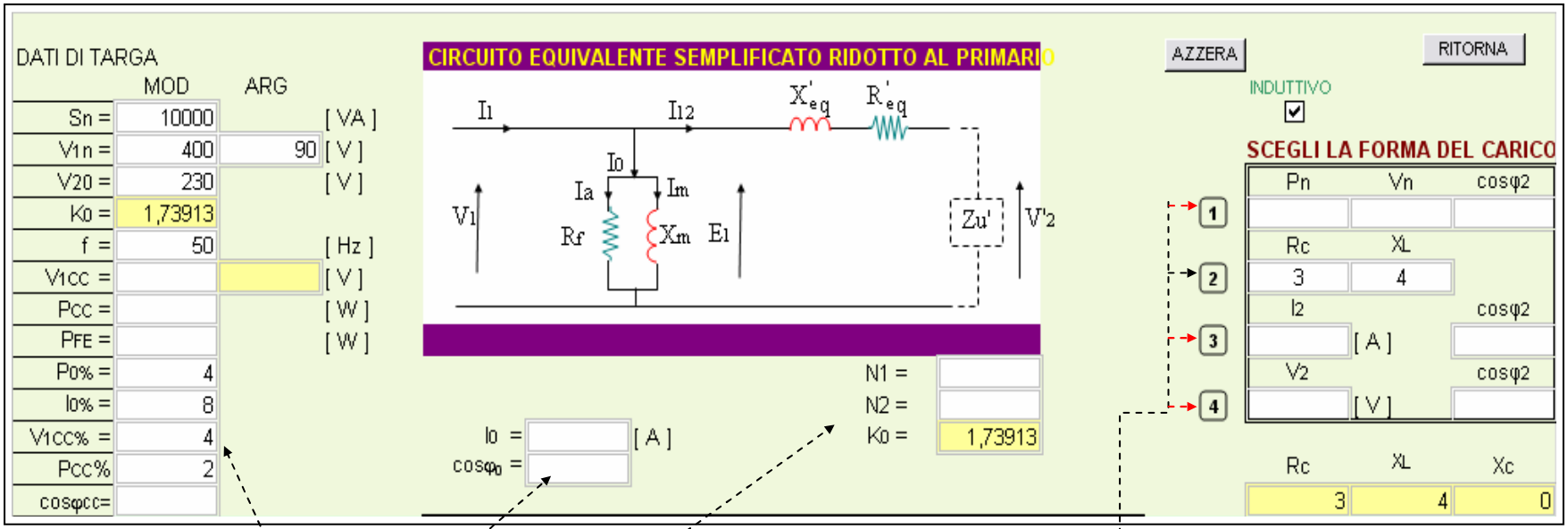
TRASFORMATORE CIRCUITO EQUIVALENTE AL PRIMARIO



1 Si inseriscono i dati a disposizione del problema

2 Si inserisce una tipologia di carico

$I_{1n} = \frac{S_{1n}}{V_{1n}} =$ 25 [A] $I_{2n} = \frac{S_{1n}}{V_{02}} =$ 43,47826 [A]

$V_{20} = V_{1n} \cdot \frac{1}{K_0} =$ MOD 230 ARG 90 [V]

RESET | E | ESEGUI

V1cc dato= $V_{2cc} = \frac{V_{1cc}(dato)}{K_0} =$ IND [V]

$V_{1cc} = \frac{V_{1cc\%} \cdot V_{1n}}{100} =$ 16 [V] $V_{2cc} = \frac{V_{1cc}}{K_0} =$ IND 9,2 [V]

$V_{1cc} = \frac{P_{cc\%}}{\cos\varphi_{cc}} \cdot \frac{V_{1n}}{100} =$ [V] $V_{2cc} = Z''_{eq} \cdot I_{2n} =$ 9,2 [V]

V1cc = 16 [V] V2cc = 9,2 [V]

$\cos\varphi_{cc} = \frac{P_{cc\%}}{V_{1cc\%}} =$ 0,5 (1)

$\cos\varphi_{cc} = \frac{P_{cc}}{V_{1cc} \cdot I_{1n}} =$ (2) NO

$\cos\varphi_{cc} = \frac{P_{cc}}{V_{2cc} \cdot I_{2n}} =$ 0,5 (3)

$\cos\varphi_{cc}$ dato = (4) FINALE

$\cos\varphi_{cc} =$ 0,5

$\varphi_{cc} = \cos^{-1}(\cos\varphi_{cc}) =$ 60 [°]

Pcc dato [W]

$P_{cc} = \frac{P_{cc\%} \cdot S_n}{100} =$ 200 [W]

$P_{cc} = V_{1cc} \cdot I_{1n} \cdot \cos\varphi_{cc} =$ 200 [W]

NO

$P_{cc} = V_{2cc} \cdot I_{2n} \cdot \cos\varphi_{cc} =$ 200 [W]

FINALE

Pcc= 200 [W]

Mediante il tasto ESEGUI si mettono in chiaro tutti i risultati **proposti** che si riescono a determinare mediante l'utilizzo del circuito equivalente al primario fino al rifasamento

$I_2 = \frac{\Delta V}{Z''_{eq} \cdot \cos(\varphi_{Zeq''} + \varphi_2)} =$ [A]

44,14467

$I_2 = \frac{V_2}{\sqrt{R_C^2 + X_C^2}} =$ [A]

$I_2 = \frac{V_{20}}{\sqrt{(R''_{eq} + R_C)^2 + (X''_{eq} + X_C)^2}} =$ 44,14467 [A]

$R''_{eq} = \frac{P_{cc}}{I_{2n}^2} =$ 0,1058 [Ω] $R'_{eq} = \frac{P_{cc}}{I_{1n}^2} =$ 0,32 [Ω]

$X''_{eq} = R''_{eq} \tan\varphi_{cc} =$ 0,183251 [Ω] $X'_{eq} = R'_{eq} \tan\varphi_{cc} =$ 0,554256 [Ω]

$Z''_{eq} = \sqrt{R''^2_{eq} + X''^2_{eq}} =$ 0,2116 [Ω] $Z'_{eq} = \sqrt{R'^2_{eq} + X'^2_{eq}} =$ 0,64 [Ω]

$\Delta V = I_2 \cdot \left| \left(R''_{eq} \cos\varphi_2\right) + \left(X''_{eq} \operatorname{sen}\varphi_2\right) \right| =$ 9,273946 [V]

9,273946

$Z'_C = \frac{V_2}{I_2} \cdot K_0^2 =$ 15,12287 $Z'_C = \sqrt{R'^2_C + X'^2_C} =$

$\Delta V = V_{20} - V_2 =$ [V] $R'_C = R_C \cdot K_0^2 =$ 9,073724 $R'_C = Z_C \cos\varphi_2 \cdot K_0^2 =$

$V_2 = V_{20} - \Delta V =$ 220,7261 [V] $X'_C = X_C \cdot K_0^2 =$ 12,0983 $X'_C = Z_C \operatorname{sen}\varphi_2 \cdot K_0^2 =$

$\Delta V\% = \frac{\Delta V}{V_{20}} \cdot 100 =$ 4,032151 %

$V_2 = \sqrt{R_C^2 + X_C^2} \cdot I_2 =$ I2 = [A] 220,7233 [V]

cosφ2 = 0,6

senφ2 = 0,8

INDUTTIVO φ2 = 53,1301 [°]

$\varphi_{cc} = \varphi_{Zeq''} = \tan^{-1}\left[\frac{X''_{eq}}{R''_{eq}}\right] =$ 60 [°]

$\varphi_{cc} = \varphi_{Zeq'} = \tan^{-1}\left[\frac{X'_{eq}}{R'_{eq}}\right] =$ 60 [°]

$R_C = \frac{V_2}{I_2} \cdot \cos\varphi_2 =$ 3 [Ω]

$X_C = \frac{V_2}{I_2} \cdot \operatorname{sen}\varphi_2 =$ 4 [Ω]

$P_{cc} = R''_{eq} \cdot I_{2n}^2 =$ 200 [W] $P_{cc} = R'_{eq} \cdot I_{1n}^2 =$ 200 [W]

$Q_{cc} = X''_{eq} \cdot I_{2n}^2 =$ 346,4102 [VAR] $Q_{cc} = X'_{eq} \cdot I_{1n}^2 =$ 346,4102 [VAR]

PARAMETRI NEL FERRO

$\cos\varphi_0 = \frac{P_0}{V_{1n} \cdot I_0} =$

$\cos\varphi_0$ dato =

$\cos\varphi_0 = \left(\frac{P_0\%}{I_0\%}\right) =$ 0,5

$\cos\varphi_0 = \frac{P_0\% \cdot S_{1n}}{100} \cdot \frac{1}{V_{1n} \cdot I_0} =$

FINALE

$\cos\varphi_0 =$ 0,5

$\varphi_0 = \cos^{-1}(\cos\varphi_0) =$ 60 [°]

$\operatorname{sen}\varphi_0 =$ 0,866025

$I_a = V_{1n} / R_f =$ 1 [A]

$I_m = V_{1n} / X_m =$ 1,732051 [A]

$I_0 = \sqrt{I_a^2 + I_m^2} =$ 2 [A]

I0 dato= [A]

$I_0 = \frac{I_0\% \cdot I_{1n}}{100} =$ 2 [A]

FINALE

I0 = 2 [A]

I0 = 2 [A]

$I_a = I_0 \cos\varphi_0 =$ 1 [A]

$I_m = I_0 \operatorname{sen}\varphi_0 =$ 1,732051 [A]

$P_{FE} = \frac{P_0\% \cdot S_n}{100} =$ 400 [W]

400

P_{FE} dato= [W]

$P_{FE} = V_{1n} \cdot I_0 \cdot \cos\varphi_0 =$ 400 [W]

$P_{FE} = V_{1n} \cdot I_0 \cdot \cos\varphi_0 =$ 400 [W]

$Q_{FE} = P_{FE} \cdot \tan\varphi_0 =$ 692,8203 [VAR]

$R_f = \frac{V_{1n}^2}{P_{FE}} =$ 400 [Ω]

$X_m = \frac{V_{1n}^2}{Q_{FE}} = \frac{V_{1n}^2}{P_{FE} \cdot \tan\varphi_0} =$ 230,9401 [Ω]

CORRENTI AL PRIMARIO

$I_{12} = \frac{V_{1n}}{\sqrt{\left(R'_{eq} + R'_C\right)^2 + \left(X'_{eq} + X'_C\right)^2}} =$ 25,38318 [A]

$I_1 = \sqrt{(I_0 \cos\varphi_0 + I_{12} \cos\varphi_{12})^2 + (I_0 \operatorname{sen}\varphi_0 + I_{12} \operatorname{sen}\varphi_{12})^2} =$ 27,37093 [A]

$V'_2 = Z'_C \cdot I_{12} =$ 383,8667 [V]

$\cos\varphi_{12} = \cos\left\{\tan^{-1}\left[\frac{\left(X'_{eq} + X'_C\right)}{\left(R'_{eq} + R'_C\right)}\right]\right\} =$ 0,596107

NON UTILIZZATA nota la differenza

$I_{12} = I_2 \cdot \frac{V_{20}}{V_{1n}} =$ 25,38318 [A]

$\operatorname{sen}\varphi_{12} = \operatorname{sen}\left\{\tan^{-1}\left[\frac{\left(X'_{eq} + X'_C\right)}{\left(R'_{eq} + R'_C\right)}\right]\right\} =$ 0,802905

POTENZE ATTIVE REATTIVE E APPARENTI AL SECONDARIO E AL PRIMARIO

RENDIMENTO

$Q_{FE} = P_{FE} \cdot \tan \varphi_0 =$ 692,8203 [VAR]

$Q_2 = V_2 \cdot I_2 \cdot \text{sen}\, \varphi_2 =$ 7795,007 [VAR]

$Q_{Fe} = V_1 \cdot I_0 \cdot \text{sen}\, \varphi_0 =$ 692,8203 [VAR]

$Q_{X''_{eq}} = X''_{eq} \cdot I_2^2 =$ 357,1107 [VAR]

$P_2 = V_2 I_2 \cos \varphi_2 =$ 5846,255 [W]

$P_{cu} = P_{cc} \left(\frac{I_2}{I_{2n}} \right)^2 =$ 206,1779 [W]

$P_{cu} = P_{cc} \left(\frac{I_{12}}{I_{1n}} \right)^2 =$ 206,1779 [W]

$P_{FE} =$ 400 [W]

$\eta = \frac{P_2}{P_2 + P_{FE} + P_{cu}} =$ 0,906054

$Q_1 = Q_2 + Q_{Fe} + Q_{X_{eq}'} =$ 8844,938 [VAR]

$P_1 = P_2 + P_{FE} + P_{cu} =$ 6452,433 [W]

$S_1 = \sqrt{P_1^2 + Q_1^2} =$ 10948,37 [VA]

$I_1 = \frac{S_1}{V_1} =$ 27,37093 [A]

$\cos \varphi_1 = \frac{P_1}{S_1} =$ 0,589351

$\varphi_1 =$ 53,88903 [°]

RIFASAMENTO

IMPORRE $\cos \varphi_{rif}$

$\cos \varphi_{rif} =$ 0,9

$\varphi rif =$ 25,84193

$C_{rif} = \frac{P_1 (\tan \varphi_1 - \tan \varphi_{rif})}{\omega V_1^2} =$ 0,000114 [F]