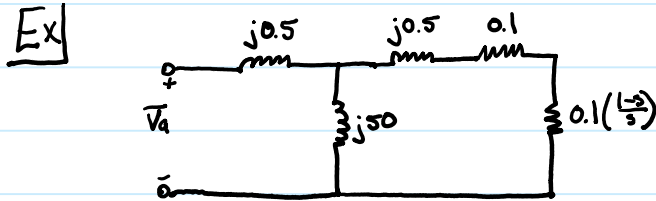


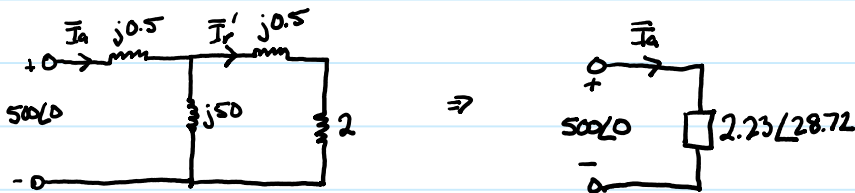
2018-12-10-1



$V_L = 866V$        $s = 0.05$        $f = 60\text{ Hz}$

Find:  $\bar{S}$ ,  $T^e$

Solution:  $V_a = \frac{V_L}{\sqrt{3}} = 500V$



$\bar{I}_a = 224.2 \angle -28.72^\circ$

$\bar{S} = 3 \bar{V}_a \bar{I}_a^* \Rightarrow 336.3 \angle 28.72^\circ \text{ kVA}$

$\bar{V}_r = 500 \angle 0 - j0.5 \bar{I}_a \Rightarrow \bar{V}_r = 500 \angle 0 - 112.1 \angle 61.28^\circ \Rightarrow \bar{V}_r = 446.1 - j98.31 \Rightarrow \bar{V}_r = 456.8 \angle -12.43^\circ$

$\bar{I}_r' = 221.58 \angle -26.46^\circ \text{ A}$

$P_{AG} = 3 |\bar{I}_r'|^2 \frac{R'}{s} \Rightarrow P_{AG} = 294.59 \text{ kW}$

$P_m = (1-s) P_{AG}$

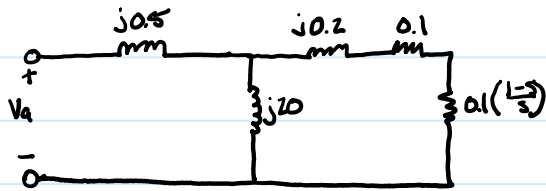
$P_m = 279.86 \text{ kW}$

$T^e = \frac{P_m}{\omega_m} = \frac{P_m}{(1-s)\omega_s}$

$T^e = 781.4 \text{ Nm}$

2018-12-10-2

Ex|



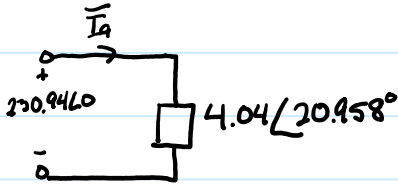
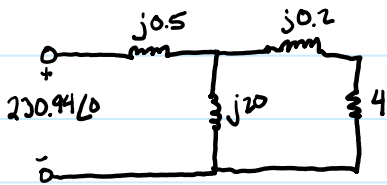
3 phase, wye connected, 60 Hz, 400V,  $p=4$ ,  $N_r=1755$  rpm

Find:  $T^e$

Solution:  $V_a = \frac{400}{\sqrt{3}} \Rightarrow V_a = 230.94$  V

$$N_s = \left(\frac{2}{p}\right) 2\pi f \left(\frac{60}{2\pi}\right) \Rightarrow N_s = 1800 \text{ rpm}$$

$$s = \frac{1800 - 1755}{1800} = 0.025$$



$$\bar{I}_a = 57.16 \angle -20.958^\circ$$

$$V_r' = \bar{V}_a - j0.5 \bar{I}_a \Rightarrow \bar{V}_r' = 220.72 - j26.69 \Rightarrow \bar{V}_r' = 222.33 \angle -6.895^\circ$$

$$\bar{I}_r' = 55.513 \angle -9.757^\circ$$

$$P_{AG} = 3 |\bar{I}_r'|^2 \left(\frac{R_r'}{s}\right) \Rightarrow P_{AG} = 36.98 \text{ kW}$$

$$P_m = (1-s) P_{AG}$$

$$P_m = 36.056 \text{ kW}$$

$$T^e = \frac{P_m}{\omega_m} \Rightarrow T^e = 196.19 \text{ Nm}$$