Etude du transformateur réel

à vide I_{1v} très faible → $(R_1 + j\ell_1\omega)I_{1v} \ll U_1$ donc ≈ 0

$$\Rightarrow \begin{cases} \underline{U_{2v}} \approx -m\,U_1 \Rightarrow \boxed{m = \dfrac{U_{2v}}{U_1}} \\ \underline{\mathcal{P}_{1v}}_{\text{active}} = F + R_1 I_{1v}^2 \\ F \gg R_1 I_{1v}^2 \end{cases} \Rightarrow \boxed{F = \mathcal{P}_{1v}\ \text{active}}$$ constantes.

à charge nominale $\underline{I_2} = -\dfrac{1}{m}\underline{I_1}$

Essai : secondaire en court-circuit

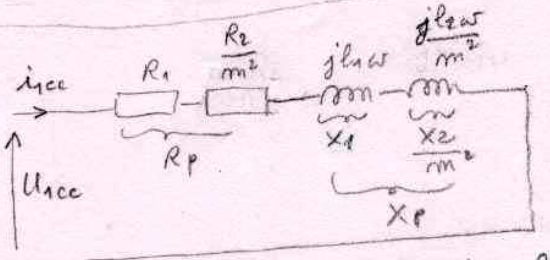

schéma "tout ramené au primaire"

(U_{1cc} faible donc F et $L_{1\omega}$ faibles car prop. à U_1^2)

$$Z_p = \frac{U_{1cc}}{I_{1cc}}$$

$\mathcal{P}_{1cc}$ mesurée au Wattmètre →
- $\mathcal{P}_{1cc} = R_p I_{1cc}^2 = C$ → donne $R_p = R_1 + \dfrac{R_2}{m^2}$ → $R_s = m^2 R_p$
- $X_p = \sqrt{Z_p^2 - R_p^2}$ → donne X_p et $\ell_1 + \dfrac{\ell_2}{m^2}$ → $X_s = m^2 X_p$

En charge

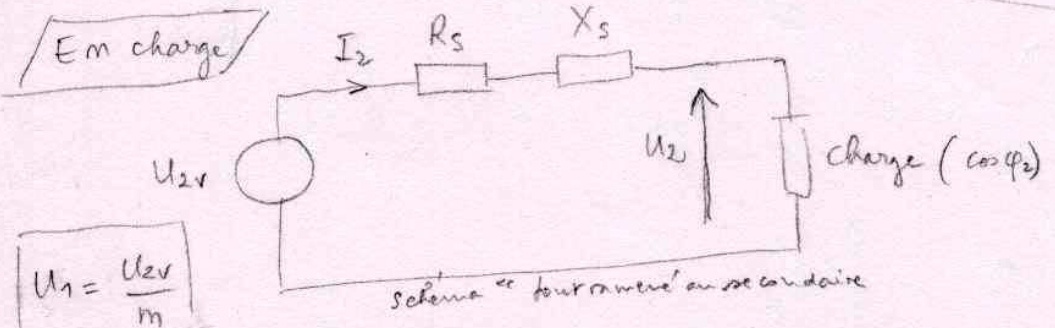

schéma ramené au secondaire

$\boxed{U_1 = \dfrac{U_{2v}}{m}}$

$$\Delta U_2 = U_{2v} - U_2 = R_s I_2 \cos\varphi_2 + X_s I_2 \sin\varphi_2$$

$$\boxed{C = R_s I_2^2} \quad ; \quad \mathcal{P}_2 = U_2 I_2 \cos\varphi_2$$

$$\boxed{\mathcal{P}_1 = \mathcal{P}_2 + F + C} \quad \text{et} \quad \eta = \frac{\mathcal{P}_2}{\mathcal{P}_1}$$