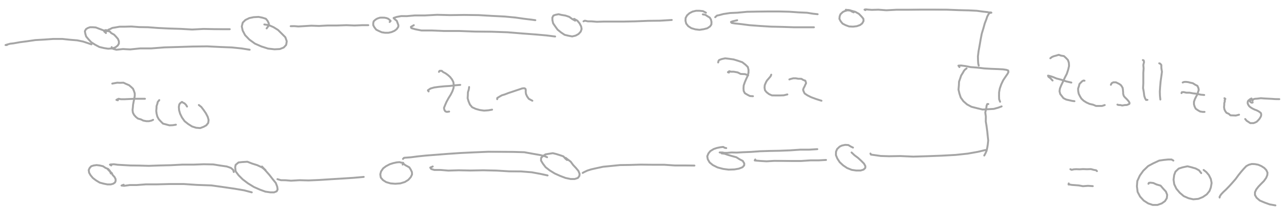


$\frac{\lambda}{4}$ – Trafo

$$\frac{Z_{ein}}{Z_W} = \frac{Z_W}{Z_{aus}}$$

$$Z_W = \sqrt{Z_{ein} \cdot Z_{aus}} = \sqrt{Z_{L3} \cdot R_{U2}}$$
$$= 120\,\Omega$$

3.4)



$$Z_{L2} = Z_{L3} \parallel Z_{L5} = 60\Omega$$

$\frac{\lambda}{4}$ - Trafo

$$Z_{L1} = \sqrt{Z_{L2} \cdot Z_{L0}} = 77{,}45\,\Omega$$

1.1) ja.

$$v_{ph} = \frac{dz}{dt} = \frac{\omega}{k} = \frac{1}{\sqrt{\mu_0 \varepsilon_0}} = c_0 \checkmark$$

$$\gamma = \alpha + j\beta$$

$$\alpha = 0 \qquad \beta = \omega\sqrt{\mu_0 \varepsilon_0} = \beta_1 = \frac{\omega}{c_0} \checkmark$$

1.2) für $\varepsilon_r \neq 1$ hybride Wellen mit E_z, H_z

$$\lambda_z = \frac{\lambda_0}{\sqrt{[illegible]}}$$

$\sqrt{\varepsilon_{r,eff}}$

Der Grundwellentyp lässt sich näherungsweise als Quasi-TEM-Welle beschreiben.

1.3) $\beta_z = \frac{2\pi}{\lambda_z} = \frac{2\pi f \sqrt{\varepsilon_{r,eff}}}{c_0}$

$= \frac{\omega}{v_{ph,z}}$