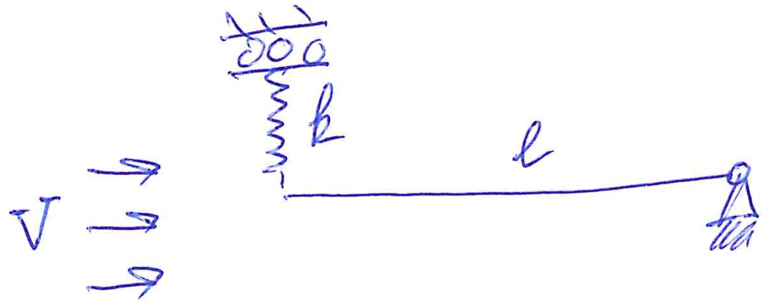
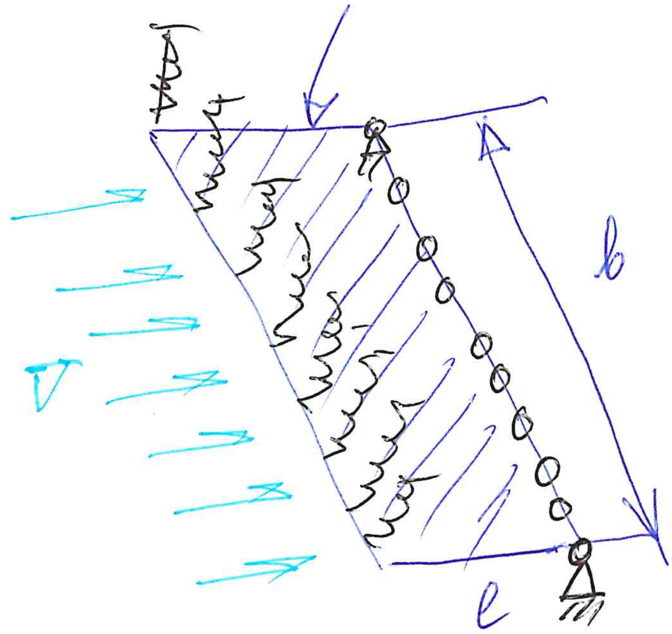
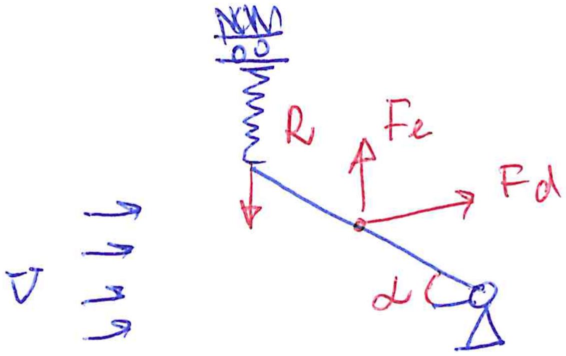
Esempio 1



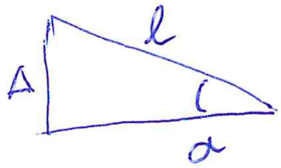
$S = bl$





α – parametro cinematico

1. $R = k\Delta$, $\quad \Delta = l \sin\alpha \Rightarrow R = lk\sin\alpha$

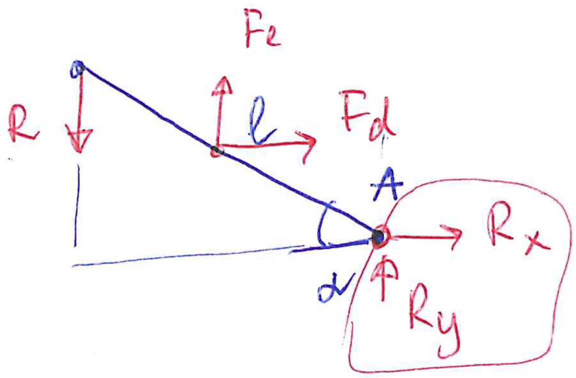


$$\boxed{F_h = \frac{1}{2}\rho_a V^2 D\, C_h}$$

$D = l$

2. $F_d = \frac{1}{2}\rho_a V^2 l\, C_d$

$F_l = \frac{1}{2}\rho_a V^2 l\, C_l$



$\alpha \sim$ l'angolo di attacco

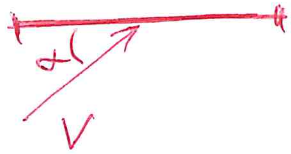
A: il Momento:

$$R\,l\cos\alpha - F_e\frac{l}{2}\cos\alpha + F_d\frac{l}{2}\sin\alpha = 0$$

$F_d \sim C_d$; $C_d = \cancel{C_d} + C_d'\alpha + \dots$

$F_e \sim C_e$; $C_e = \cancel{C_e} + C_e'\alpha$

per simmetria



teoria linearizatta:

$\alpha \ll 1$, $\sin\alpha \to \alpha$, $\cos\alpha \to 1$

$R = kl\alpha$, $F_e = \frac{1}{2}\rho_a V^2 l\, C_e'\alpha$,

$F_d = \frac{1}{2}\rho_a V^2 l\, C_d'\alpha$

l'equazione

$$R\,l - F_e\frac{l}{2}\cdot 1 + F_d\frac{l}{2}\alpha = 0$$

$$k\ell^2\alpha - \frac{1}{2}\rho_a V^2 \ell C_\ell' \alpha \frac{\ell}{2} + \cancel{\frac{1}{2}\rho_a V^2 \ell C_d' \alpha \cdot \frac{\ell}{2}\alpha} = 0$$

$$\left[k\ell^2 - \frac{1}{4}\rho_a V^2 \ell^2 C_\ell'\right]\alpha = 0$$

1. $\alpha = 0$ banale

2. $\alpha \neq 0$ non-banale

$$k\cancel{\ell^2} - \frac{1}{4}\rho_a V^2 \cancel{\ell^2} C_\ell' = 0$$

$$V^2 = \frac{4k}{\rho_a C_\ell'}$$

$$V = V_c = \sqrt{\frac{4k}{\rho_a C_\ell'}}$$

!