Exercice 1 :

a) $H = \frac{NI}{l}$

$H = \frac{800 \cdot 1.5}{0.4}$ $\quad H = 3000$ A/m

b) Il sera saturé plus rapidement
Puisqu'il mette plus vite

c) $B = \mu_0 \mu_r H$

$\frac{1.3}{4\pi \cdot 10^{-7} \cdot 295.5} = \mu_r$

$e = \frac{(800 \cdot 1.5 / 295.5) - 0.4}{\left(4\pi \cdot \frac{1.3}{10^{-7}} \cdot 295.5\right) - 1}$

$e = 0,00104$ m $= 1$ mm

d) Il réduit le champs magnétique dans le tore et par conséquent de désaturer le noyau

Exercice 2 :

a) $V = N_s \frac{d\Phi}{dt}$

$\frac{V}{N_s} = \frac{d\Phi}{dt} \Rightarrow B = \frac{1}{N_s} \int V \, dt$

$B = \frac{V_{max}}{N_s} \int \cdot \cos(2\pi f t) \, dt$

$B = \frac{V_{max}}{N_s} \frac{1}{2\pi f} \sin(2\pi f t)$

$B = \frac{V_{max}}{N S 2\pi f} \sin(2\pi f t)$

$B_{max} = \frac{V_{max}}{N S 2\pi f}$

b) $B_{max} = \frac{V_{max}}{N S 2\pi f}$

$B_{max} = \frac{V_{eff}\sqrt{2}}{N_s 2\pi f}$

$= \frac{240\sqrt{2}}{277 \cdot 0.0036 \cdot 2\pi \cdot 60}$

$= 0.90$ T $\quad H = 132$ At/m

$240 = \sqrt{2}\sqrt{3} \, 60 \cdot 277 \cdot \Phi_{max}$

$\Phi_{max} = 0,003$ wb

$\Phi_{max} = 3,25$ mWb

$\Phi_g = 1,625$ mWb

$\Phi = B \cdot S$

$0,001625 = B \cdot 0.0018$

$B = 0.90$ T

c) $H = \frac{NI}{l}$

$132 = \frac{277 \cdot I}{0.12 + 0.08 + 0.08 + 0.12}$

$I = 0.19$ A

$I_{eff} = 0.19/\sqrt{2}$

$I_{eff} = 0.1343$ A

d) $P_{fer} = P_{hyst} + P_{foucaux}$

$P_{fer} = \frac{100}{80} P_{fouc}$

$P_{fer} = 25$ W

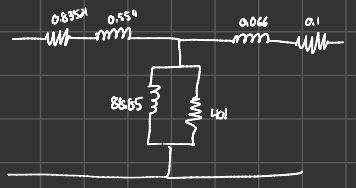
$P = VI$

$\frac{25}{240} = 0.104$ A

e) $I_0 = \sqrt{0.19^2 + 0.104^2} = 0.17$ A

Exercice 3 :

a)



$300 = \frac{347^2}{R}$ $\quad \frac{347}{90} = 2.89$

$R_{eq} = 401 \Omega$

$Q = \sqrt{(347.4) - 300}$

$Q = 1355.19$

$X_m = 88.85$

$300 = I^2 R_{eq}$

$R_{eq} = 0.7$

$R_1 = a^2 R_2$

$R = R_2 = 0.1$

$R_1 = 0.1 \cdot 2.89^2$

$R_1 = 0.83521$

$Q = \sqrt{(0.80)^2 - 300^2}$

$Q = 331.66$

$331.66 = 80^2 x$

$x = 0.13266$

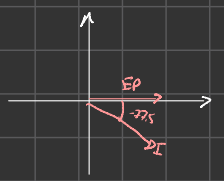
$X_1 = X_2 = \frac{x}{2} = 0.06633$

$X_{f1} = 0.06633 \cdot 2.89$

$X_1 = 0.554$

b) $\frac{88.85J \cdot 401}{88.85J + 401} = \frac{35628.85J}{401 + 88.85J} \quad \frac{90°}{12.49°} = 77.50°$

c)



$V = RI$

$\frac{V}{R} = I$ $\quad \frac{0}{77.50} = -77.50$

Exercise 4 :

$L_{ligne} = 0{,}05 \cdot 2\pi \cdot 60 / 49 = 0{,}38\ pu$

$R_{charge} = 1{,}43\ pu$

$$\frac{2000J}{20J + 100} = \frac{2000 \angle 90}{20\sqrt{26} \angle 11{,}30} = 19{,}611 \angle 78{,}77$$

$$= 3{,}819 + 19{,}2355J$$

a) $(R_1 + X_1) + (X_m // R_f) // ((X_2 + L_{ligne}) + (R_{charge} + R_2))$

$$0{,}005 + 0{,}015J + \frac{(3{,}819 + 19{,}23J)(1{,}445 + 0{,}4J)}{5{,}314 + 19{,}63J}$$

$$0{,}005 + 0{,}015J \quad \frac{-1{,}9826 + 30{,}276J}{5{,}314 + 19{,}63J} = \frac{30{,}34 \angle 93{,}74}{20{,}33 \angle 74{,}85} = 1{,}49237 \angle 18{,}69$$

$$= 1{,}4119 + 0{,}483J$$

$0{,}05 + 0{,}015J + 1{,}4119 + 0{,}483J$

$1{,}4164 + 0{,}498J$

$$\frac{1}{1{,}4164 + 0{,}498J} = S \qquad S = 0{,}6658 \angle -19{,}36$$

$FP = \arccos(-19{,}36) = 0{,}9434$

$$0{,}9434 = \frac{P}{0{,}6658} \qquad P = 628\ Mpu$$

$$Q = \sqrt{(0{,}6658^2) - (0{,}628)^2} = 221{,}1\ Mpu$$

b)

$$\frac{1}{1{,}4169 + 0{,}498J} = I \qquad I = 0{,}6666 \angle -19{,}36$$

$$\frac{3{,}819 + 19{,}2355J}{5{,}264 + 19{,}6505} = \frac{19{,}61}{20{,}344} = 0{,}9639 \cdot 0{,}6666 = 0{,}6426\ pu$$

$0{,}6426^2 \cdot R_{charge} = P_{charge}$

$P = 0{,}5905$

$P_{total} - P_{charg} = P_{pertes}$

$P_{pertes} = 0{,}6426 - 0{,}5905$

$P_{pertes} = 0{,}0521$

$$\eta = \frac{0{,}5905}{0{,}6426} = 91{,}89$$

d) $(1{,}43 + 0{,}38J) \cdot 0{,}66 = 0{,}95236 + 0{,}25308J$

$0{,}9854$

$$\frac{1 - 0{,}9854}{0{,}9854} = 1{,}4816\ \%$$

Exercice 5 :

b) H en haut Plus de tours
Bon bas moins de tours

c)

$S = VI$

$\frac{0000}{3.\frac{600}{\sqrt{3}}} = I \qquad I = 19,24\ A$