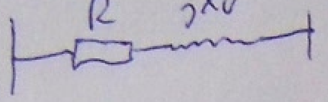
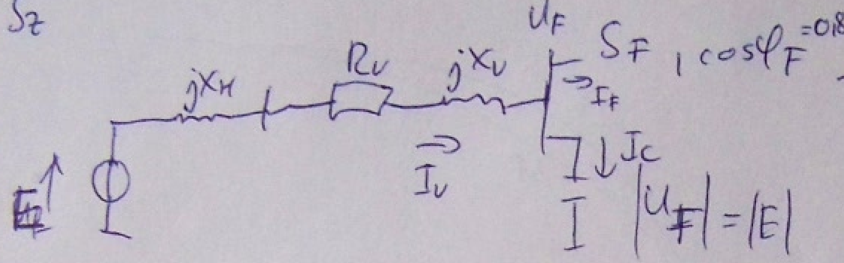
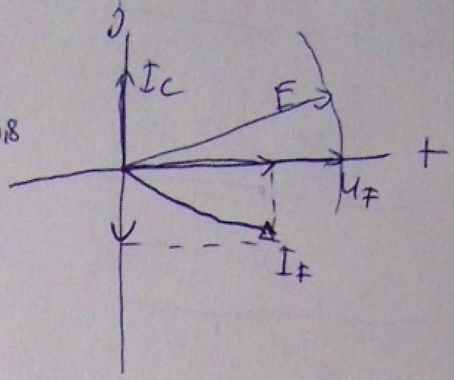
Hálózati áramellátás



Sz





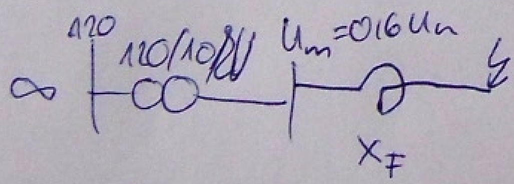
$$E^2 = (U_F + \Delta U_H)^2 + \Delta U_k^2$$

$$\Delta U_H = I_{wv} \cdot R_v + I_{mv} \cdot (X_v + X_h)$$

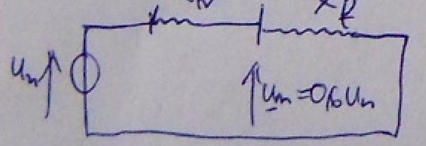
$$\Downarrow \qquad\qquad \Downarrow$$

I_{Fw} $\qquad$ $I_{mv} = I_{Fm} - I_C$ → ez a I_C miatt negatív lesz.

$$\Delta U_k = I_{wv} \cdot (X_v + X_h) - I_{mv} \cdot R_v$$

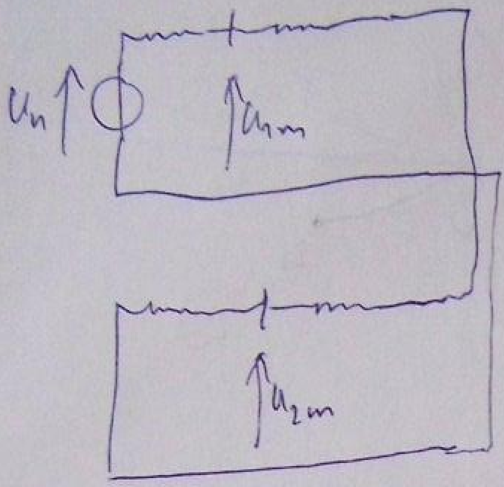


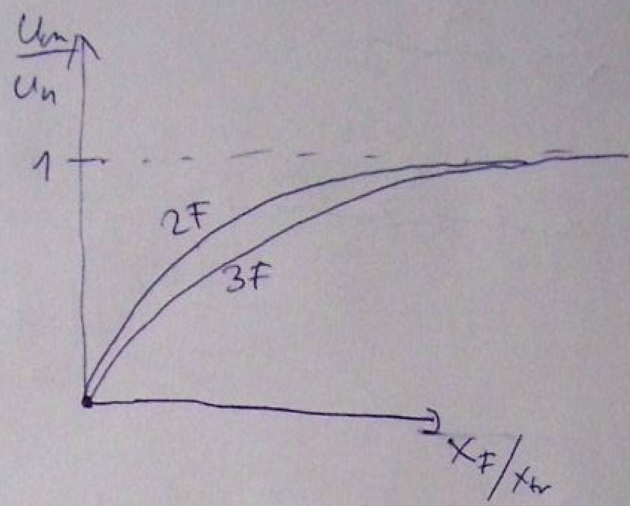
$$\frac{X_F}{X_{tr}}$$



$$\frac{X_F}{X_{tr}} = \text{[illegible]}$$

2F b,c





$|U_b| = |U_c|$

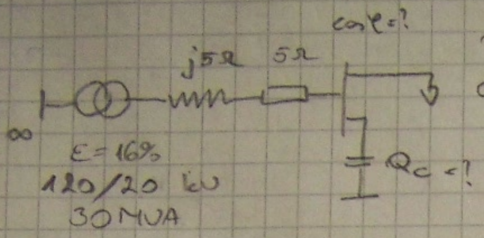
$I_2 = -I_1$

$U_{1m} = U_n - i_1 X_{tr}$

$U_{2m} = -i_2 \, X_{tr}$

$U_{bm} = a^2 U_{1m} + a U_{2m}$

2009 PSt ZH



$P = 40$ MW

$\cos\varphi_F = 0,8$ (ind)

Mekkora meddőkompenzációval lehet a névleges feszültséget tartani?

Mekkora a cos φ a betápnál?

$$S_F = \frac{P}{\cos\varphi_F} = \frac{40}{0,8} = 50 \text{ MVA}$$

$$I_F = \frac{S_F}{\sqrt{3}U_n}(\cos\varphi_F - j\sin\varphi_F) = \frac{50}{\sqrt{3}\cdot 20}(0,8 - j\,0,6) = 1,44(0,8 - j\,0,6) =$$

$$= 1,2 - j\,0,9 \ [kA]$$

$$\Delta U_h = I_w \cdot R + j\, I_m X = 1,2\cdot 5 + 0,9\left(\overbrace{0,16\cdot\frac{20^2}{30}}^{2,13} - 5\right) =$$

$$= 6 + 6,42 = 12,42 \ [kV]$$

$$|I_c| = \frac{12,42}{7,13} = 1,74 \ [kA] \rightarrow I_c = -j\,1,74 \ [kA]$$

↳ túlkompenzálunk

$$X_c = \frac{U_n}{I_c} = \frac{20}{\sqrt{3}\cdot 1,74} = 6,64 \ [\Omega]$$

$$Q_c = 3\cdot|I_c|^2\cdot X_c = 60,3 \ [MVAr]$$

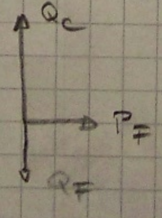
Cos φ

$S_F = 50$ MVA

$P_F = 40$ MW

$Q_F = S_F \cdot \sin\varphi_F = 30$ MVAr

$Q_c = 60,3$ MVAr



$$\left.\begin{aligned} Q_{eredő} &= Q_c - Q_F = 30,3 \text{ MVAr} \\ S_{eredő} &= \sqrt{Q_{eredő}^2 + P^2} = 50,2 \text{ MVA} \end{aligned}\right\} \frac{P_F}{S_{eredő}} = \cos\varphi = 0,97 \text{ (kapacitív)}$$