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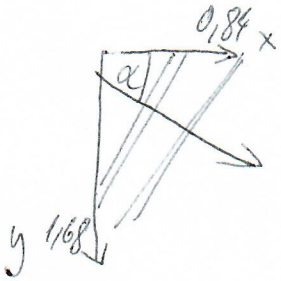
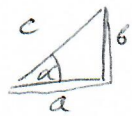
① $\varepsilon_r = 16 \quad \mu_r = 1 \qquad \Delta x = 0{,}84\,m \qquad \Delta y = 1{,}68\,m$



$\lambda_x = \frac{\lambda}{\cos\alpha} \qquad \lambda_y = \frac{\lambda}{\sin\alpha}$



$\sin\alpha = \frac{b}{c} \qquad \cos\alpha = \frac{a}{c}$

$\frac{\lambda_x}{\lambda_y} = \frac{\lambda}{\cos\alpha} \cdot \frac{\sin\alpha}{\lambda} = \frac{\sin\alpha}{\cos\alpha} = \frac{b}{c} \cdot \frac{c}{a} = \frac{b}{a}$

$\tan\alpha = \frac{b}{a}$

$\alpha = \arctan\left(\frac{\lambda_x}{\lambda_y}\right) = \arctan\left(\frac{0{,}84}{1{,}68}\right) = 0{,}4626{,}56^\circ$

a) $\alpha = 26{,}56^\circ$

$\lambda = \lambda_x \cdot \cos\alpha = 0{,}84 \cdot \cos(26{,}56^\circ) = 0{,}75\,m$

$\lambda_v = \frac{\lambda_0}{\sqrt{\varepsilon_r \mu_r}} \Rightarrow \lambda_0 = \frac{\lambda_v}{\sqrt{\varepsilon_r \mu_r}} = \frac{0{,}75}{\sqrt{16 \cdot 1}} = \frac{0{,}75}{4} = 0{,}188\,m$

$f = \frac{c}{\lambda_0} = \frac{0.3 \cdot 10^9}{0{,}188} = 1{,}596\,GHz$

(5) $Z_v = 600\Omega$ $\xi = 0,8$ $l = 40\,mm$ $f = 600\,MHz$

$$\lambda = \frac{\lambda_0}{\sqrt{\varepsilon}} \cdot \xi = \frac{c}{f}\xi = \frac{0,3 \cdot 10^9}{600 \cdot 10^6} \cdot 0,8 = \frac{1}{2} \cdot 0,8 = \frac{4}{10} \cdot 0,4$$

$\lambda = 0,4\,m$

$l = \lambda / 10$

(6) $Z_v = 200\,\Omega$ $R_h = 50\,\Omega$

$\lambda = 1\,m$ $U(0) = 1\,V$

$$I(0) = \frac{U(0)}{R_h} = \frac{1}{50} = 0{,}02\,A = 20\,mA$$

$$\rho(0) = \frac{Z_0 - Z_v}{Z_0 + Z_v} = \frac{R_h - Z_v}{R_h + Z_v} = \frac{50-200}{50+200} = \frac{-150}{250} = -\frac{3}{5}$$

$U(0) = U^P(0) + U^Z(0)$ ~~$\rho(0) = U^P / U^Z$~~

$I(0) = I^P(0) - I^Z(0)$

~~$U^P(0) = \frac{1}{2}U(0) + \frac{1}{2}Z_v I(0) = \frac{1}{2} + \frac{200 \cdot 0{,}02}{2} = \frac{1}{2} + 2$~~

$$\rho(0) = \frac{U^Z(0)}{U^P(0)} \Rightarrow U^Z(0) = \rho(0)\,U^P(0)$$

$U(\xi) = U^P(\xi) + U^Z(\xi)$ $U^P(0) + U^P(0)\rho(0) = U(0)$

$$U(0) = (1+\rho(0))U^P(0) \Rightarrow U^P = \frac{U_0}{1+\rho(0)} = \frac{1}{1-\frac{3}{5}} = \frac{5}{2} = 2{,}5\,V$$

$$U^Z(0) = U(0) - U^P(0) = 1 - 2{,}5 = -1{,}5\,V \qquad I^P(0) =$$

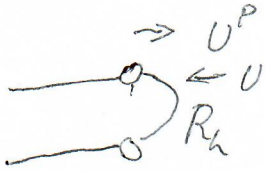
a) $I(0) = 0{,}02\,A$ $U^P(0) =$

$$I^P(0) = \frac{I(0)}{1-\rho(0)} = \frac{0{,}02}{1+\frac{3}{5}} = \frac{5}{8} \cdot 0{,}02 = 0{,}0125\,A$$

$$I^Z(0) = I(0) + I^P(0) = 0{,}02 + 0{,}0125\,A = 0{,}0325\,A$$

b) kmitna-

1. kmitna – $\cos(\alpha\xi) = -1$ $\alpha = \frac{2\pi}{m} \Rightarrow \cos(\alpha\pi)$



$$U(\xi) = U^P(0)\exp(j\alpha\xi) + U^Z(0)\exp(-j\alpha\xi) \qquad \xi = 0{,}5\,m$$

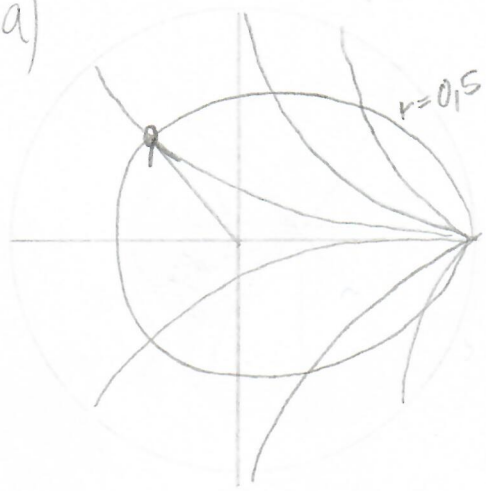
($U^Z(0)$: záporné)

$\cos(\alpha\xi)$ ~~$\cos(\alpha\xi)$~~ $\cos(-\alpha\xi)$

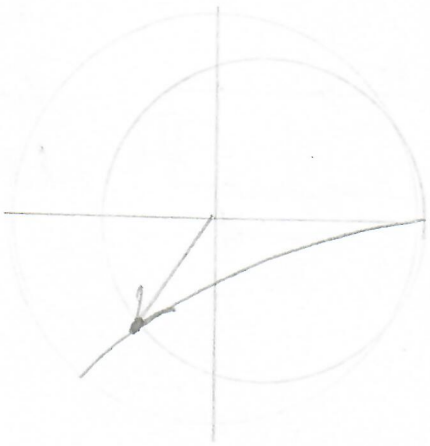
~~PSV~~

(7)

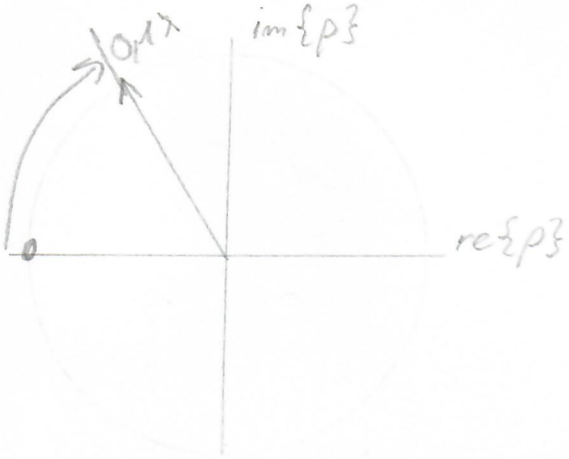
a)



b) $\varphi = 0{,}5 - j0{,}5$



c) $\xi = 0{,}1\lambda$



(8) $Z_L = 100 + j100\ \Omega$ $Z_V = 50\ \Omega$

$z = 2 + j2$

$z_{VL} = -j2 - 2 - j2$

~~$l_{VL} = 0{,}208\lambda$~~

$l_{VL} = 0{,}208\lambda$