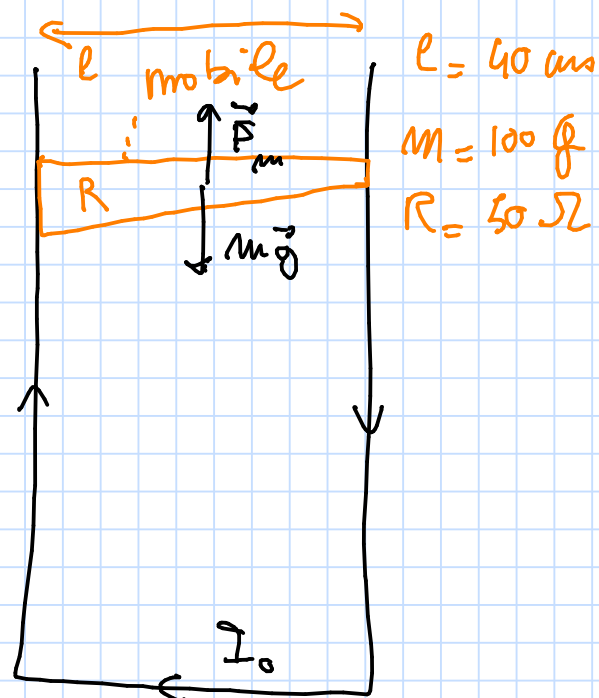
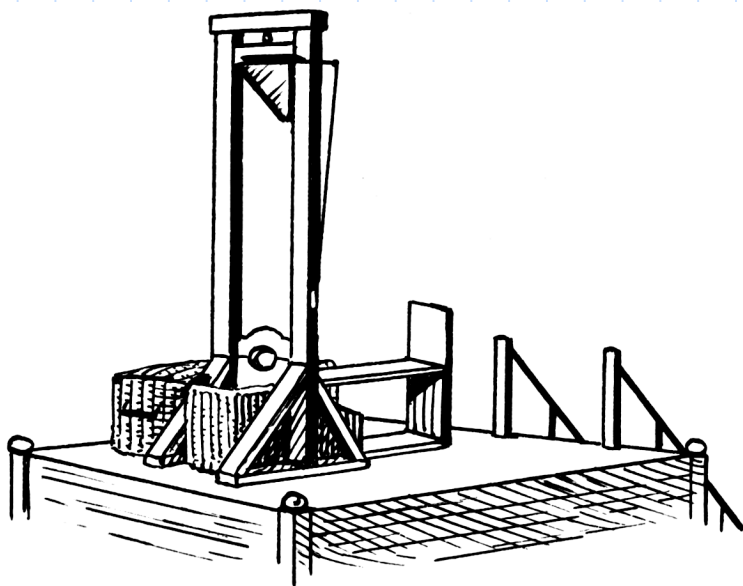
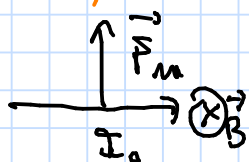




inizio $I_0 = 2.5 \text{ A}$

a) B , orientazione per avere equilibrio



entrante

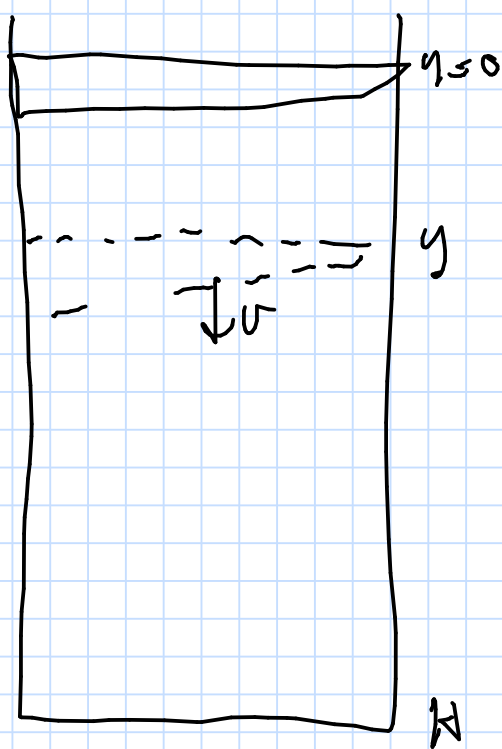
$$P_m = i l B = m g \Rightarrow$$

$$B = \frac{m g}{I_0 l} = \frac{0.1 \text{ kg} \cdot 9.8 \text{ m/s}^2}{2.5 \text{ A} \cdot 0.4 \text{ m}} \approx 0.98 \text{ T}$$

al tempo t_0 : $I_0 = 0$

b) tratto di caduta h necessario perché ceda da t_0 nel sistema ma $q = 10^{16} \text{ e}$

c) velocità angolare, i corrispondente



verso $\boxed{\otimes} \hat{n} \otimes \vec{B}$

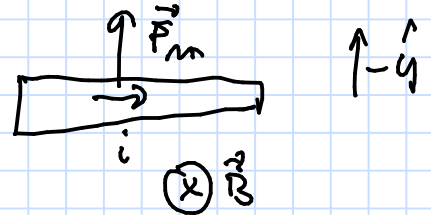
$$\phi(y) = (H-y) l B > 0$$

$$-\frac{d\phi}{dy} = l B \frac{dy}{dt} = l B v > 0$$

$\mathcal{E}_i > 0$ concorde con verso = alto

$\Rightarrow i$ generata in senso orario

$$i = \frac{\mathcal{E}_i}{R}$$



Newton

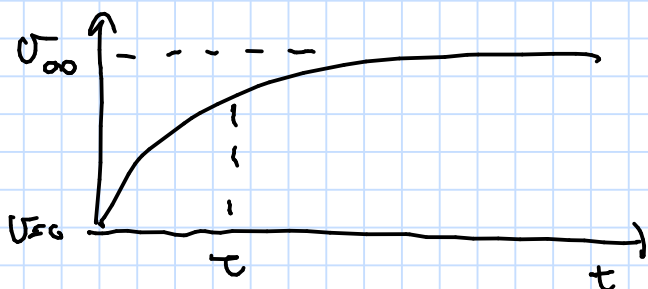
$$\begin{aligned} m \frac{dv}{dt} &= mg - i l B \\ &= mg - \left(\frac{e v B}{R} \right) l B \\ &= mg - \frac{e^2 B^2}{R} v \end{aligned}$$

asintotica v_{∞} quando $\frac{dv}{dt} = 0$

$$\Rightarrow v_{\infty} = \frac{mgR}{B^2 l^2}$$

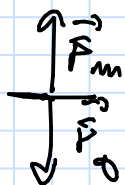
$$\tau = \left(\frac{e^2 B^2}{m R} \right)^{-1} = \left(\beta m g \right)^{-1}$$

$$\begin{aligned} &= \frac{g}{\frac{1}{\tau}} \\ &= 319 \text{ m/s} \quad \text{C)} \end{aligned}$$



$$\text{slitta } v(t) = v_{\infty} [1 - e^{-t/\tau}]$$

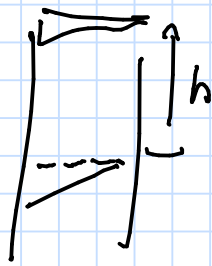
a regime



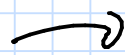
sono uguali, come con I_0

$$v_{\infty} \rightarrow i_{\infty} = I_0 = 2.5 \text{ A} \quad \text{C)}$$

b) Felici



ϕ_0



ϕ_1

$$\Delta\phi = \phi_0 - \phi_1$$

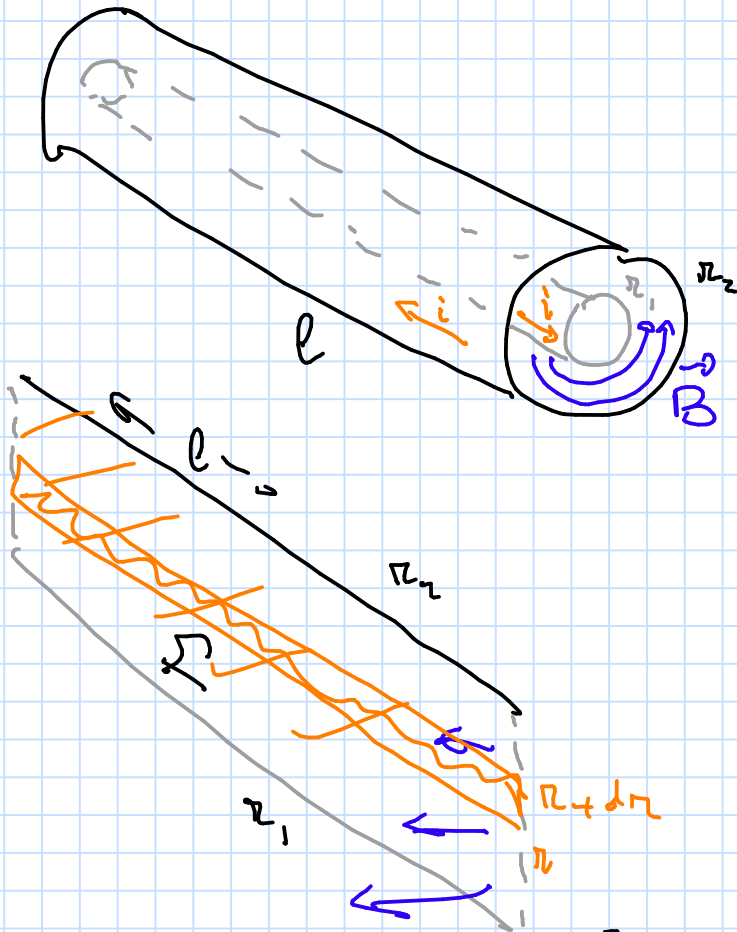
modulo $|q| = \frac{1}{R} |\Delta\phi| = 10^{16} e$

$$\Delta\phi = e h B$$

$$\frac{e h B}{R} = 10^{16} e$$

$$h = \frac{10^{16} e R}{e B} = \frac{10^{16} \cdot 1.6 \cdot 10^{-19} \cdot 50}{0.4 \cdot 0.98} \approx 0.2 \text{ m}$$

Filo coassiale, coeff. di autoinduzione L



$B \neq 0$ solo tra
 r_1 e r_2

B-S
$$B(r) = \frac{\mu_0 i}{2\pi r}$$

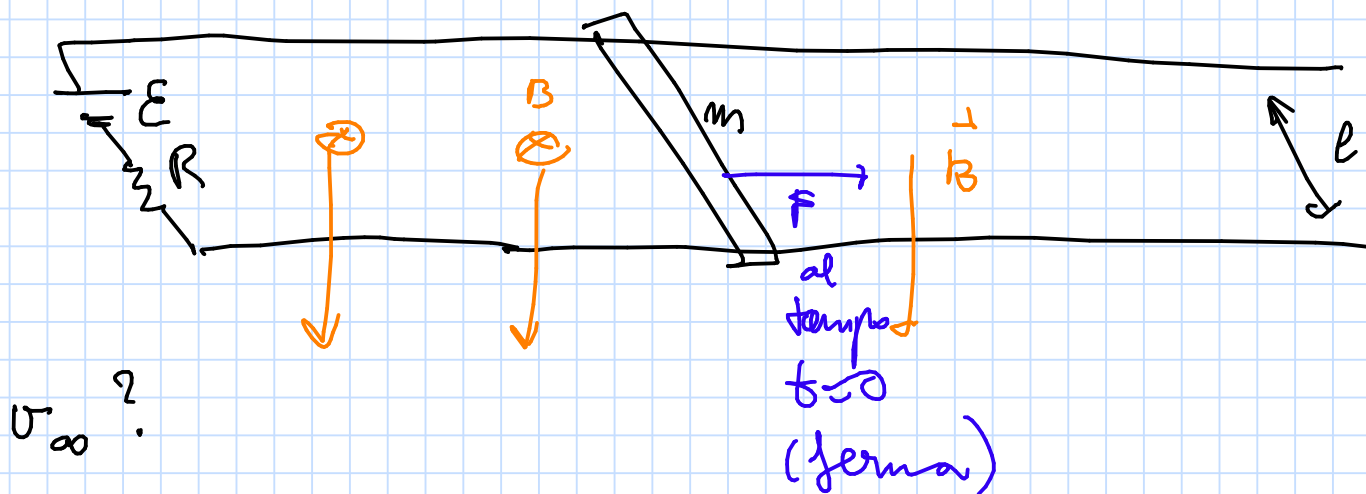
$\Phi_B: Li \Rightarrow L$

$$\begin{aligned}\Phi_B &= \int_S \vec{B}(r) \cdot \hat{n} d\Omega = \int_{r_1}^{r_2} \frac{\mu_0 i}{2\pi} \frac{1}{r} \underbrace{d\Omega}_{l dr} \\ &= \left(\frac{\mu_0 l}{2\pi} \log \frac{r_2}{r_1} \right) i\end{aligned}$$

metodo 2.

$$U_L = \frac{1}{2} L i^2$$

$$U = \int_{vol} \frac{B^2}{2\mu_0} d\tau \quad \dots \quad \text{next week ...}$$



... exercițiul în care ...

$$i = \frac{\mathcal{E} + \mathcal{E}_i}{R} = \left(\mathcal{E} - \frac{Blv}{R} \right) \Rightarrow F_m = i l B = \left(\right) l B$$

la regim $F_m = 0 \Rightarrow \left(\right) = 0$

... v_∞

... $i_\infty = 0$