

2. Aufgabe:

a) $P_{\text{rest}} = \frac{U_k^2}{Z}$ $Z = \sqrt{\frac{L^2}{C^2}} = \sqrt{\frac{0,162}{5 \cdot 10^{-6}}} \Omega$

$Z = 180 \Omega$

$P_{\text{rest}} = \frac{(750 \text{ V})^2}{180 \Omega} = 3125 \text{ MW}$

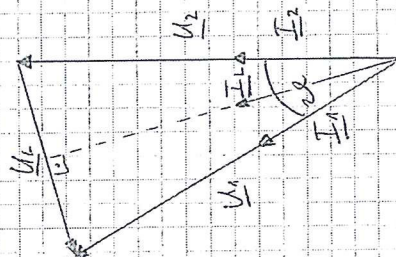
b) $U_k = U_2 \cdot e^{j\varphi}$

$e^{j\varphi} = \sqrt{\omega L' \cdot \omega C'} \cdot L = \sqrt{0,162 \frac{\Omega}{\text{km}} \cdot 5 \cdot 10^{-6} \frac{\text{s}}{\text{km}}} \cdot 600 \text{ km}$

$= 0,54 \text{ rad}$

$= 0,54 \cdot \frac{360^\circ}{2\pi} = 30,94^\circ$

c)



d)



$jX_{gr} = \frac{1}{2} j\omega L + \frac{1}{j\omega C} + \frac{1}{2} j\omega L = j(\omega L - \frac{1}{\omega C})$

$\omega L = \omega L' \cdot L = 0,162 \frac{\Omega}{\text{km}} \cdot 600 \text{ km} = 97,2 \Omega$

$\omega C = 2\pi \cdot 50 \frac{1}{s} \cdot 50 \cdot 10^{-6} \frac{\text{As}}{\text{V}} = \frac{\pi}{200} \frac{1}{\Omega} = 15,71 \text{ mS}$

$X_{gr} = 97,2 \Omega - \frac{1}{15,71 \text{ mS}} = j33,54 \Omega$

$\omega C = \omega C' \cdot L = 5 \cdot 10^{-6} \frac{\text{s}}{\text{km}} \cdot 600 \text{ km} = 3 \text{ mS}$

$U_{2k} = \frac{750 \text{ V}}{\sqrt{3}} = 433 \text{ V}$

$I_k = \frac{S_A}{\sqrt{3} \cdot U_k} = \frac{P_{\text{rest}}}{\sqrt{3} \cdot U_k} = I_2$

$\Rightarrow I_2 = \frac{3125 \text{ MW}}{\sqrt{3} \cdot 750 \text{ kV}} = 2405,63 \text{ A}$

$|I_{c2}| = \frac{\omega C}{2} \cdot (U_{2k}) = 15 \text{ mS} \cdot 433 \text{ kV} = 649,5 \text{ A}$

$|I| = \sqrt{|I_2|^2 + |I_{c2}|^2} = \sqrt{2405,63^2 + 649,5^2} \text{ A} = 2491,77 \text{ A}$

$|U_k| = |I| \cdot X_{gr} = 2491,77 \text{ A} \cdot 33,54 \Omega = 83,57 \text{ kV}$