ZSE
KOLOKWIUM

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ZADANIE 1:

SYSTEM EE: $Z_Q = \frac{cU_n^2}{S''_{kQ}} = \frac{1,1 \cdot 110^2}{1331} = 10\,\Omega$ przy $R_Q = 0$: $X_Q = 10\,\Omega$

T1: $Z_{T1} = \frac{U_{kr}}{100\%} \cdot \frac{U_{nT1}^2}{S_{nT1}} = \frac{10}{100} \cdot \frac{20^2}{20} = 2\,\Omega$ przy $R_{T1} = 0$: $X_{T1} = 2\,\Omega$

L1: $X'_{L1} = X'_1 \cdot l = 0,4\,\Omega/km \cdot 10\,km \rightarrow X_{L1} = 4\,\Omega$

T2: $X_{T2} = Z_{T2} = \frac{U_{kr}}{100\%} \cdot \frac{U_{nT1}^2}{S_{nT2}} = \frac{5}{100} \cdot \frac{0,4^2}{2} = 4 \cdot 10^{-3}\,\Omega$ ← strona N

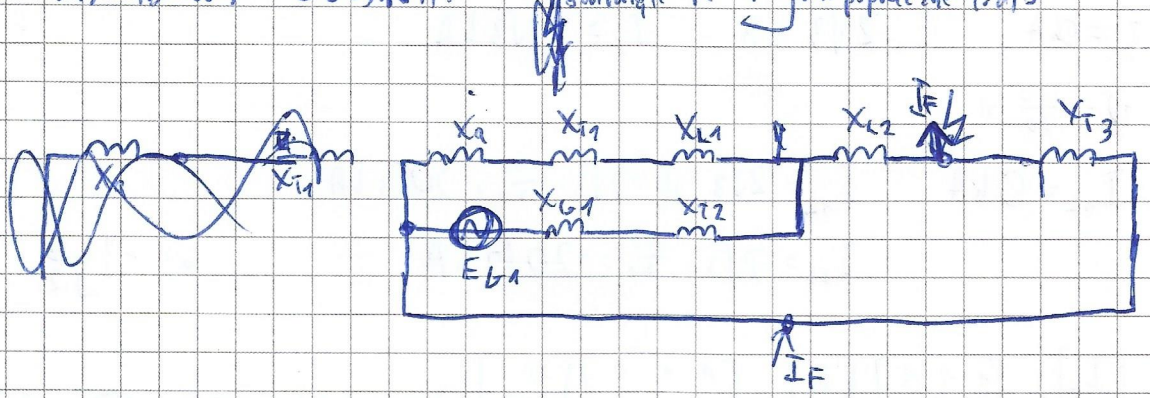
STRONA N

G1: $X_G = Z_G = \frac{0,4^2}{2} = 0,08\,\Omega$

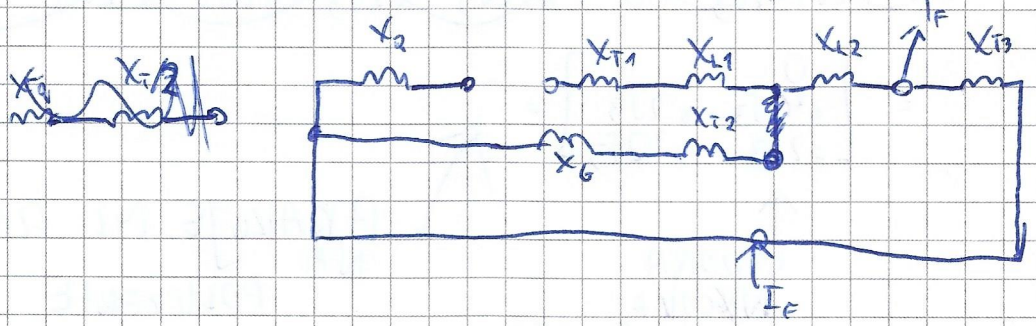
L2: $X_{L2} = X'_1 \cdot l = 0,4 \frac{\Omega}{km} \cdot 3\,km = 1,2\,\Omega$

T3: $Z_{T3} = \frac{U_{kr}}{100\%} \cdot \frac{U_{nT3}^2}{S_{nT}} = \frac{6}{100} \cdot \frac{0,4^2}{1} = 9,6 \cdot 10^{-3}\,\Omega$ ← STRONA N $X_{T3} = 9,6 \cdot 10^{-3}\,\Omega$

SKŁADOWA ZGODNA: Pominięte R : gał. poprzeczne trafo



SKŁADOWA ZEROWA:



ZADANIE 3

$U = 15\,kV \qquad \underline{Z}_k = 0{,}3 + j0{,}9 \qquad Z_k = 0{,}9486\ \Omega$

a) $I_k'' = \frac{c U_n}{\sqrt{3} Z_k} = \frac{1{,}1 \cdot 15}{\sqrt{3} \cdot 0{,}9487} = 10{,}04\ kA$

b) $i_p = \chi \sqrt{2} I_k'' = 1{,}3805 \cdot \sqrt{2} \cdot 10{,}04 = 19{,}60\ kA$

$\chi = 1{,}02 + 0{,}98 e^{-3R/X} = 1{,}3805$

c) $i_{dc} = \sqrt{2} I_k'' e^{-2\pi f_n \frac{R}{X}} = \sqrt{2} \cdot 10{,}04 \cdot e^{-2\pi 50 \cdot 0{,}02 \cdot \frac{0{,}3}{0{,}9}} = 1{,}748\ kA$

ZADANIE 4:

$I_0 = 0\,kA \qquad I_1 = 2\sqrt{3}\ kA \qquad I_2 = -2\sqrt{3}\ kA$

$k = \frac{200}{20} = 10$

$I_{0L} = 0\,kA \qquad I_{1L} = 2\sqrt{3} \cdot k = 2\sqrt{3} \cdot \frac{200}{20} = 20\sqrt{3}\ kA$

$I_{2L} = -2\sqrt{3} \cdot \frac{200}{20} = -20\sqrt{3}\ kA$

$a = -\frac{1}{2} + j\frac{\sqrt{3}}{2}$

$$\begin{bmatrix} I_A \\ I_B \\ I_C \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 \\ 1 & a^2 & a \\ 1 & a & a^2 \end{bmatrix} \begin{bmatrix} I_0 \\ I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 \\ 1 & a^2 & a \\ 1 & a & a^2 \end{bmatrix} \begin{bmatrix} 0 \\ 2\sqrt{3} \\ -2\sqrt{3} \end{bmatrix} = 2\sqrt{3} - 2\sqrt{3} + a^2 2\sqrt{3} - a 2\sqrt{3} + a 2\sqrt{3} - a^2 2\sqrt{3} =$$

$$= 0 + 2\sqrt{3} - 2\sqrt{3} + 0 + a^2 2\sqrt{3} - a 2\sqrt{3} + a 2\sqrt{3} - a^2 2\sqrt{3} = 0\ (?)$$

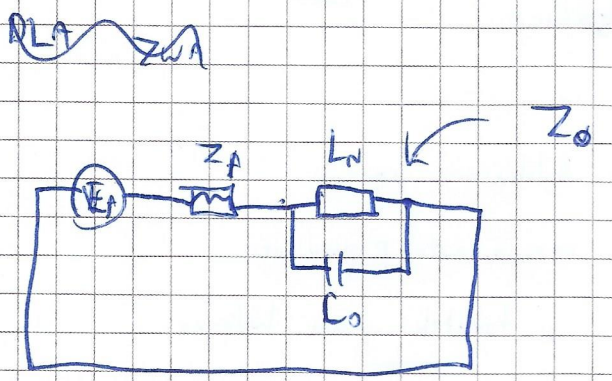
$$= \begin{bmatrix} 0 \\ a^2 2\sqrt{3} - a 2\sqrt{3} \\ a 2\sqrt{3} - a^2 2\sqrt{3} \end{bmatrix} =$$

BRAKUJE MI CZASU NA POLICZENIE

STRONA WYŻSZA, DLA NIŻSZEJ PODMIANA $2\sqrt{3} \to 20\sqrt{3}$!

ZADANIE 3:

$\underline{E}_f = E_1 = j11{,}5\,kV$ $\quad 50Hz$ $\quad L_N = 27\,mH$ $\quad C_0 = 125\,\mu F$ $\quad Z_f = j4\,\Omega$



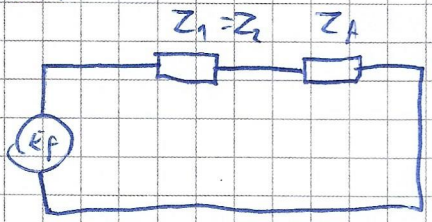
$$\underline{Z}_0 = \frac{j\omega L_N}{1-\omega^2 C_0 3 L_N} = j12{,}72\,\Omega$$

$$\underline{I}_A = \frac{\underline{E}_f}{Z_A + Z_N} = \frac{j11{,}5kV}{j4 + j12{,}72} = 0{,}81\,kA \quad \text{w fazie A}$$

SIEĆ NIEDOKOMPENSOWANA, PRĄD ZA DUŻY (>500A)

ZADANIE 2

ZGODNA:/PRZECIWNA:



ZEROWA: