

$$1-6. P_1 = U_N I_N \eta_N.$$

$$\text{输入功率 } P = \frac{P_1}{\eta_N} = 26.5 \text{ kW}.$$

$$I_N = \frac{P}{U_N} = 120.48 \text{ A}.$$

$$1-7 \text{ (1) } p=3 \quad C_e = \frac{pN}{60a}. \quad E = C_e \Phi n. \quad E = 208.95 \text{ V}.$$

$a=p=3.$

(2) ∵ 单波绕组 ∴ $a=1.$

$$n = \frac{E}{C_e \Phi} = \frac{E}{\Phi} \cdot \frac{60a}{pN} = 550.371 \text{ r/min}.$$

$$1-8. \text{ (1) } p=2 \quad a=1 \quad C_e = \frac{pN}{60a} \quad E = C_e \Phi n = 204.6 \text{ V}$$

$E < U.$ 电动机状态.

$$(2) I_a = \frac{U-E}{R_a} = 70 \text{ A}$$

$$P_{em} = E I_a = 14.322 \text{ kW}$$

$$T_{em} = C_T \Phi I_a = \frac{pN}{2\pi a} \Phi I_a = 91.18 \text{ N}\cdot\text{m}.$$

13). 忽略励磁电流

$$P_1 = UI = I_a U_a = 15.4 \text{ kW} .$$

$$P_2 = P_1 - P_{\text{cu a}} - P_{\text{Fe}} - P_{\text{mec}} =$$

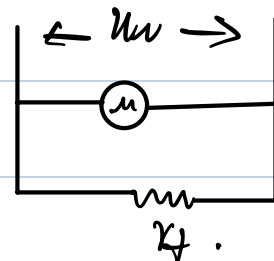
$$= P_1 - I_a^2 R_a - P_{\text{Fe}} - P_{\text{mec}} = 1.37 \text{ kW}$$

$$\eta = P_2 / P_1 = 8.96 \%$$

$$1-12 \text{ u) } \begin{cases} E_0 = C_e \Phi n_0' \\ E_0 = U_N - I_{a0} R_a \end{cases} \Rightarrow C_e \Phi = \frac{U_N - I_{a0} R_a}{n_0'} = 0.0635$$

$$E_N = C_e \Phi n_N, \quad I_{aN} = \frac{U_N - E_N}{R_a} .$$

$$P_{\text{emN}} = E_N \cdot I_{aN}, \quad T_{\text{emN}} = \frac{60 P_{\text{emN}}}{2\pi n_N}$$



代入数据, 得 $E_N = 190.5 \text{ V}$ $T_{\text{emN}} = 57.334 \text{ N}\cdot\text{m} .$

$$T_{2N} = \frac{60 P_N}{2\pi n_N} = 54.113 \text{ N}\cdot\text{m} .$$

$$12) \quad n_0 = \frac{U_N}{C_e \Phi} = \frac{U_N}{U_N - I_{a0} R_a} \cdot n_0' = 3464.5 \text{ r/min} .$$

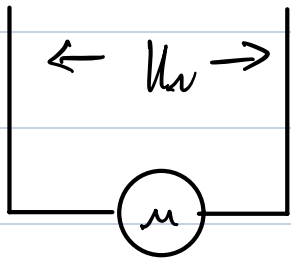
$$(3) T_{emN} = T_{2v} + T_0 = T_c \text{ 不变.}$$

$$T_{em} = C_T \bar{\Phi} I_{av} \Rightarrow I_{av} \text{ 不变.}$$

$$I_{av} = \frac{U_N - E_N}{R_a} = \frac{U_N - E'}{R_a + R_g}$$

$$E' = C_e \bar{\Phi} n' \Rightarrow n' = \frac{E'}{C_e \bar{\Phi}} = 2478.85 \text{ r/min.}$$

1-13



$$1) \begin{cases} P_{emN} = E_N \cdot I_N \Rightarrow P_{emN} = 6240 \text{ W} \\ I_N = U_N - I_N R_a \end{cases}$$

$$T_{emN} = \frac{60 P_{emN}}{2\pi n_N} = \frac{936}{\pi} \text{ N}\cdot\text{m}$$

$$E_N = C_e \bar{\Phi} n_N \Rightarrow C_e \bar{\Phi} = 0.208$$

平衡时: T_{em1}, I_1, E_1, n_1 满足:

$$\begin{cases} T_{em1} = 0.8 T_{emN} \\ T_{em1} = \frac{60 E_1 I_1}{2\pi n_1} = \frac{30}{\pi} C_e \bar{\Phi} I_1 \end{cases} \Rightarrow I_1 = 24 \text{ A}$$

$$E_1 = C_e \bar{\Phi} n_1, U_N = E_1 + I_1 (R_a + R_g) \Rightarrow E_1 = 191.2 \text{ V}$$

$$n_1 = 919.23 \text{ r/min.}$$

(2) 由(1)知 $C_e \bar{\Phi} = 0.20 \text{ s}$, $C_T \bar{\Phi} = 9.55 C_e \bar{\Phi}$.

$$n = \frac{U}{C_e \bar{\Phi}} - \frac{R_a}{C_e C_T \bar{\Phi}^2} \cdot I_a \quad C_T \bar{\Phi} = 9.55 C_e \bar{\Phi}$$

$$\Rightarrow U_2 = C_e \bar{\Phi} \cdot \left(n + \frac{R_a \cdot 0.8 I_{em}}{9.55 (C_e \bar{\Phi})^2} \right) = 113.6 \text{ V} \cdot$$

$$E_2 = C_e \bar{\Phi} n = 104 \text{ V} \cdot$$

$$I_{a2} = \frac{U_2 - E_2}{R_a} = 24 \text{ A} \cdot$$

(3). $T = C_T \bar{\Phi} I_a \Rightarrow I_{a3} = \frac{1}{0.85} I_{a2} = \frac{1}{0.85} \times 24 \text{ A} = 28.235 \text{ A} \cdot$

$$E_3 = U_v - I_{a3} R_a = 354.817 \text{ V} \cdot$$

$$C_e \bar{\Phi}' = 0.85 C_e \bar{\Phi} = 0.176 \text{ s} \cdot$$

$$n_3 = \frac{E_3}{C_e \bar{\Phi}'} = 1180.46 \text{ r/min} \cdot$$

(4). $T = C_T \bar{\Phi} I_a \quad I_{a4} = \frac{1}{0.9} I_{a1} = \frac{80}{3} \text{ A} = 26.667 \text{ A} \cdot$

$$U_4 = U_v - 0.9 = 198 \text{ V} \cdot$$

$$E = U_4 - I_{a4} R_a = \frac{562}{3} \text{ V} \cdot$$

$$n_{\varphi} = 1000.71 \text{ r/min.}$$