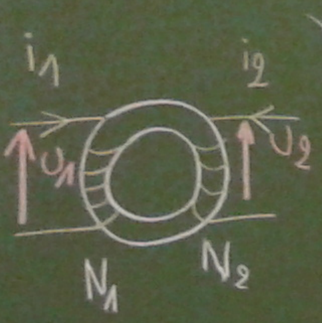
# MP 21 : Conversion de puissance électrique - électrique

## INTRODUCTION

Quelles conversions de puissance doit on effectuer de la centrale électrique à la maison ?

## I | Le transformateur

### * Principe




Transformateur parfait :

$\frac{u_2}{u_1} = \frac{N_2}{N_1} = m$

$\frac{i_2}{i_1} = -\frac{N_1}{N_2} = -\frac{1}{m}$


↳ $\frac{N_2}{N_1} > 1$ → Elévateur de tension

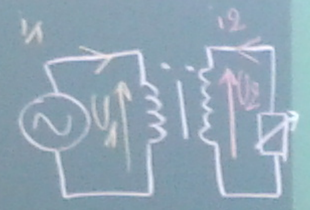
↳ fréquence inchangée

↳ pertes

↳ $\frac{N_2}{N_1} < 1$ → Abaisseur de tension

### * Caractéristique en charge

Pour $u_1$ nominal, que vaut $i_2$ nominal ? $\eta = \frac{P_2}{P_1}$




$u_1 = u_{1\,nominal} = 230$ V

$P_1 = \ldots \pm \ldots$ W

$P_2 = \ldots \pm \ldots$ W

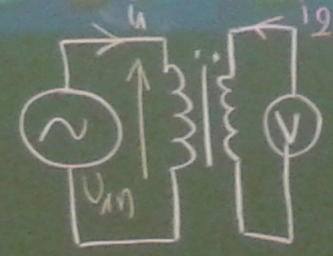
$i_2 = \ldots \pm \ldots$ A

$\Delta P = 1{,}5\% P \pm 2 \times 0{,}1$ W

$\Delta i = 0{,}7\% P \pm 5 \times 1$ mA $\Rightarrow$ $i_{2\,nominal} = \eta(U_{1n}, i_{2n}) = \pm$

### * Pertes fer

- $\mathcal{P}_{fer} = P_1(u_{1n}, i_2 = 0) = \ldots \pm \ldots \propto U_1^2$




- $\frac{u_2}{u_1} = \ldots \pm \ldots$

$m_{HR} = \frac{U_{2n}}{U_{1n}} = \frac{24}{230} = 0{,}104$

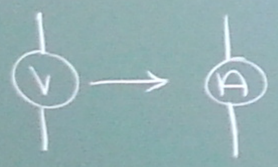
$\frac{P_2}{P_1}$

$U_1^2$

104

* Pertes cuivres

• $\mathcal{P}_{cuivre} = P_1(u_1=0, i_{2n}) = \_\_\_ \pm \_\_\_ \alpha i_2^2$



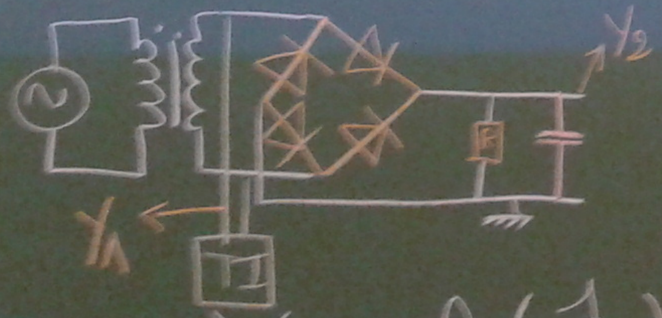

• $\frac{i_2}{i_1} = \_\_\_ \pm \_\_\_$

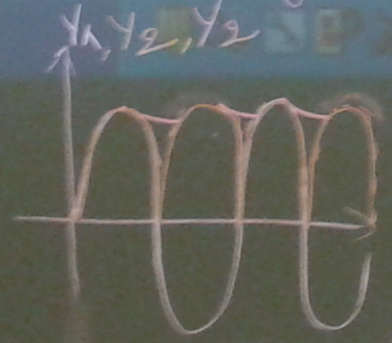
* Méthode des pertes séparées

$P_2 = P_1 - \mathcal{P}_{fer} - \mathcal{P}_{cuivre}$

$\Rightarrow \eta = \frac{P_2}{P_1} = \frac{P_{1(nom)} - \mathcal{P}_f - \mathcal{P}_c}{P_{1(nom)}} = \_\_\_ \pm \_\_\_$

## II Redresseur double alternance et lissage

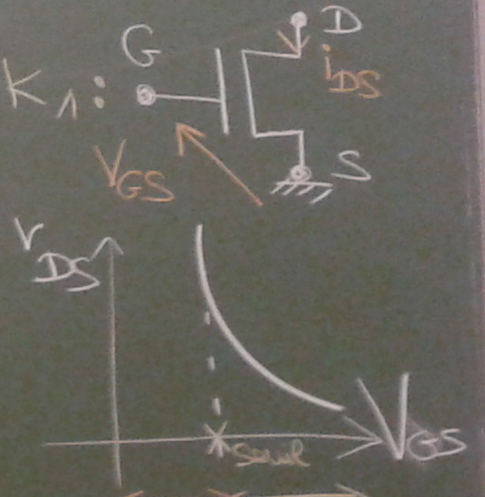


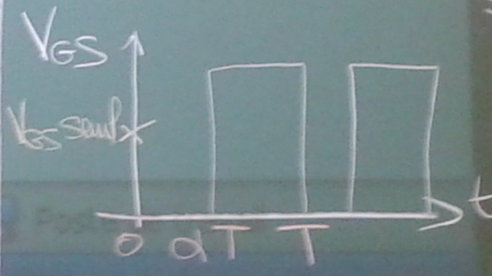




$\tau = \frac{V_{eff}}{V_{moy}} = f\left(\frac{1}{RC}\right)$ $RC \nearrow, \tau \searrow$

Vérification : $\eta = \frac{P_2}{P_1} \simeq$

## III Hacheur dévolteur


$\Delta i = i_{Max} - i_{min} = \frac{\alpha(1-\alpha)E}{fL}$

$f = \frac{1}{T}$