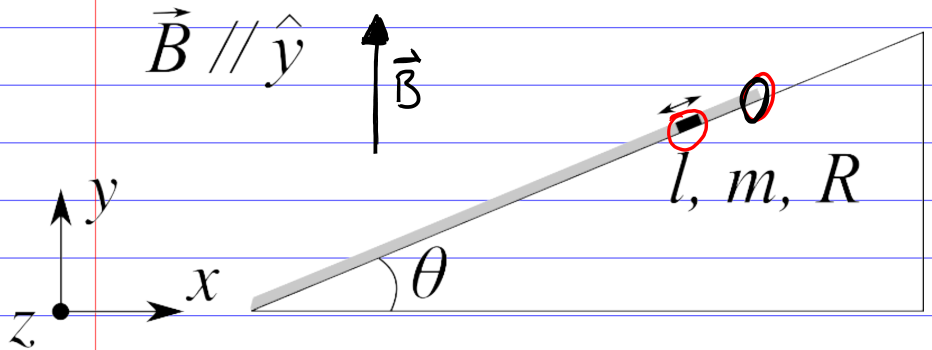
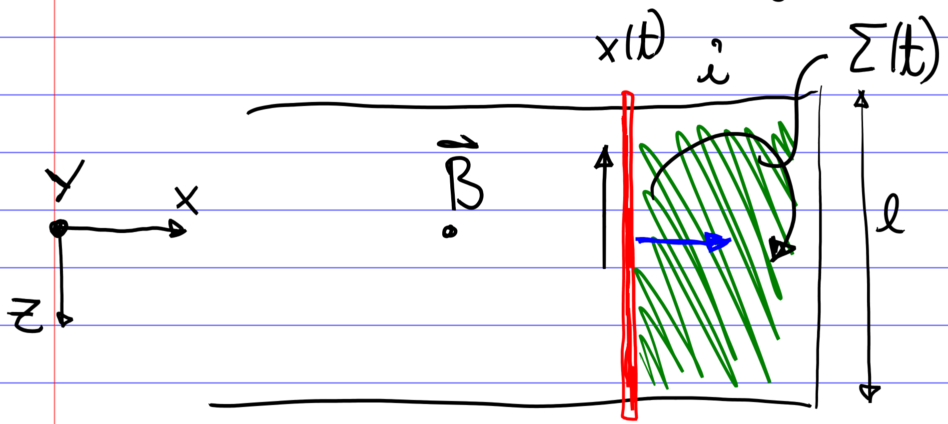


$\theta = 30° = \frac{\pi}{6}$, $l = 10$ cm, $m = 10$ g, $R = 0.1\ \Omega$

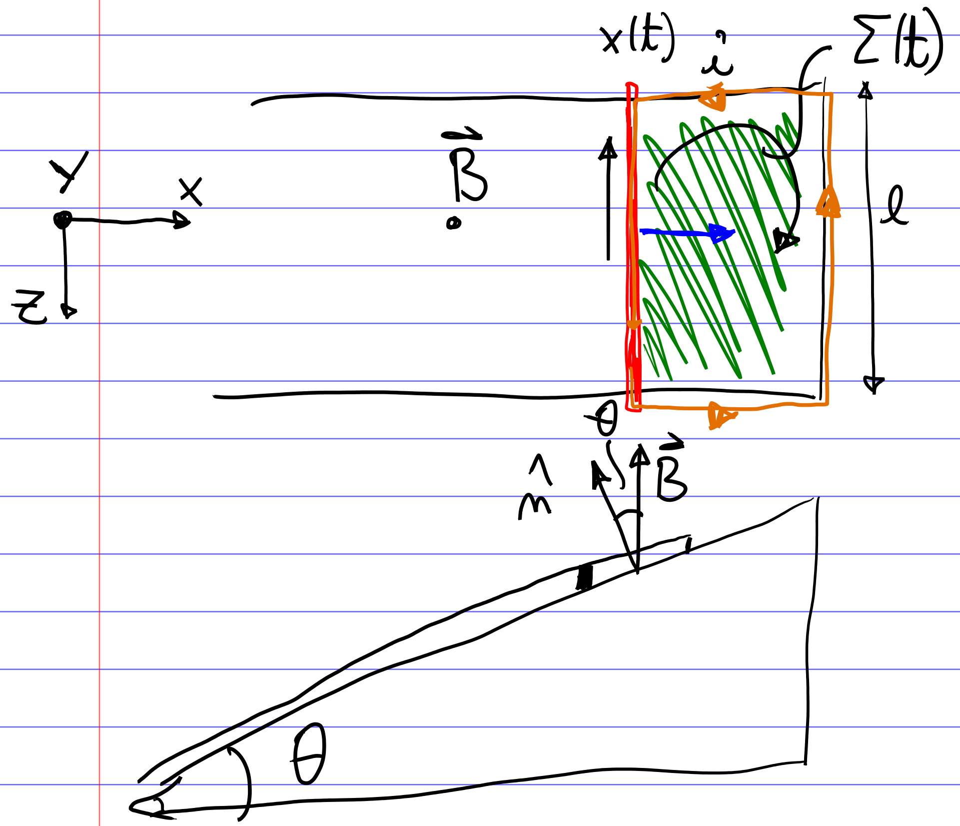
$B = 0.5$ T

① verso e intensità della corrente indotta nella spira formata dalle rotaie + sbarretta

② la velocità limite raggiunta dalla sbarretta



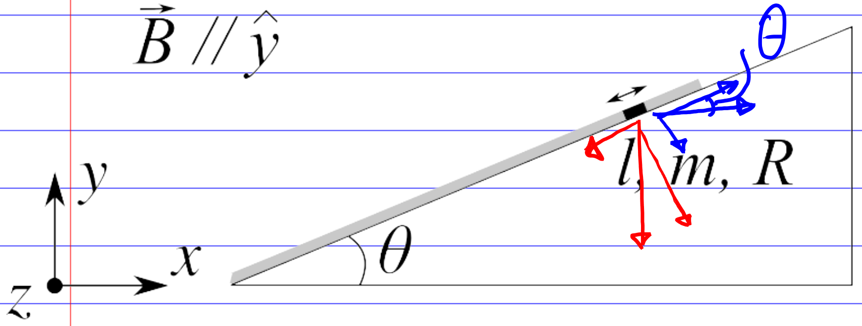
$$\mathcal{E}_i = -\frac{d\Phi}{dt}$$



$$\Phi(B) = \ell\, x(t)\, \vec{B}\cdot\hat{n} = \ell\, x(t)\, B\cos\theta \Rightarrow$$

$$\mathcal{E}_i = -\frac{d\Phi}{dt} = -\ell\, v(t)\, B\cos\theta \Rightarrow$$

$$i = \left|\frac{\mathcal{E}_i}{R}\right| = \frac{\ell\, v(t)\, B\cos\theta}{R}$$

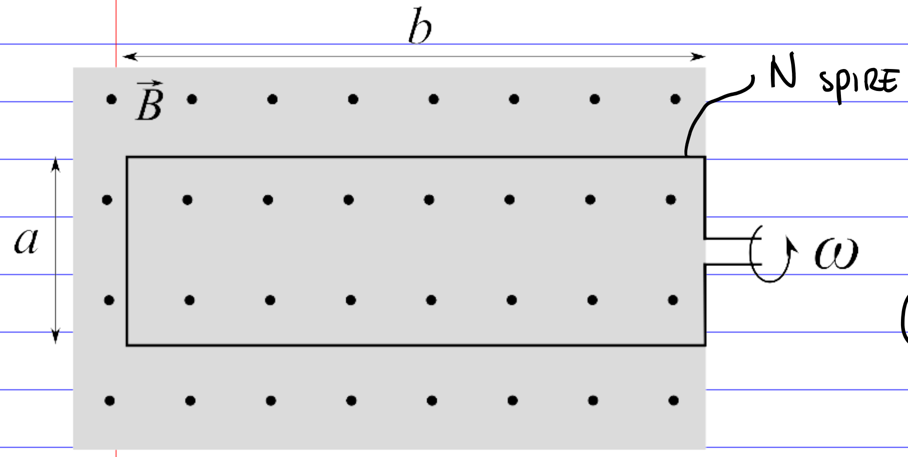


$$F_{pp} = mg \sin\theta$$

$$\vec{F}_m = i\,\vec{l} \times \vec{B} = i l B\,\hat{x} = \frac{l^2B^2}{R}\cos\theta\, v(t)\,\hat{x} \Rightarrow$$

$$F_{mp} = F_m \cos\theta = \frac{l^2B^2}{R}\, v(t) \cos^2\theta \Rightarrow$$

$$mg\sin\theta = \frac{l^2B^2}{R} v_\infty \cos^2\theta \Rightarrow v_\infty = \frac{R m g \,\mathrm{tg}\,\theta}{l^2B^2\cos\theta}$$



, $N = 1000$, $a = 1\,cm$, $b = 5\,cm$, ω, $B = 0.4\,T$

1) $\Phi_0(\vec{B})$ nella configurazione in figura

2) determinare l'espressione del ΔV massimo tra i collettori ΔV_{max}

3) ω: $\Delta V_{max} = 100\,V$

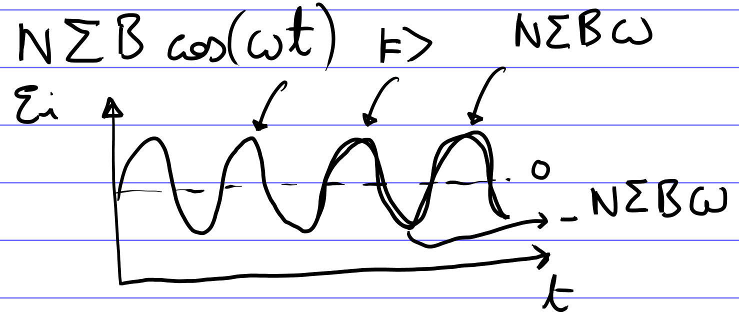
$$\Phi(\vec{B}) = \int_\Sigma \vec{B}\cdot\hat{n}\, d\Sigma = \vec{B}\cdot\hat{n}\int_\Sigma d\Sigma = \Sigma\, \vec{B}\cdot\hat{n} \quad , \quad 1)\ \Phi_0(\vec{B}) = N\Sigma B = N\,a\,b\,B$$

$$\theta = \omega t$$

2) $$\Delta V = \mathcal{E}_i = -\frac{d\Phi(\vec{B})}{dt} \quad , \quad \Phi(\vec{B}) = N\Sigma\, \vec{B}\cdot\hat{n} = N\Sigma B \cos(\omega t) \Rightarrow$$

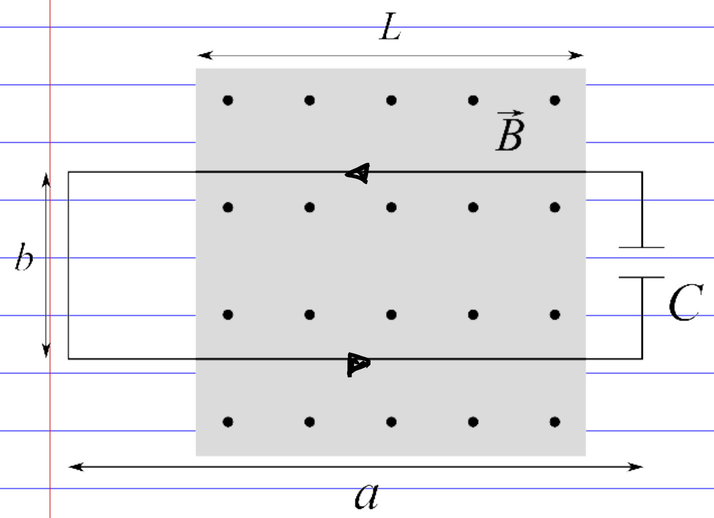
$\mathcal{E}_i = N\Sigma B\omega \underline{\sin\omega t}$ f.e.m. al tempo generico

Il $\sin\omega t$ è massimo quando $\omega t = \frac{\pi}{2}$



$$\Delta V_{max} = N a b B \omega$$

③ Se $\Delta V_{max} = 100\ V$, quanto vale ω, $\quad \omega = \dfrac{\Delta V_{max}}{N a b B}$



$$\vec{B} = B(t)\hat{z} \quad , \quad B(t) = B_0 e^{-t/\tau}$$

determinare segno e quantità di carica $q(t)$ presente sulle armature del condensatore

$$\Phi(\vec{B}) = L b B(t) \Rightarrow$$

$$\frac{d\Phi}{dt} = -\frac{B_0 L b e^{-t/\tau}}{\tau} \Rightarrow$$

$$\mathcal{E}_i = \frac{B_0 L b e^{-t/\tau}}{\tau} \Rightarrow q(t) = C\,\mathcal{E}_i(t)$$