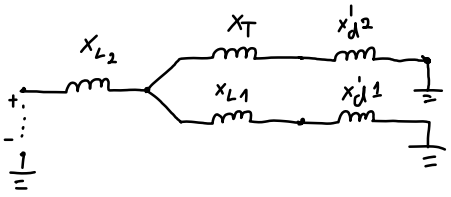
a)



$$X_{th} = X_{L_2} + \left[(X_T + x'_d 2) /\!/ (X_{L_1} + x'_d 1) \right]^{-1}$$

$$X_{L_2} = X_{L1} = \frac{0.1 \cdot 100}{\frac{(160\,K)^2}{100\,M}}$$

$X_T = 0.07$ $\quad X_{th} \approx 0.3147$ $\quad \frac{1}{X_{th}} = 3.1776$ $\quad P_{cc} = 3.1776 \cdot 100 \times 10^6 = 317.76\ MVA$

$x'_d 1 = 1 \rightarrow 1 \cdot \frac{100}{1000} = 0.1$

$x'_d 2 = 0,2$

$$I_{cc} 2 = \frac{X_{L1} + x'_d 1}{X_{L1} + x'_d 1 + X_T + x'_d 2} \cdot \frac{1}{X_{th}} = 1.6114\ \mu \rightarrow 620.23\ \mu$$

b)

$$[-B] = \begin{bmatrix} \frac{1}{X_L} & -\frac{1}{X_L} & 0 \\ -\frac{1}{X_L} & \frac{2}{X_L} & -\frac{1}{X_L} \\ 0 & -\frac{1}{X_L} & \frac{1}{X_L} \end{bmatrix}$$

$$[\theta] = [-B]^{-1} [P]$$

$P_1 = 1.2$ $\quad \theta_1 = 0$

$P_2 = 0,8$ $\quad \theta_2 = -0.21(3) = -12.2°$

$P_3 = -2$ $\quad \theta_3 = -0.56(8) = -32.5956°$

$$P_{12} = \frac{\theta_1 - \theta_2}{X_L} = 120\ MW$$

$$P_{23} = \frac{\theta_2 - \theta_3}{X_L} = 200\ MW$$

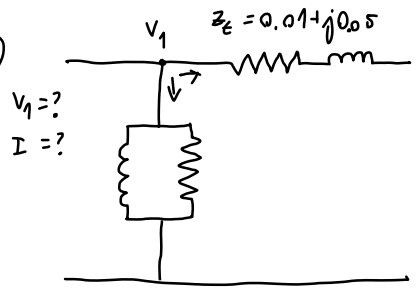
$\theta_3 > 30°$, logo a aproximação não é particularmente boa

c) $P_{max} \approx \frac{V^2}{2X_L} = \frac{1}{2X_L} = 2.8131\mu \rightarrow 281.3\ MW$

a) $S = 3 V I^* \Leftrightarrow I = \frac{S^*}{3V^*} = \frac{(18 - j3) \times 10^6}{3 \cdot \frac{30 \times 10^3}{\sqrt{3}}} = 351.19\, e^{-j0.165149}\ A$

$$Z = \frac{V}{I} = 48.65 + j\,8.11\ \Omega$$

b)



$V_2 = V \rightarrow 1\ \mu$

$I_2 = I \rightarrow 0.912\ \mu$

$V_t = z_t \cdot I_2$

$V_1 = V_2 + V_t$

$I_m = V_1 \cdot Y_m$

$I_1 = I_m + I_2$

$S = I_1^* \cdot V_1$

$R_L\{S\} = 18\ 21$

$I_m\{S\} = 4\ 25$