Chap. 1 : Rappels

I – notat° et convention

$\theta = \omega t$ $^{-s}$

θ : rad ; ω : rad.s^{-1}

$\omega = 2\pi f$

$f = \frac{1}{T}$; f : Hz ; $\frac{1}{T}$: s^{-1}

$i(t) = I_{max} \cdot \sin(\omega t - \varphi)$

⇒ Diapo 9 (à imp.) /♡

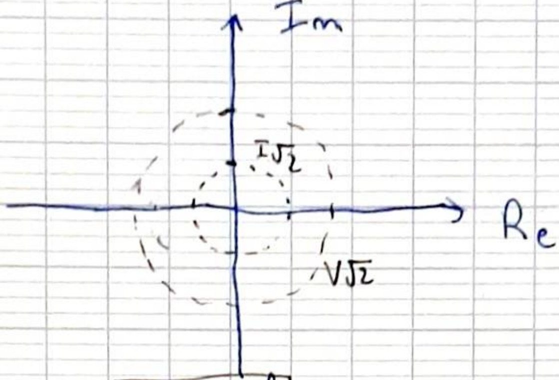
⚠ : val. moy : i pas I.

$i(t) = \hat{I} \sin(\omega t - \varphi)$ | $v(t) = \hat{V} \sin(\omega t)$

$i = I\sqrt{2} \sin(\omega t - \varphi)$ | $v = V\sqrt{2} \sin(\omega t)$

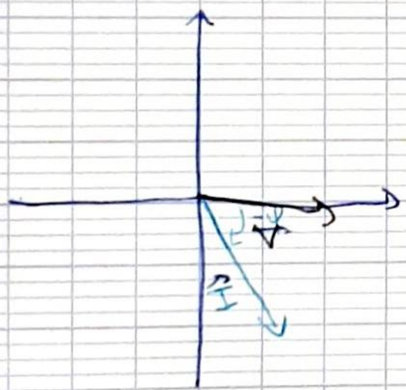
$\underline{i} = I\sqrt{2} \,.\, e^{j(\omega t - \varphi)}$ $\quad \underline{v} = V\sqrt{2} \,.\, e^{j\omega t}$

$\underline{i} = I\sqrt{2} \,.\, e^{j\omega t} \,.\, e^{-j\varphi}$



$\underline{i} = \sqrt{2} \,.\, e^{j\omega t} \,.\, \boxed{\underbrace{I}_{\text{val eff}} \,.\, e^{-j\varphi}}$ $\quad \underline{v} = \sqrt{2} \,.\, e^{j\omega t} \,.\, \boxed{\underbrace{V}_{\text{val eff}}}$

val. eff cmplx



II - Dipoles elementaires

Resistance :

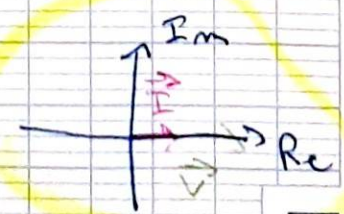
$v = R \,.\, i$; $v = V\sqrt{2} \sin \omega t$ $\Rightarrow V = R \,.\, I$

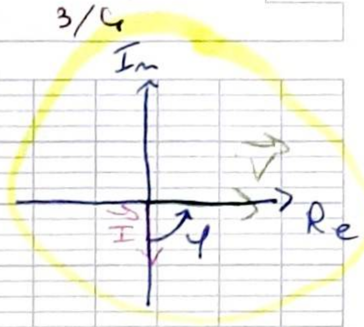
$i = \dfrac{V\sqrt{2}}{R} \sin \omega t$

$\underline{Z}_R = \dfrac{\underline{V}}{\underline{I}} = R$

$\underline{v} = V.\sqrt{2} \,.\, e^{j\omega t}$ donc $\underline{V} = V$

$\underline{i} = I\sqrt{2} \,.\, e^{j\omega t}$ donc $\underline{I} = I$





Bobine :

$$v(t) = L \cdot \frac{di}{dt}$$

$$\underline{v} = L \cdot j\omega \cdot \underline{i} \rightarrow \underline{V} = \boxed{\underbrace{jL\omega}_{Z_L}} \cdot \underline{I}$$

$$\varphi_L = \frac{\pi}{2}$$

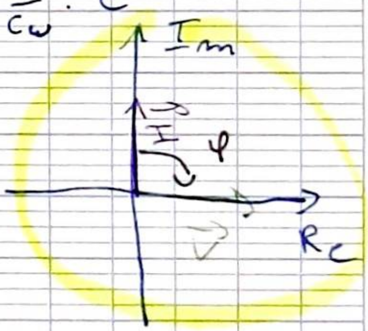
$\vec{I}$ en retard de $\frac{\pi}{2}$ / $\vec{V}$

$$\underline{I} = -j \frac{V}{L\omega} = \frac{V}{L\omega} e^{-j\frac{\pi}{2}} = \frac{V}{L\omega} e^{-j\varphi_L}$$

Condensateur

$$i = C \frac{dv}{dt} \rightsquigarrow \underline{i} = C\, \underline{v} \cdot j\omega$$

$$\underline{i} \cdot Z_C = \underline{v} \Rightarrow \boxed{Z_C = \frac{1}{jC\omega}} = \frac{1}{C\omega} \cdot e^{j\varphi_C}$$



$$\underline{I} = V \cdot jC\omega$$

$\vec{I}$ avance de $\frac{\pi}{2}$ / $\vec{V}$

$$\underline{I} = C\omega V \cdot e^{-j\varphi_C^2}$$

III - Puissance en monophasée

$$p(t) = v \cdot i$$

$$= \underbrace{V \cdot I \cos\varphi\,(1 - \cos(2\omega t))}_{p_R(t)} \underbrace{- V \cdot I \sin\varphi \sin(2\omega t)}_{p_X(t)}$$

$$\langle p_R \rangle = VI\cos\varphi \quad ; \quad \langle p_X \rangle = 0$$

$P = VI\cos\varphi \rightarrow$ puiss active en W

$Q = VI\sin\varphi \Rightarrow$ puiss reactive en var $\qquad FP = \frac{P}{S} = \cos\varphi$

$S = \sqrt{P^2 + Q^2} = VI \Rightarrow$ puiss apparente en VA

J'admne que $\frac{Q}{P} > 0,4 \iff \frac{\sin \varphi}{\cos \varphi} > 0,4$

$\iff \tan \varphi > 0,4$

$\iff |\varphi| > 21,8°$

$\iff \cos \varphi < 0,93$!

il faut donc tjrs avoir $\cos \varphi = FP > 0,93$.

→ jouer avec des condo pour rester ds cette plage. (ou des inductances)