3. 3f AM dos. dr.

$P_N = 5{,}5\,kW$

$U_1 = 380V$

$f_1 = 50Hz$

$I_{1N} = 13A$

$\cos\varphi_{1N} = 0{,}76$

$n_N = 945\,min^{-1}$

$E_{20} = 158V$

$I_{2N} = 21{,}3A$

$M_{om}/M_N = 3$

a) naz. obr. s

η_N $\quad P_{trv} = 100W$

P_{2el}

P_{Fe+Cu1}

E_2, f_2

b) n_{om}, M_{om}

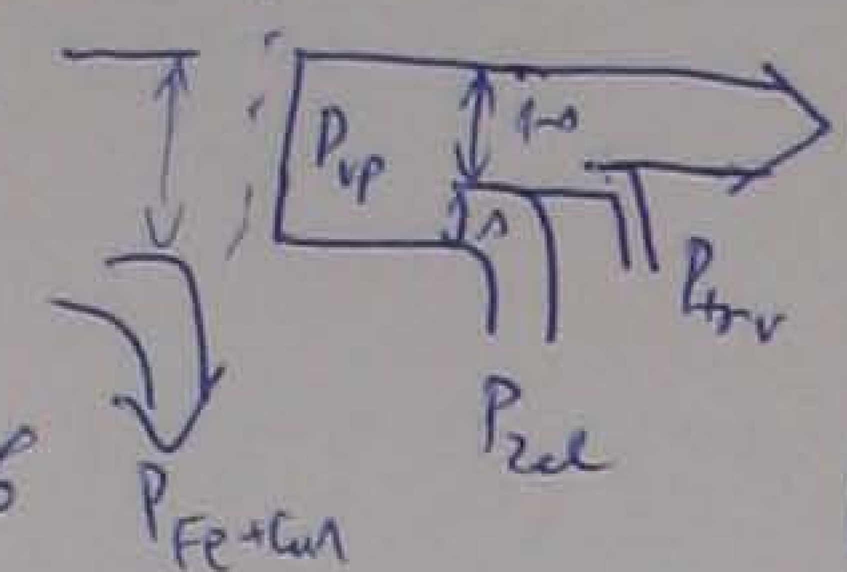
c) $n', P_2', E_2', f_2', P_{2el}'$

$R_{2dod} = 3\Omega/fazo$

$I_2' = I_{2N}$

a) $\eta_N = \dfrac{P_N}{\sqrt{3}U_1 I_{1N}\cdot\cos\varphi_{1N}} = \dfrac{5500W}{\sqrt{3}\cdot 380V\cdot 13A\cdot 0{,}76} = \underline{\underline{0{,}85}}$

$n_s = \dfrac{60f}{p}$ (najbl. večji) $= \dfrac{300}{3} = 1000\,min^{-1}$ $\quad s_N = \dfrac{n_s - n_N}{n_s} = \dfrac{1000-945}{1000} = 0{,}055$



~~P_{2el} z P_{vp}~~ $\quad P_N + P_{trv} = P_{vp}(1-s_N)$

$P_{vp} = \dfrac{P_N + P_{trv}}{1-s_N} = \dfrac{5500+100}{1-0{,}055}W = 5926W$

$P_{2el} = sP_{vp} = 0{,}055\cdot 5926W \cong \underline{\underline{326W}}$

~~$P_{Fe}+P_{Cu}$~~ $P_{Fe} + P_{Cu1} = P_{1N} - P_{vp} = \sqrt{3}U_1 I_{1N}\cos\varphi_{1N} - P_{vp} = \underline{\underline{577W}}$

$E_2 = sE_{20} = 0{,}055\cdot 158V = \underline{\underline{8{,}69V}}$ $\quad f_2 = sf_1 = \underline{\underline{2{,}75Hz}}$

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b) $M_N = \dfrac{2M_{om}}{\dfrac{s_N}{s_{om}} + \dfrac{s_{om}}{s_N}}$ $\quad x = \dfrac{s_{om}}{s}$ $\quad a = \dfrac{M_{om}}{M_N}$ $\Big\}$ $x^2 - 2ax + 1 = 0$

$x_{12} = a \pm \sqrt{a^2-1} = 3 \pm \sqrt{3^2-1} =$

$= 0{,}17\ldots$ ~~//~~

$= 5{,}828\ldots$ ✓ $(s_{om} > s_N)$

$n_{om} = n_s(1 - s_{om}) = n_s(1 - x s_N) =$

$= 1000\,min^{-1}(1 - 5{,}8\ldots\cdot 0{,}055) = \underline{\underline{679}}$

$P_N = M_N\omega_N$ $\quad M_N = \dfrac{P_N}{\omega_N} = \dfrac{P_N\cdot 60}{2\pi n_N} = \dfrac{5500\cdot 60}{2\pi\cdot 945} = 55{,}57\ldots Nm$

$M_{om} = 3\cdot M_N = \underline{\underline{167\,Nm}}$

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c) $R_2 = \dfrac{sE_{20}}{\sqrt{3}I_2}$ (E_{20} – konst., I_2 – konst., R_2 – poznamo) $\quad R_{2N} = \dfrac{s_N E_{20}}{\sqrt{3}I_{2N}} = \dfrac{0{,}055\cdot 158V}{\sqrt{3}\cdot 21{,}3A} = 0{,}2355\Omega$

$R_2 = R_{2N} + R_{2dod} = 3{,}2355\ldots\Omega$

$s' = \dfrac{R_2\sqrt{3}I_{2N}}{E_{20}} = \dfrac{\sqrt{3}\cdot 21{,}3A\cdot 3{,}2355\Omega}{A\cdot 158\Omega} = 0{,}75548\ldots$ $\quad n' = n_s(1-s') = \underline{\underline{245\,min^{-1}}}$

$E_2' = s'E_{20} = \underline{\underline{119V}}$ $\quad f_2' = sf_1 = \underline{\underline{38Hz}}$ $\quad$ PREDPOSTAVKA $M = M_N$ ... ??

$P_{vp} = \dfrac{P_{trv}+P_2'}{1-s}$ $\quad P_{2el} = sP_{vp}$ $\quad P_{TRV} + P_2' = (1-s)P_{vp}$

$P_N = M_N\omega_N$ $\quad \dfrac{P_2'}{P_N} = \dfrac{\omega'}{\omega_N} = \dfrac{2\pi n'}{2\pi n_N}$ $\quad P_2' = P_N\cdot\dfrac{n'}{n_N} = 5500W\cdot\dfrac{245}{945} = \underline{\underline{1426W}}$

~~P_{vp}~~ (P_{vp}) ⇒ P_2', P_{trv}, P_{2el}

$P_{2el} = \dfrac{s'}{1-s'}(P_2' + P_{trv}) = \dfrac{0{,}755\ldots}{1-0{,}755\ldots}\cdot(1426W + 100W) = \underline{\underline{4714W}}$

4. EM TLJE

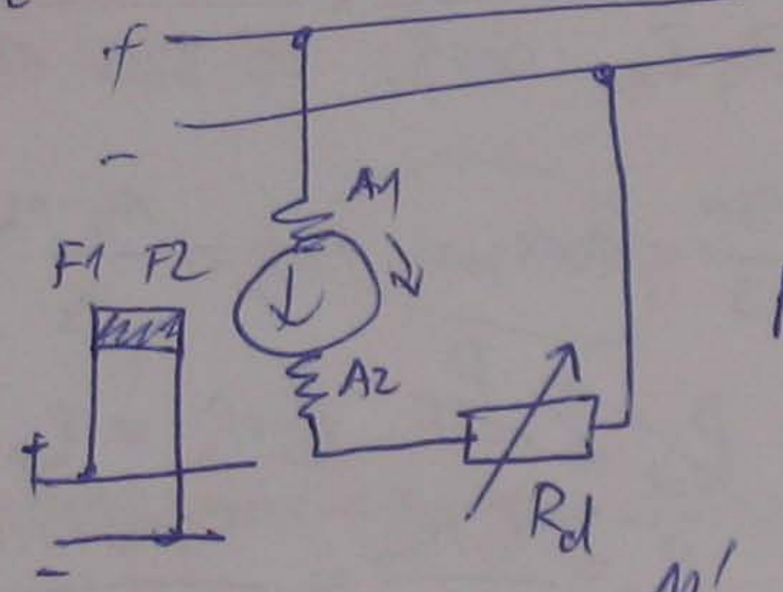
$M_b = \text{konst.}$

$P_N = 25\,kW$

$U_N = 220\,V$

$n_N = 600\,min^{-1}$

$I_{iN} = 132\,A$



$R_{ic} = 0,116\,\Omega$

$\Delta U_{sc} = 2\,V$

$\phi = k_\phi I_v$

$E = k_e \cdot n \cdot \phi = k_e k_\phi n I_v$

$M = k_m \cdot I_i \phi = k_m k_\phi I_v I_i$

$E \propto n$

$\frac{n'}{n_N} = \frac{E'}{E_N} = \frac{0,5U_N - (R_c + R_d) I_{iN} - \Delta U_{sc}}{U_N - R_c I_{iN} - \Delta U_{sc}}$

$E = U - R_c I_i - \Delta U_{sc}$

$n' = n_N \cdot \frac{\sim}{\sim} = 600 \cdot \frac{110V - (0,416\Omega) \cdot 132A - 2V}{220V - 0,116\Omega \cdot 132A - 2V}$

$= 157\,min^{-1}$

a) $R_d = 0,3\,\Omega$

mar. orb. $n' = ?$

$\frac{M}{M_N} = \frac{I_i'}{I_{iN}}$ konst.

$I_i' = I_{iN}$

$U' = \frac{U_N}{2}$

$I_i' = \frac{U'}{R'} = \frac{U_N}{2(R_c + R_d)} = \frac{220V}{2(0,416)\Omega} =$

$U \rightarrow \phi \rightarrow E_i \rightarrow I_i \rightarrow M$

5) U_N

$\Phi' = 0{,}6\,\Phi_N$

$n', I_i = ?$

$R_d \Rightarrow n'' = ?$

$$\frac{E'}{E_N} = \frac{n'\Phi'}{n_N\Phi_N} = \frac{n'0{,}6\Phi_N}{n_N\Phi_N} = \frac{0{,}6n'}{n_N} = \frac{U_N - R_c I_i' - \Delta U_{sz}}{U_N - E_N}$$

$$E_N = U_N - R_c I_{iN} - \Delta U_{sz} = 202{,}688\,V$$

$$M = k_m I_i \Phi$$

$$1 = \frac{M'}{M_N} = \frac{k_m I_i' \Phi 0{,}6\Phi_N}{k_m I_{iN}\Phi_N} = \frac{0{,}6 I_i'}{I_{iN}}$$

$$I_i' = I_{iN}\cdot\frac{1}{0{,}6} = 220\,A$$

$$n' = \frac{n_N}{0{,}6}\cdot\frac{U_N - R_c I_i' - \Delta U_{sz}}{202{,}688V} = \frac{600}{0{,}6}\cdot\frac{220V - 0{,}116\Omega\cdot 220A - 2V}{202{,}688} =$$

$$= 950\,min^{-1}$$

$$n'' = \frac{n_N}{0{,}6}\cdot\frac{U_N - (R_c + R_d) I_i' - \Delta U_{sz}}{E_N} = \frac{600}{0{,}6}\cdot\frac{220 - 0{,}416\cdot 220 - 2}{202{,}688} = 624\,min^{-1}$$