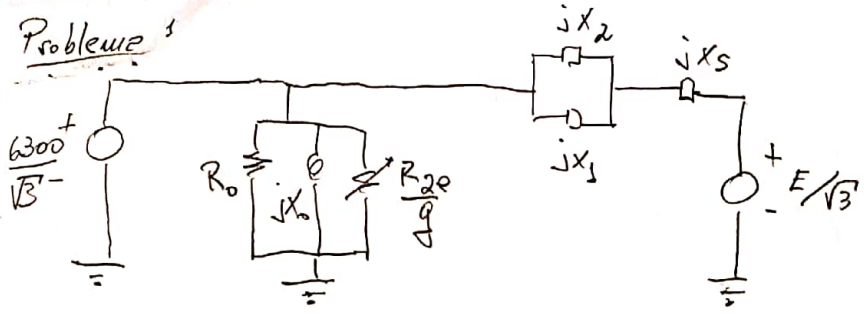
Problème 1

1)



$X_s = 0,2 \frac{6,3^2}{1,5} = 5,3\,\Omega$

$X_J = 0,05 \frac{6,3^2}{0,8} = 2,5\,\Omega$.

$X_2 = 0,05 \frac{6,3^2}{0,5} = 4,0\,\Omega$.

MI : $2\times10^6 = g_N(1-g_N)\frac{6300^2}{R_{2e}}$ $\quad g_N = 0,02$

$\Rightarrow R_{2e} = 0,39\,\Omega$

$R_0 = 522,2\,\Omega$.

$Q_0 = \sqrt{(\sqrt{3}\,6300\times100)^2 - 76000^2} = 1090$ KVAR.

$X_0 = 36,4\,\Omega$.

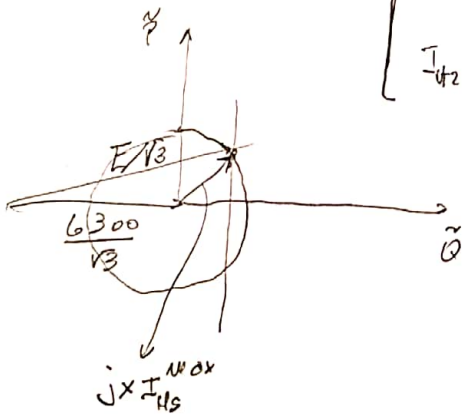
2) MI en vacío $\Rightarrow$ $P_{MI} = 76$ KW $\quad Q_{MI} = 1090$ KVAR.

I_{HS}^{max} / No sobrecargue equipos :

$I_{NT_1} = \frac{800\times10^3}{\sqrt{3}\times6300} = 73,4\,A$

$I_{NT_2} = \frac{500\times10^3}{\sqrt{3}\times6300} = 45,9\,A$

$\Rightarrow I_{HS}^{max} = I_{NT_1} + I_{NT_2} = 119,3\,A$



$X = \frac{4\times3,5}{4+2,5} + 5,3 = 6,84\,\Omega$.

$\tilde{Q} = \frac{1\times10^6\times6,84}{\sqrt{3}\times6300} = 627,6$

$\Rightarrow \tilde{P} = \sqrt{(119,3\times6,84)^2 - 627,6^2} = 521,5 = \frac{6,84\times P}{\sqrt{3}\times6300}$

$\Rightarrow P_{HS} = 831$ KW.

$\Rightarrow \begin{cases} P_{Red} = P_{MI} - P_{HS} = -755\,KW \\ Q_{Red} = Q_{MI} - Q_{HS} = 90\,KW \end{cases}$

$E = \frac{6300}{\sqrt{3}}\times\sqrt{\left(\frac{6300}{\sqrt{3}}+\tilde{Q}\right)^2 + \tilde{P}^2} = \sqrt{3}\times4300,5 = 7443V$

$\Rightarrow \boxed{E \simeq 2362V} \Rightarrow \boxed{i \simeq 2,4\,A}$

3)

$\frac{6300^2\times g}{157\times0,39} = 8,88\times1500(1-g) \rightarrow 49g = 1-g \rightarrow 50g = 1 \Rightarrow g = 0,02$

$\Rightarrow P_{MI} = 2\,MW + 0,076\,MW = 2076$ KW

$Q_{MI} = 1090$ KVAR.

$P_{HS} = 831$ KW

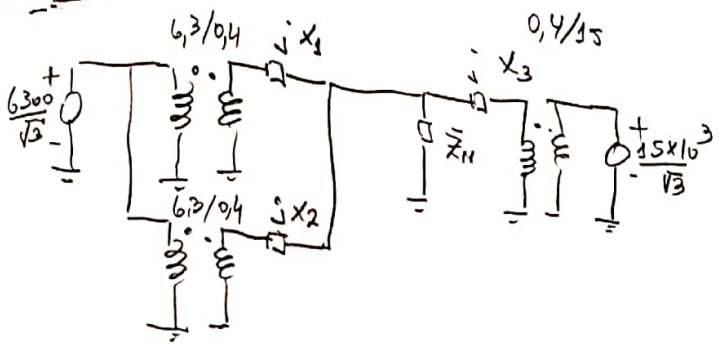
$Q_{HS} = 1$ MVAR

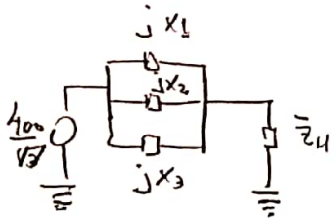
$\Rightarrow P_{Red.} = 1245$ KW

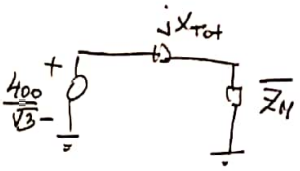
$Q_{Red} = 90$ KW

$\cos\varphi = 99$

Problema 2







$X_{tot} = X_1 // X_2 // X_3$

1)

$X_1 = 0,06 \times \frac{400^2}{300 \times 10^3} = 0,032\,\Omega$

$X_2 = 9,04 \times \frac{400^2}{200 \times 10^3} = 0,032\,\Omega$

$X_3 = 9,08 \times \frac{400^2}{400 \times 10^3} = 0,032\,\Omega$

$\Rightarrow X_{tot} = \frac{0,32}{3} = 9,0107\,\Omega.$

MI: $Z_{cc} = \frac{100/\sqrt{3}}{480} \angle \arccos\left(\frac{12000}{\sqrt{3} \times 100 \times 480}\right) = 0,12 \angle 81,7° = 0,017 + j\,0,118 \Rightarrow jX_{tot} + \bar{Z}_{cc} = 0,13 \angle \varphi$

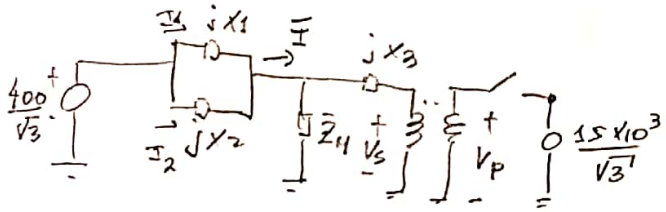
$\bar{I}_{Arr} = \frac{400/\sqrt{3}}{0,13 \angle \varphi} = 1778,6\,A \angle -\varphi \Rightarrow V_H = 213,4V \Rightarrow \underline{U_1 = 369,2V}$

2)

$X_0 = \frac{400/\sqrt{3}}{200} = 1,16\,\Omega$ $\quad g = \frac{1500 - 1455}{1500} = 903$ $\quad \bar{Z}_H = j\,1,16 // \left(R_1 + \frac{R_{2e}}{g} + j\,0,118\right)$

$R_1 = R_{2e} = 8,5 \times 10^{-3}\,\Omega \Rightarrow \frac{R_{2e}}{g} = 0,28\,\Omega \Rightarrow R_1 + \frac{R_{2e}}{g} = 0,3\,\Omega$

$\Rightarrow \bar{Z}_H = 0,28 \angle 34,68° = 0,23 + j\,916.$



$jX_1 // jX_2 = j\,0,016\,\Omega.$

$\bar{I} = \frac{400/\sqrt{3}}{j\,0,016 + 0,23 + j\,0,16} = \frac{231,2}{0,23 + j\,0,032} = 797,2 \angle -$

$0,29 \angle -$

$\Rightarrow I = 797,2\,A \Rightarrow V_S = 797,2 \times 0,28 = 223,2V \rightarrow U_S = 386,1V \Rightarrow \underline{U_P = 14479V}$

No es admisible este funcionamiento.

3) $I_1 = I_2 = \frac{797,3}{2} = 398,6\,A$

$I_{N1} = \frac{300 \times 10^3}{\sqrt{3} \times 400} = 433,5\,A$ $\quad I_{N_{T2}} = \frac{200 \times 10^3}{\sqrt{3} \times 400} = 289A$

η_1) 92 % $\quad \eta_2$) 138 %