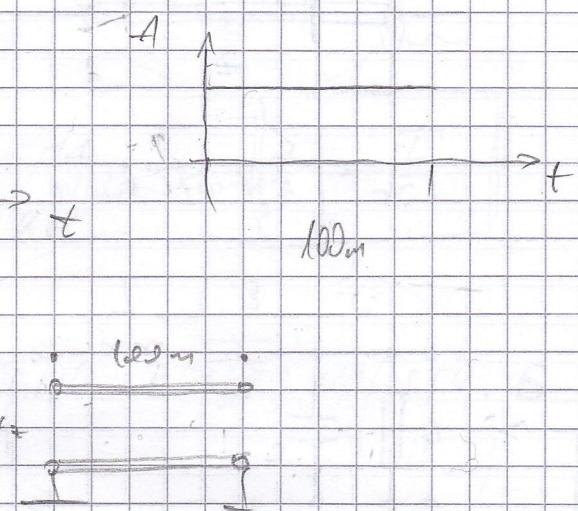
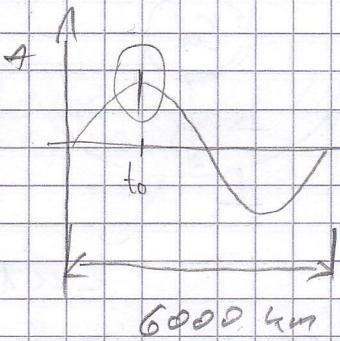


(prestor - vremensko gledanje!!!)

$$\lambda = \frac{c}{f} = \frac{3 \cdot 10^8 \text{ m}}{50 \text{ Hz}} = 6000 \text{ km}$$

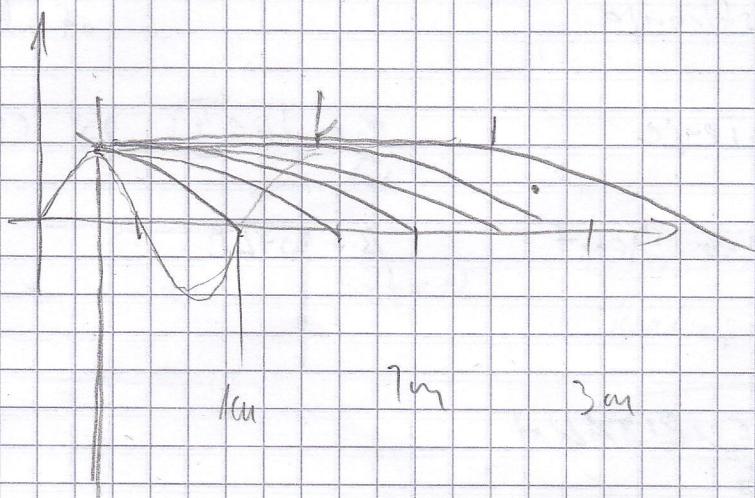
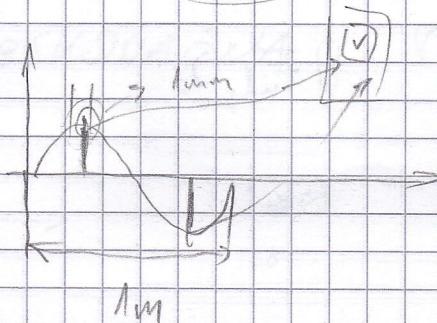
$$f = 50 \text{ Hz}$$



$$\lambda \approx l \quad \text{TEPL - FPL}$$

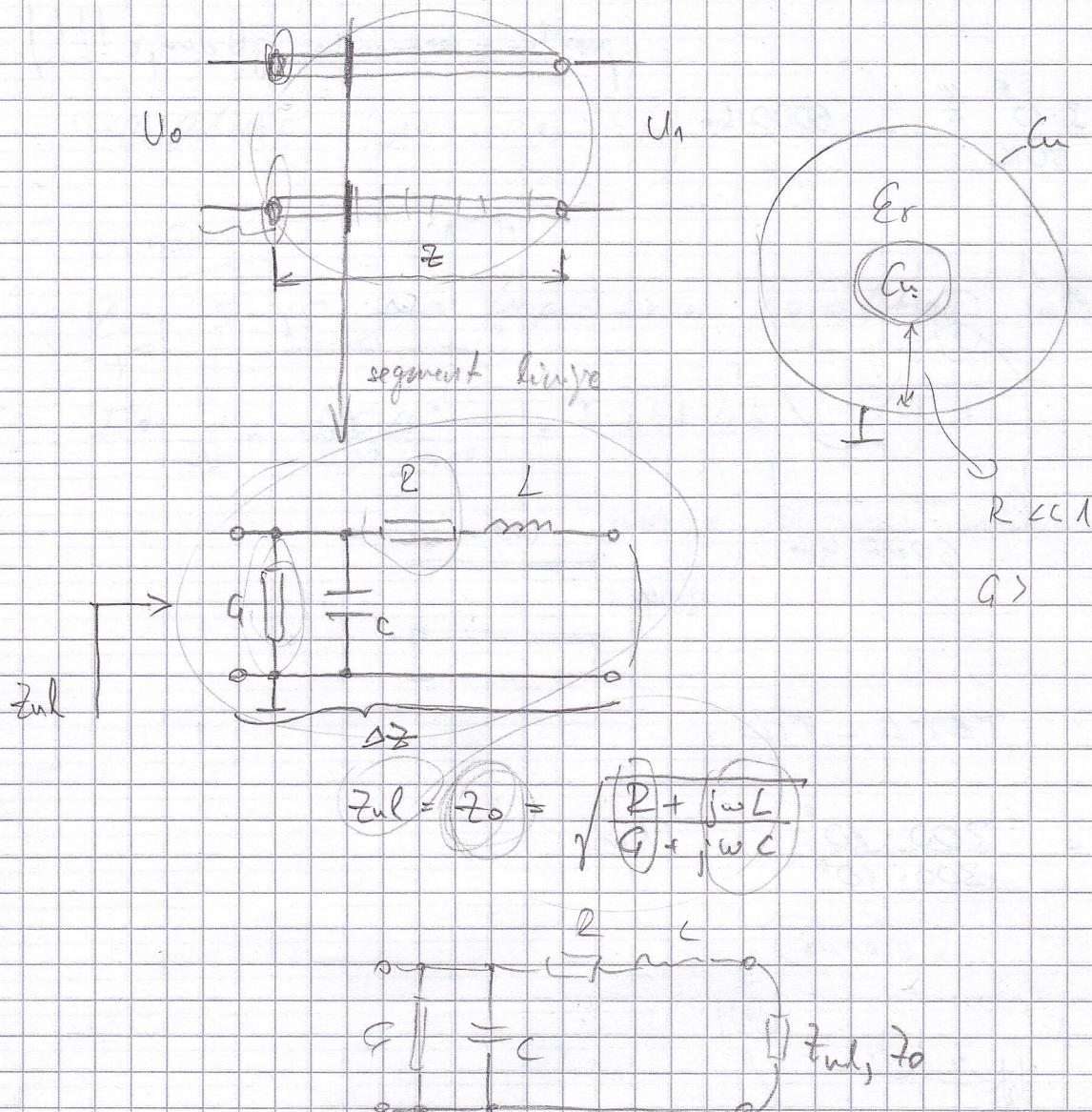
$$\lambda = \frac{c}{f} = \frac{300 \cdot 10^6}{300 \cdot 10^6} = 1 \text{ m}$$

300 MHz



~ linije krate od 8λ nemaju

efekt FPL



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

koeficijent rasprostiranja

α - gajev/c

$$\alpha = \sqrt{RG}$$

β - farna konst.

$$\beta = \omega LC$$

LIVIJA BEZ GUBITAKA

$$\alpha = \beta \rightarrow \sqrt{RG} = \beta ; R = G = \beta$$

LIVIJA BEZ DISTORZIJE

$$D \cdot C = L \cdot G$$

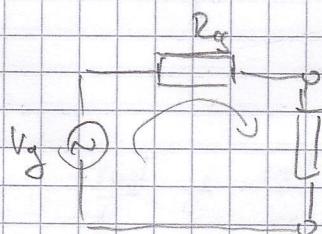
NE! LIVIJE S DIST.
NE DOLAZE

2

$$\gamma = \underbrace{-\sqrt{RQ}}_{\alpha} + j \underbrace{\omega \sqrt{LC}}_{\beta}$$

$$Z_0 = \sqrt{\frac{R + j\omega L}{C + j\omega C}} \Rightarrow \text{LINIJA NEMA} \rightarrow \boxed{Z_0 = \sqrt{\frac{L}{C}}}$$

GUBITKE



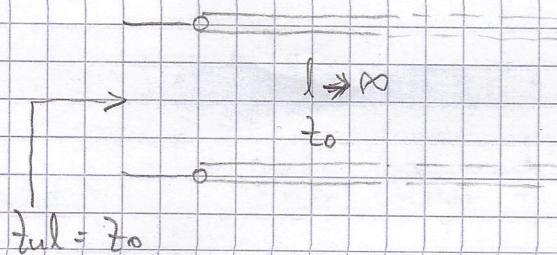
OSTVARIJENO BOJE NA STR. 6 - dolje

$$R_L = l \cdot r \quad P_{max} \rightarrow R_L = R_g$$

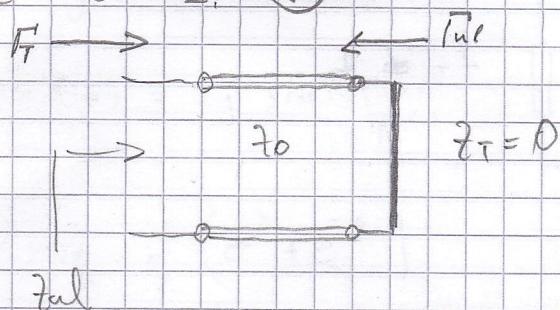
SPEC. SL. LINIJE

LINIJA JE BESKONAČNA

①



LINIJA JE U KS. ②



$$\Gamma'_T = -1 \quad (\text{stojni val})$$

koefficijent refleksije

$$\Gamma'_T = \frac{Z_T - Z_0}{Z_T + Z_0}$$

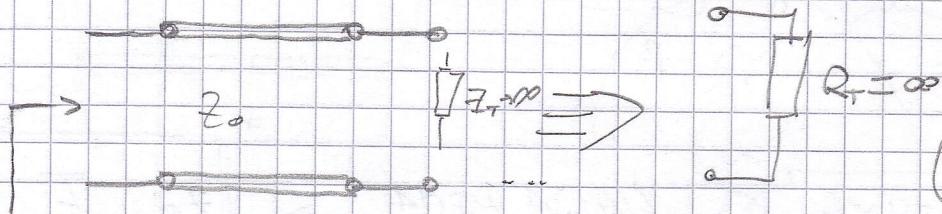
$$z_{ul} = j Z_0 \tan(\beta l)$$

- induktivan karakter (-mn -)

③

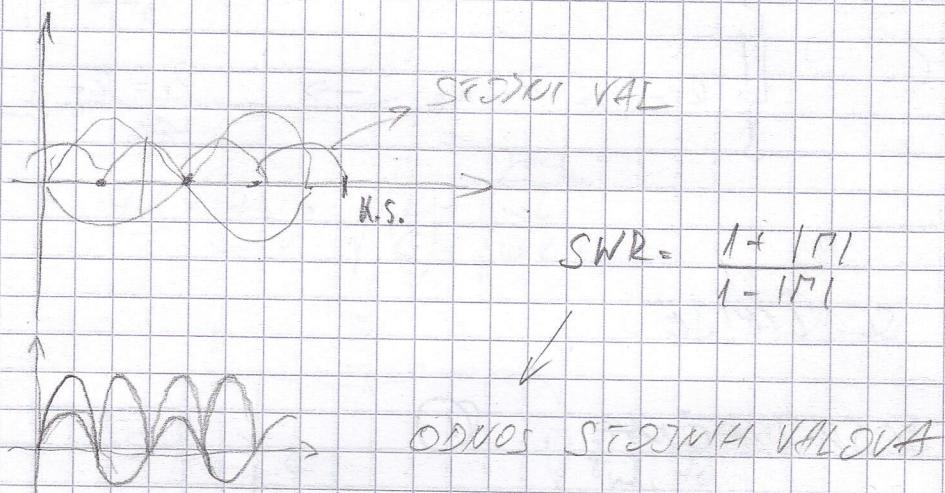
LINE JE ZAKLJUČENA PRAVIM VODOM

$Z_T \rightarrow$



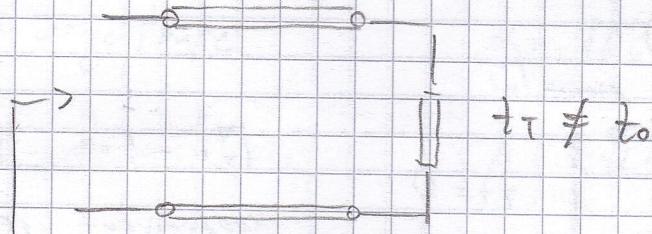
(kapacitivan karakter)

$$\gamma = \frac{Z_T - Z_0}{Z_T + Z_0} = \frac{Z_T}{Z_T} \Rightarrow 1 \quad Z_{\text{ref}} = -j \frac{Z_0}{\tan(\beta l)}$$



$$SWR = \frac{1 + |\gamma|}{1 - |\gamma|}$$

Z_{ref} (velika imp. gledana od izvora)



Z_{ref}

* linija zaključena sa Z_0 nema refleksije - kao da je beskonačna i $Z_{\text{ref}} = Z_0$

$$x=0: \quad Z_{ul} = Z_0 \cdot \begin{bmatrix} Z_T \cdot \cos(\beta l) + j Z_0 \sin(\beta l) \\ Z_0 \cdot \cos(\beta l) + j Z_T \sin(\beta l) \end{bmatrix} \quad | : \cos(\beta l)$$

$z_0:$
 $\alpha \neq 0$

$$Z_{ul} = Z_0 \cdot \begin{bmatrix} Z_T \operatorname{ch}(8l) + Z_0 \operatorname{sh}(8l) \\ Z_0 \operatorname{ch}(8l) + Z_T \operatorname{sh}(8l) \end{bmatrix}$$

duljina od početka linije

• $(\beta je u \frac{\text{rad}}{\text{km}} ili \frac{\text{rad}}{\text{m}}) \dots$

$$\beta = \frac{2\pi}{\lambda} / -l \rightarrow \beta l = \frac{2\pi}{\lambda} \quad ?$$

odjevni uvrstiti: l

NAPOMENA: ADICIONE; TRIGONOMETRIČKE

$$\operatorname{ch}(x+y) = \operatorname{ch}(x) \cdot \operatorname{ch}(y) + \operatorname{sh}(x) \cdot \operatorname{sh}(y)$$

$$\operatorname{sh}(x+y) = \operatorname{sh}(x) \operatorname{ch}(y) + \operatorname{sh}(y) \operatorname{ch}(x)$$

$$\operatorname{ch}(jx) = \cos(x)$$

$$e^{\pm jx} = \cos(x) \pm j \sin(x)$$

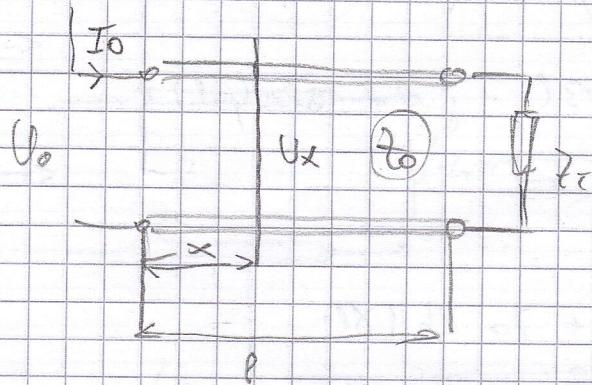
$$\operatorname{sh}(jx) = j \sin(x)$$

$$\operatorname{ch}(x) = \frac{1}{2} (e^x + e^{-x})$$

$$\operatorname{sh}(x) = \frac{1}{2} (e^x - e^{-x})$$

$$\bullet \operatorname{ch}(x+j) \text{ PASPLJAVI} \rightarrow$$

PRIŠENOSNE JESENJE ŽIVE



$$U_x = U_0 \cdot \cosh(\gamma x) - Z_0 \cdot I_0 \sinh(\gamma x)$$

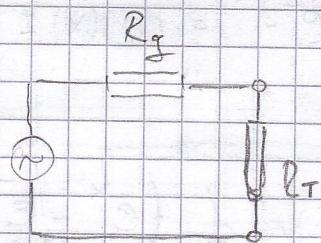
$$I_x = -\frac{U_0}{Z_0} \sinh(\gamma x) + I_0 \cosh(\gamma x)$$

ULAZNA REFLEKSIJA (gledamo od fereta na generator)

$$\Gamma_{ul} = \Gamma_T \cdot e^{-2\gamma l} \Rightarrow z_a \propto = \phi \Rightarrow \Gamma_T \cdot e^{-2j\beta l}$$

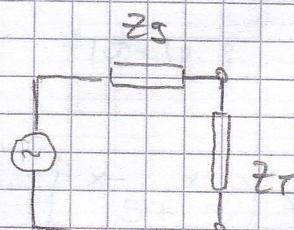
$$z_{ul} = \frac{1 + \Gamma_{ul}}{1 - \Gamma_{ul}} \cdot Z_0$$

|||||



za $P_T = \max$

$$R_T = R_g$$



za $P_T = \max$

$$Z_T = Z_g^*$$

6