29.13

① Datos

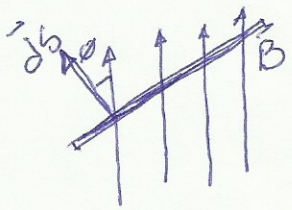
$N = 120$

$a = 1.6\ cm$

$B = 0.075\ T$

$\mathcal{E}_{i\,MAX} = 24\ mV$

② Ilustra el problema.



θ depende del tiempo

$\theta = \omega t$

③ Determinar el flujo

$$\phi_B = \int \vec{B} \cdot d\vec{S}$$

$$\phi_B = \int B \cdot dS \cos\theta$$

$$\phi_B = B\cos\theta \int dS$$

$$\phi_B = B(\cos\theta)S$$

$$\phi_B = Ba^2\cos\theta$$

$$\phi_B = Ba^2\cos\omega t$$

④ $\mathcal{E}_i = -N\dfrac{d\phi_B}{dt}$ $\quad \theta = \omega t$

$$\frac{d\phi_B}{dt} = \frac{d(Ba^2\cos\omega t)}{dt}$$

$$= Ba^2\frac{d(\cos\omega t)}{dt}$$

$$\frac{d\phi_B}{dt} = -Ba^2\omega\,\text{sen}\,\omega t$$

$$\mathcal{E}_i = NBa^2\omega\,\text{sen}\,\omega t$$

⑤ la $\mathcal{E}_{MAX} = NBa^2\omega$, de donde:

$$\omega = \frac{\mathcal{E}_{MAX}}{NBa^2} = \frac{24\cdot10^{-3}}{120\,(1.6\cdot10^{-2})^2(0.075)} = 10.4\ rad/s$$