b) $M_b = 1{,}4 \cdot M$

$$M = M_b \cdot \sin\delta = 1{,}4 \cdot M \cdot \sin\delta$$

$$\sin\delta = \frac{M}{1{,}4 \cdot M} = \frac{1}{1{,}4} = 0{,}715 \quad \rightarrow \quad \delta = 45{,}5°$$

$\delta = 45{,}5°$

4.4. feladat

a) $n_0 = \dfrac{f}{p} = \dfrac{50}{3} = 16{,}66\ 1/s = 1000\ 1/min$ — **$n_0 = 1000$ 1/min**

$\omega_0 = 2 \cdot \pi \cdot n_0 = 2 \cdot \pi \cdot 16{,}66 = 104{,}71\ 1/s$ — **$\omega_0 = 104{,}71$ 1/s**

b) $P = S \cdot \cos\varphi = 80 \cdot 0{,}8 = 64$ kW — **$P = 64$ kW**

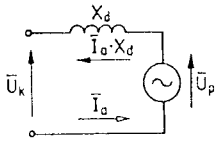
$\sin\varphi = \sqrt{1 - \cos^2\varphi} = \sqrt{1 - 0{,}8^2} = 0{,}6$

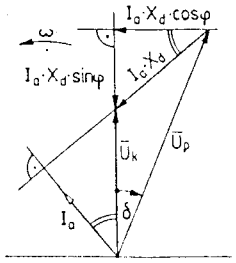
$Q = S \cdot \sin\varphi = 80 \cdot 0{,}6 = 48$ kvar — **$Q = 48$ kvar**

$$I_{an} = \frac{S_n}{3 \cdot U_{1n}} = \frac{80000}{3 \cdot 220} = 121{,}21\ \text{A}$$ — **$I_{an} = 121{,}21$ A**

c) $M_n = \dfrac{P}{\omega_0} = \dfrac{64000}{104{,}71} = 611{,}21$ N·m — **$M_n = 611{,}21$ N·m**

d)





e) $U_p = \sqrt{\left(U_k + I_a \cdot X_d \cdot \sin\varphi\right)^2 + \left(I_a \cdot X_d \cdot \cos\varphi\right)^2} =$

$= \sqrt{(220 + 121{,}21 \cdot 4 \cdot 0{,}6)^2 + (121{,}21 \cdot 4 \cdot 0{,}8)^2} = 641{,}45$ V — **$U_p = 641{,}45$ V**

f) $\sin\delta = \dfrac{I_a \cdot X_d \cdot \cos\varphi}{U_p} = \dfrac{121{,}21 \cdot 4 \cdot 0{,}8}{641{,}45} = 0{,}604 \quad \rightarrow \quad \delta = 37{,}2°$ — **$\delta = 37{,}2°$**