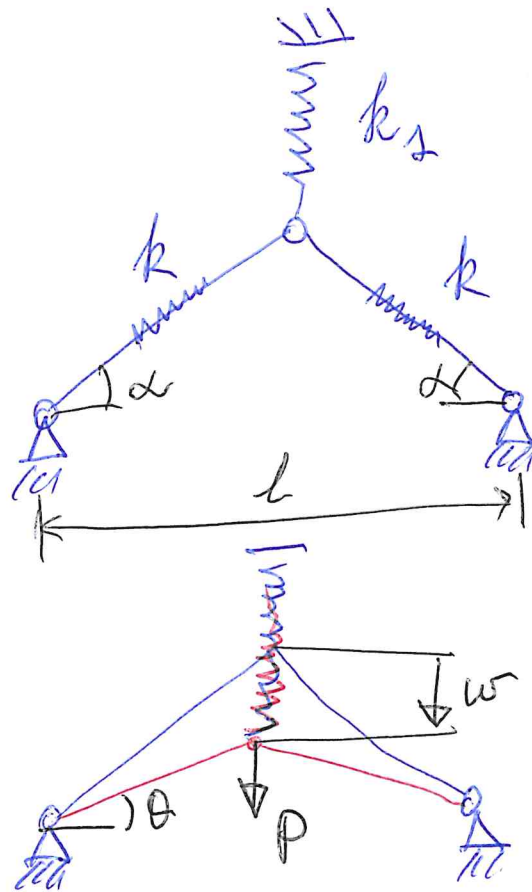
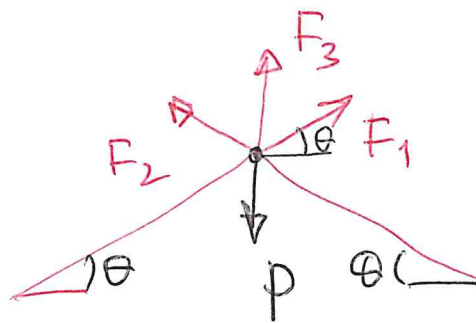


Esempio



Statico:



$$F_1 \cos \theta = F_2 \cos \theta \Rightarrow \underline{F_1 = F_2 = F}$$

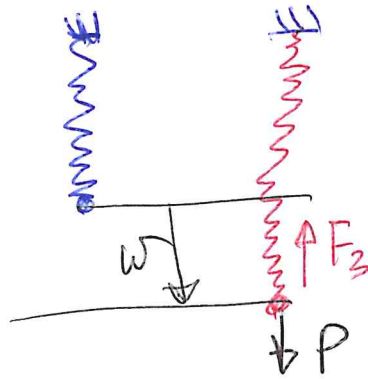
$$F_3 + F_1 \sin \theta + F_2 \sin \theta - P = 0$$

$$P = 2F \sin \theta + F_3$$

$$P = 2F \sin \theta + F_3$$

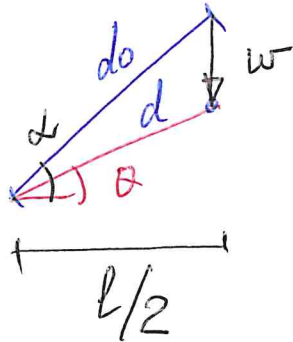
$$F, F_3 - ?$$

$$F_3 :$$



$$F_3 = k_1 \cdot \Delta d$$

$$F :$$



$$\Delta d = \Delta d$$

$$d_0 = ?$$

$$d_0 \cos \alpha = \frac{l}{2}$$

$$d_0 = \frac{l}{2 \cos \alpha}$$

$$d \cos \theta = \frac{l}{2} \Rightarrow$$

$$d = \frac{l}{2 \cos \theta}$$

$$\Rightarrow \Delta d = d - d_0 =$$

$$= \frac{l}{2} \left(\frac{1}{\cos \theta} - \frac{1}{\cos \alpha} \right)$$

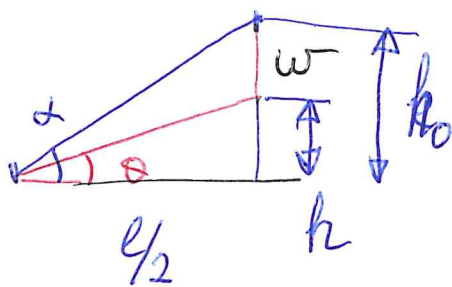
$$F = k \Delta d = \frac{k l}{2} \left(\frac{1}{\cos \theta} - \frac{1}{\cos \alpha} \right)$$

l'equazione di equilibrio :

$$P = 2F \sin \theta + F_3$$

$$P = 2 \frac{k\ell}{2} \left(\frac{1}{\cos \theta} - \frac{1}{\cos \alpha} \right) \sin \theta + k_1 w$$

θ e $w \Rightarrow w(\theta)$



$$w = h_0 - h$$

$$h_0 = \frac{\ell}{2} \tan \alpha$$

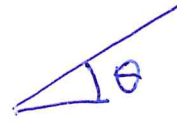
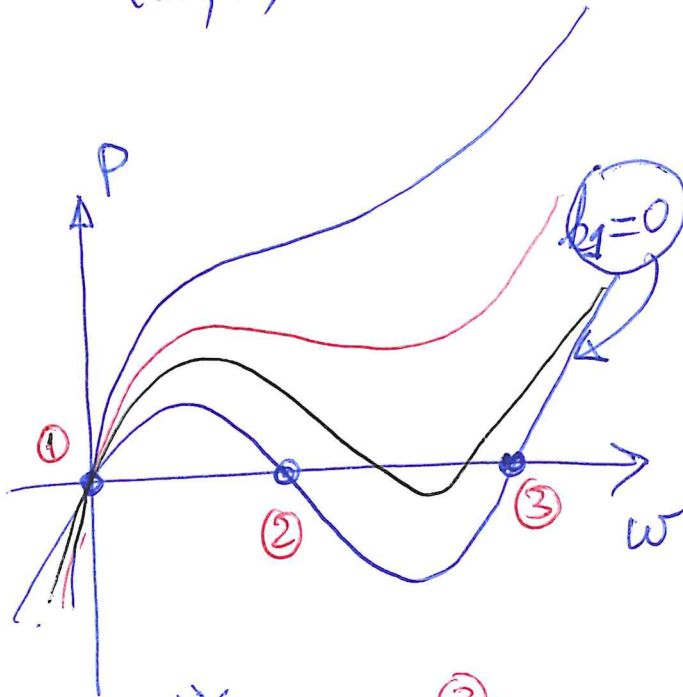
$$h = \frac{\ell}{2} \tan \theta$$

$$b = ? \Rightarrow \underline{b = a \tan \varphi}$$

$$\Rightarrow \begin{cases} w = \frac{\ell}{2} [\tan \alpha - \tan \theta] \\ P = k\ell \left[\frac{1}{\cos \theta} - \frac{1}{\cos \alpha} \right] \sin \theta + \\ + \frac{k_1 \ell}{2} [\tan \alpha - \tan \theta] \end{cases}$$

$$P = P(\theta), \quad w = w(\theta)$$

(w, P)



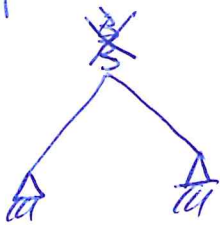
(x, y)

$$\begin{cases} x = x(t) \\ y = y(t) \end{cases}$$

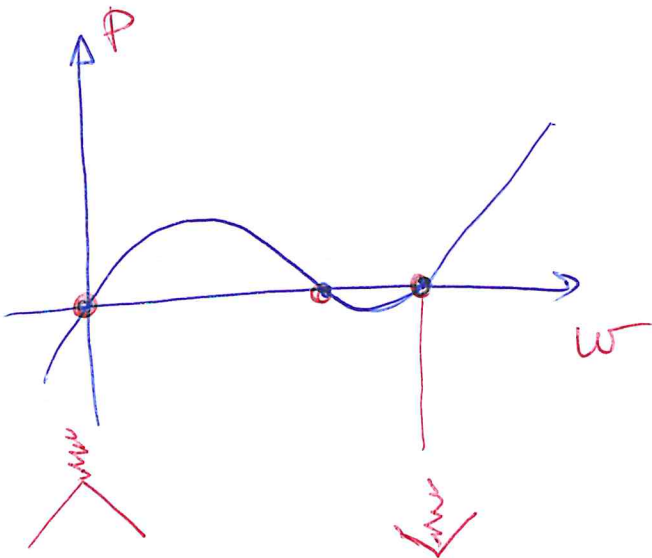
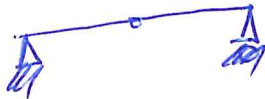
forma parametrico

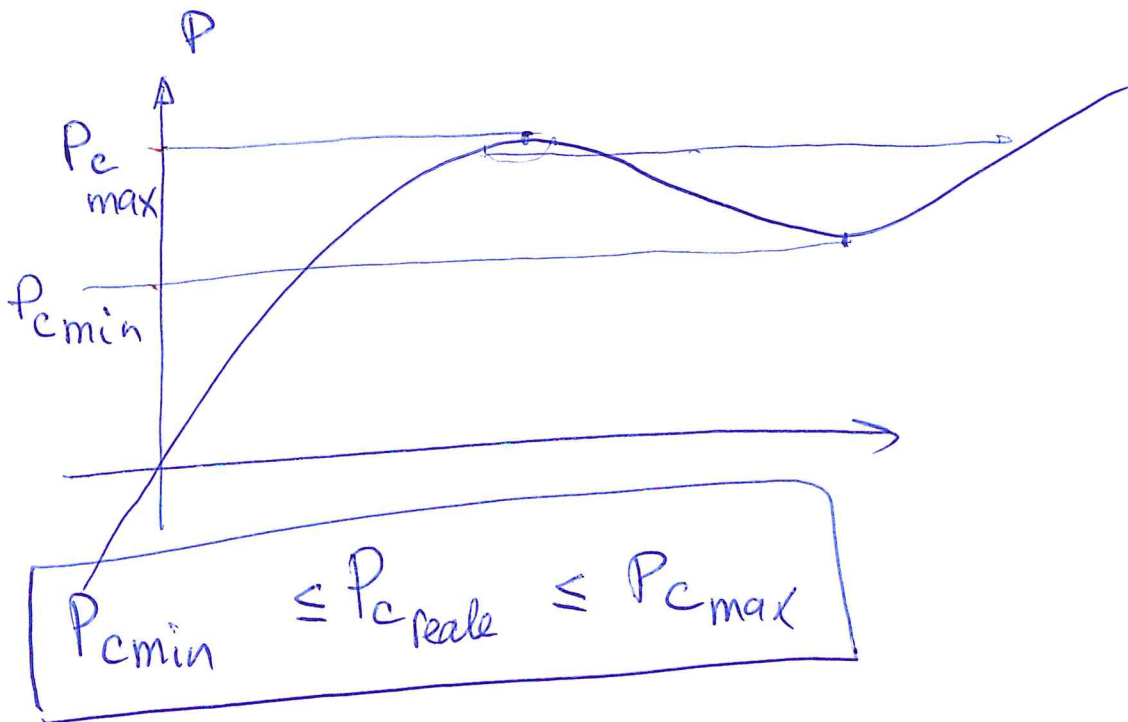
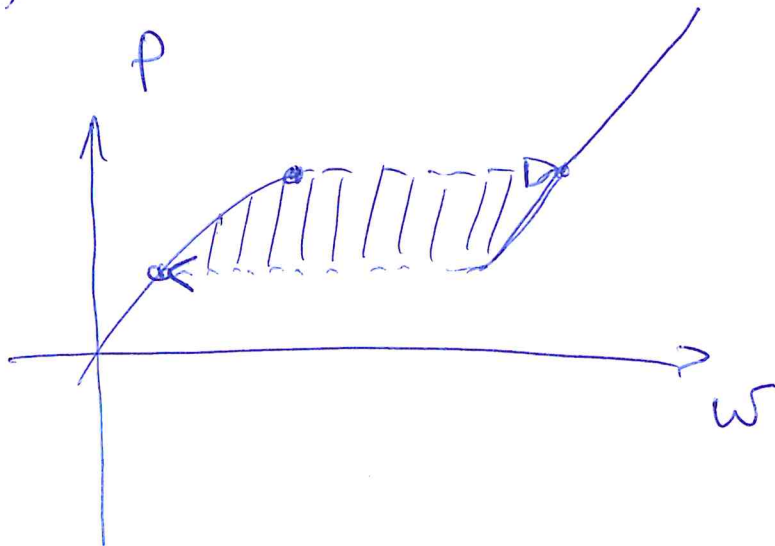
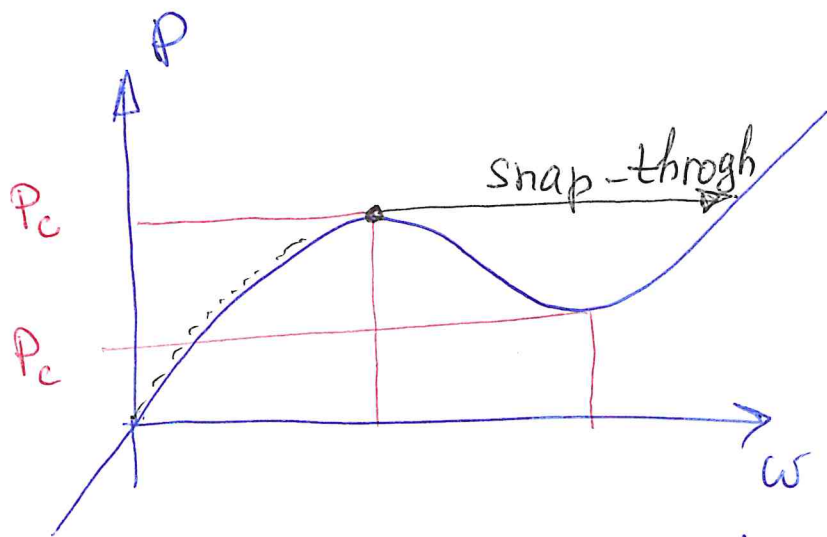
③

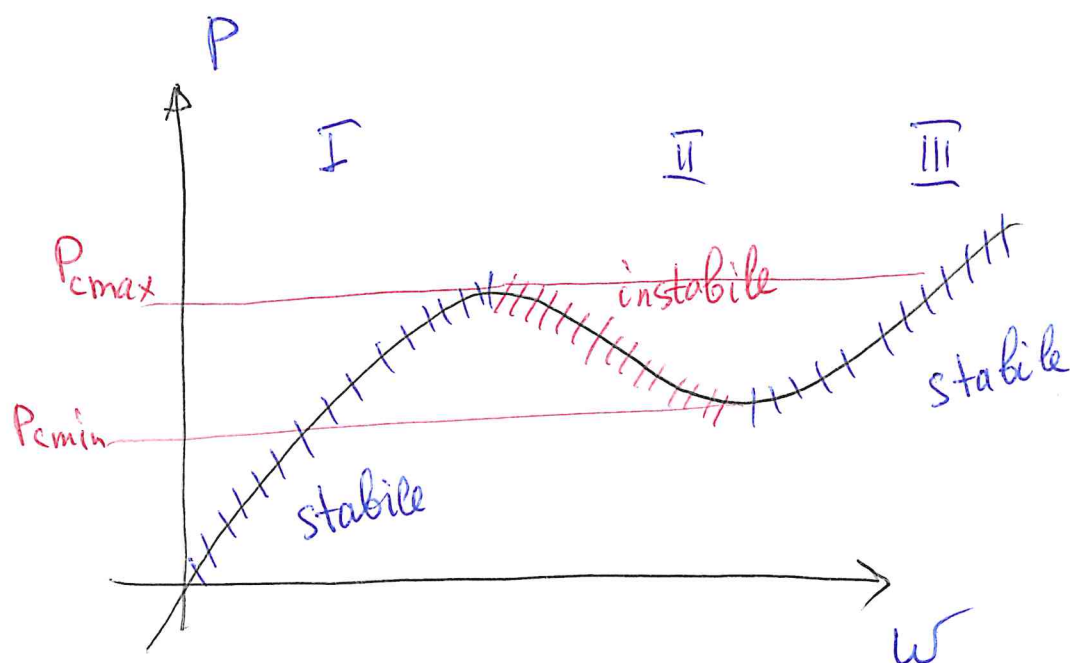
①



②

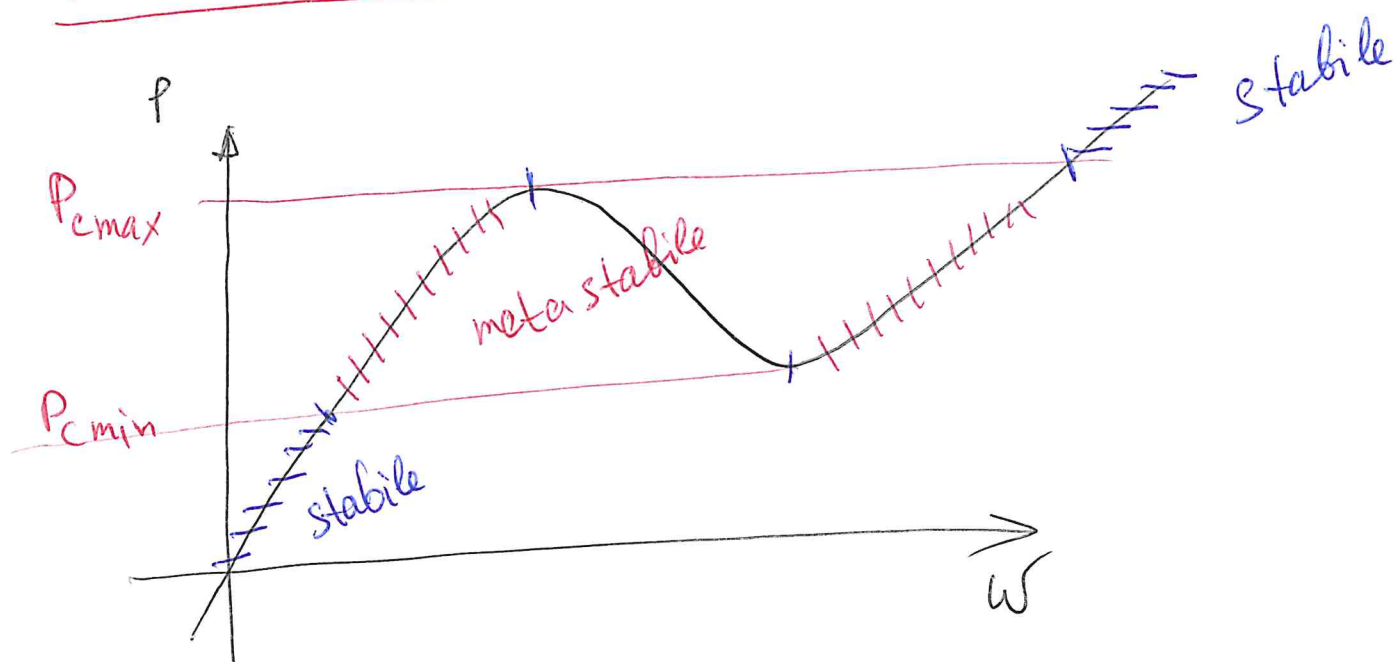




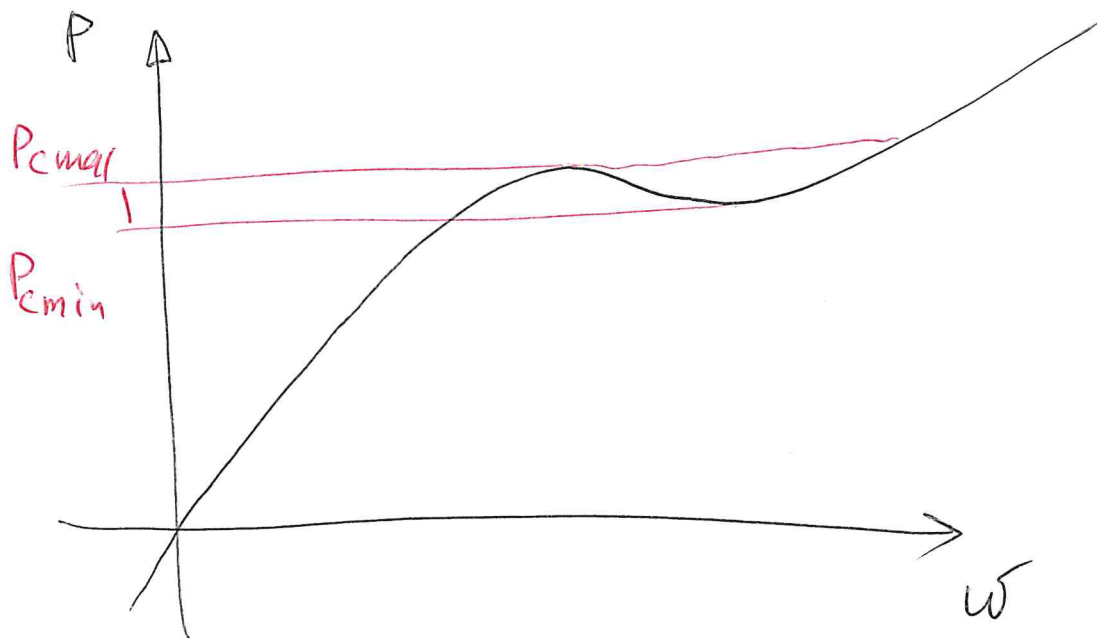


Per stabilità : $\frac{dP}{dw} > 0$

perturbazione infinitesimale



perturbazione finite :



il criterio energetico

$\Pi - ?$

$$\Pi = U - V$$

$$V = P\omega$$

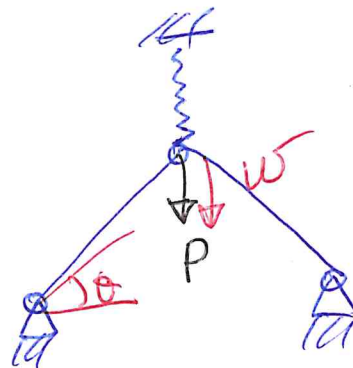
$$U = U_1 + U_2 + U_3$$

$$U_3 = \frac{1}{2} k_1 \underline{\omega^2}$$

$$U_1 = U_2 = U = \frac{1}{2} k (\Delta d)^2$$

$$\Delta d = d - d_0 = \frac{l}{2} \cos \theta - \frac{l}{2} \cos \alpha$$

$$\Pi = k \left[\frac{l}{2} \cos \theta - \frac{l}{2} \cos \alpha \right]^2 + \frac{1}{2} k_1 \omega^2 - P\omega$$



$$\Pi = \Pi(\theta)$$

$$w = w(\theta)$$

$$\frac{d\Pi}{dw} = \frac{d\Pi}{d\theta} \frac{d\theta}{dw} = \frac{d\Pi}{d\theta} \left(\frac{dw}{d\theta} \right)^{-1} \dots$$

$$\frac{d^2\Pi}{dw^2} \gtrless 0 \quad ?$$

ABAQUS

$$\varepsilon = \ln l/l_0$$

Hencky strain

$$F = k \ln d/d_0$$

...