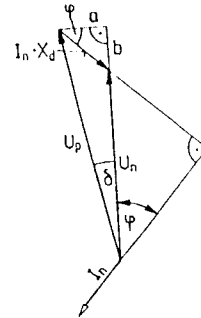
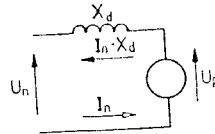


4. SZINKRON GÉPEK

$$X_d = \frac{Z_n \cdot x_d}{100} = \frac{3,24 \cdot 80}{100} = 2,594 \, \Omega$$

$$X_d = 2,594 \, \Omega$$

d)



$$e) \sin \varphi_n = \sqrt{1 - \cos^2 \varphi_n} = \sqrt{1 - 0,8^2} = 0,6$$

$$a = I_n \cdot X_d \cdot \cos \varphi_n = 3207,5 \cdot 2,594 \cdot 0,8 = 6,656 \, \text{kV}$$

$$b = I_n \cdot X_d \cdot \sin \varphi_n = 3207,5 \cdot 2,594 \cdot 0,6 = 4,992 \, \text{kV}$$

$$U_{nf} + b = 10,4 + 4,992 = 15,392 \, \text{kV}$$

$$U_{pf} = \sqrt{(I_n \cdot X_d \cdot \cos \varphi_n)^2 + (U_{nf} + b)^2} = \sqrt{6,656^2 + 15,392^2} = 16,769 \, \text{kV}$$

$$U_{pf} = 16,769 \, \text{kV}$$

$$U_{pv} = \sqrt{3} \cdot U_{pf} = \sqrt{3} \cdot 16,769 = 29,045 \, \text{kV}$$

$$U_{pv} = 29,045 \, \text{kV}$$

$$\sin \delta = \frac{I_n \cdot X_d \cdot \cos \varphi_n}{U_{pf}} = \frac{6,656}{16,769} = 0,3969 \rightarrow \delta = 23,38^\circ$$

$$\delta = 23,38^\circ$$

$$\omega_0 = 2 \cdot \pi \cdot f = 2 \cdot \pi \cdot 50 = 314,16 \, \text{rad/s}$$

$$M_b = \frac{3 \cdot U_{nf} \cdot U_{pf}}{\omega_0 \cdot X_d} = \frac{3 \cdot 10,4 \cdot 10^3 \cdot 16,769 \cdot 10^3}{314,16 \cdot 2,594} = 642,030 \, \text{N} \cdot \text{m}$$

$$M_b = 642,03 \, \text{N} \cdot \text{m}$$

$$M_v = M_b \cdot \sin \delta = 642,030 \cdot 0,3969 = 254,82 \, \text{N} \cdot \text{m}$$

$$M_v = 254,82 \, \text{N} \cdot \text{m}$$