Représentation complexe d'un signal harmonique.

$$s(t) = s_m \cos(\overbrace{\omega t + \varphi}^{\text{phase}})$$

amplitude

pulsation $\omega = 2\pi f = 2\pi / T$

phase à l'origine.

$j^2 = -1$

Signal harmonique		Représentation complexe
$s(t) = s_m \cos(\omega t + \varphi)$	$\longleftrightarrow$	$\underline{s}(t) = s_m e^{j(\omega t + \varphi)}$

amplitude

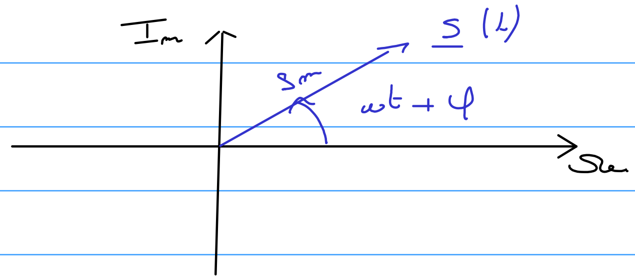
pulsation

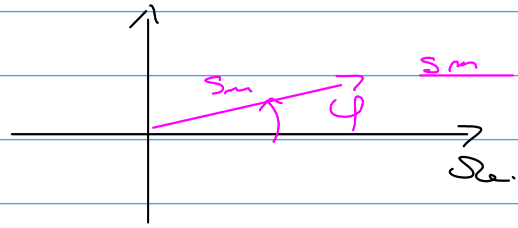
$$\left\{ \boxed{\begin{aligned} \underline{s}(t) &= \underline{s_m}\, e^{j\omega t} \\ \underline{s_m} &= s_m e^{j\varphi} \end{aligned}} \right.$$

amplitude complexe

phase (à l'origine)

Fresnel





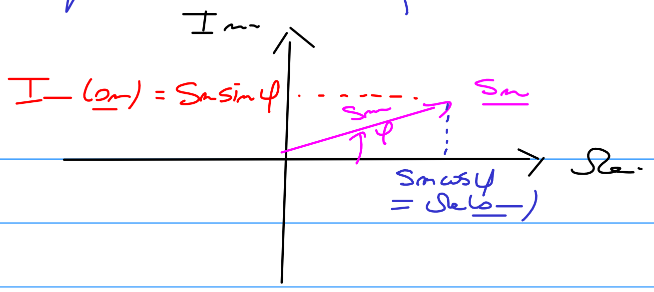
Lien entre les deux représentations :

$$\left(s(t) = \mathrm{Re}(\underline{s}(t)) \right)$$

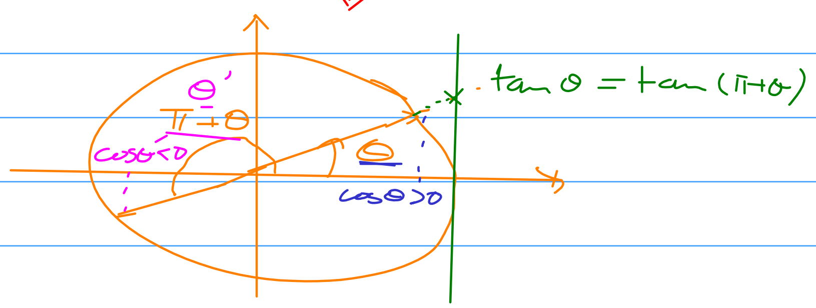
$s_m = |\underline{s}(t)|$ ou

$$\boxed{\begin{aligned} s_m &= |\underline{s_m}| \\ \varphi &= \arg(\underline{s_m}) \end{aligned}}$$

Expression de φ :



$$\boxed{\tan\varphi = \frac{Im(\underline{s_m})}{Re(\underline{s_m})}}$$



$$\varphi = \arctan\left(\frac{Im(\underline{s_m})}{Re(\underline{s_m})}\right)$$
si $\cos\varphi > 0$

$$\varphi = \pi + \arctan\left(\frac{Im(\underline{s_m})}{Re(\underline{s_m})}\right)$$
si $\cos\varphi < 0$

avec $\cos\varphi = \dfrac{Re(\underline{s_m})}{|\underline{s_m}|}$