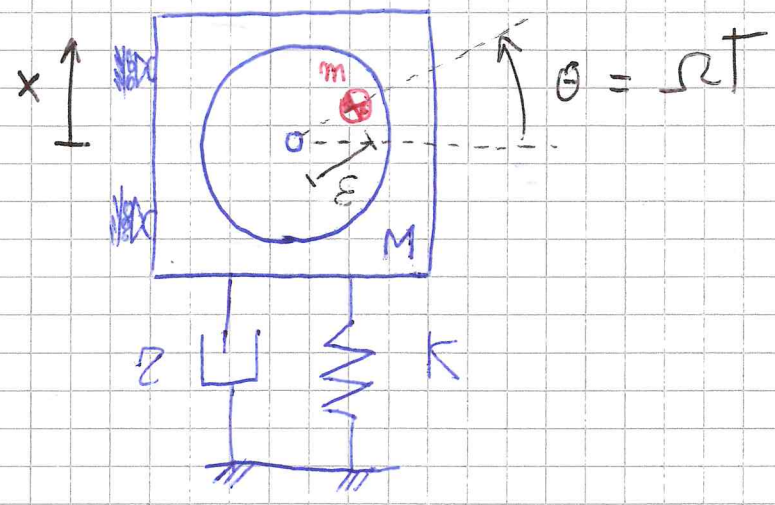
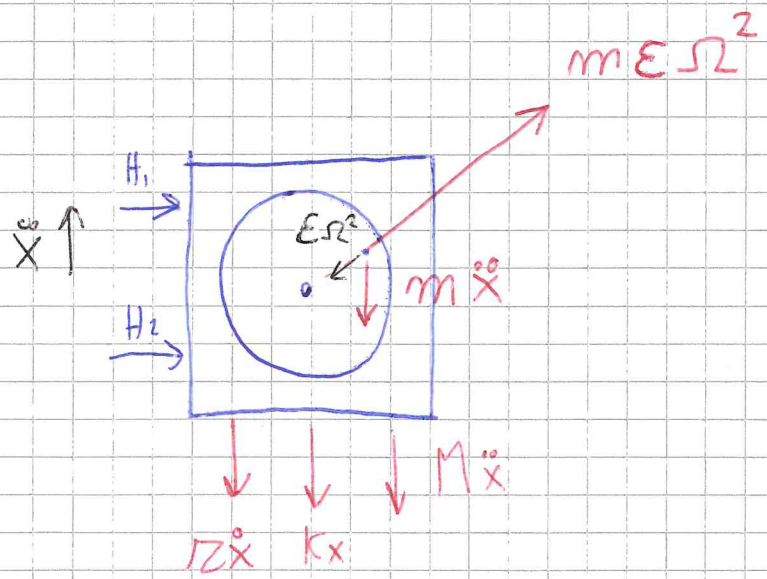
FORZAMENTO PRODOTTO DA UNA MASSA SQUILIBRATA ROTANTE



ε : ECCENTRICITÀ

Ω = VELOCITÀ ANGOLARE COSTANTE

EQUILIBRI DINAMICI



EQUILIBRIO IN DIREZIONE VERTICALE

$$(M+m)\ddot{x} + c\dot{x} + Kx = (m\varepsilon\Omega^2)\sin\Omega t$$

NOTA: LA FORZANTE INERZIALE (FORZA CENTRIFUGA) È PROPORZIONALA A Ω^2 IN MODULO ED HA PULSAZIONE PARI AD Ω

INTEGRALE PARTICOLARE

$$(m+M)\ddot{x} + Z\dot{x} + Kx = m\varepsilon\Omega^2 \sin\Omega T$$

$$= m\varepsilon\Omega^2 \operatorname{Im}(e^{i\Omega T})$$

$$= m\varepsilon\Omega^2 e^{i\Omega T}$$

$$x = X_0 e^{i\Omega T} \xrightarrow{\text{Pol}} x = |X_0| \sin(\Omega T + \varphi)$$

$$\dot{x} = X_0 (i\Omega) e^{i\Omega T}$$

$$\ddot{x} = X_0 (-\Omega^2) e^{i\Omega T}$$

$$\frac{K}{m+M} = \omega^2 \qquad \frac{Z}{m+M} = 2h\omega$$

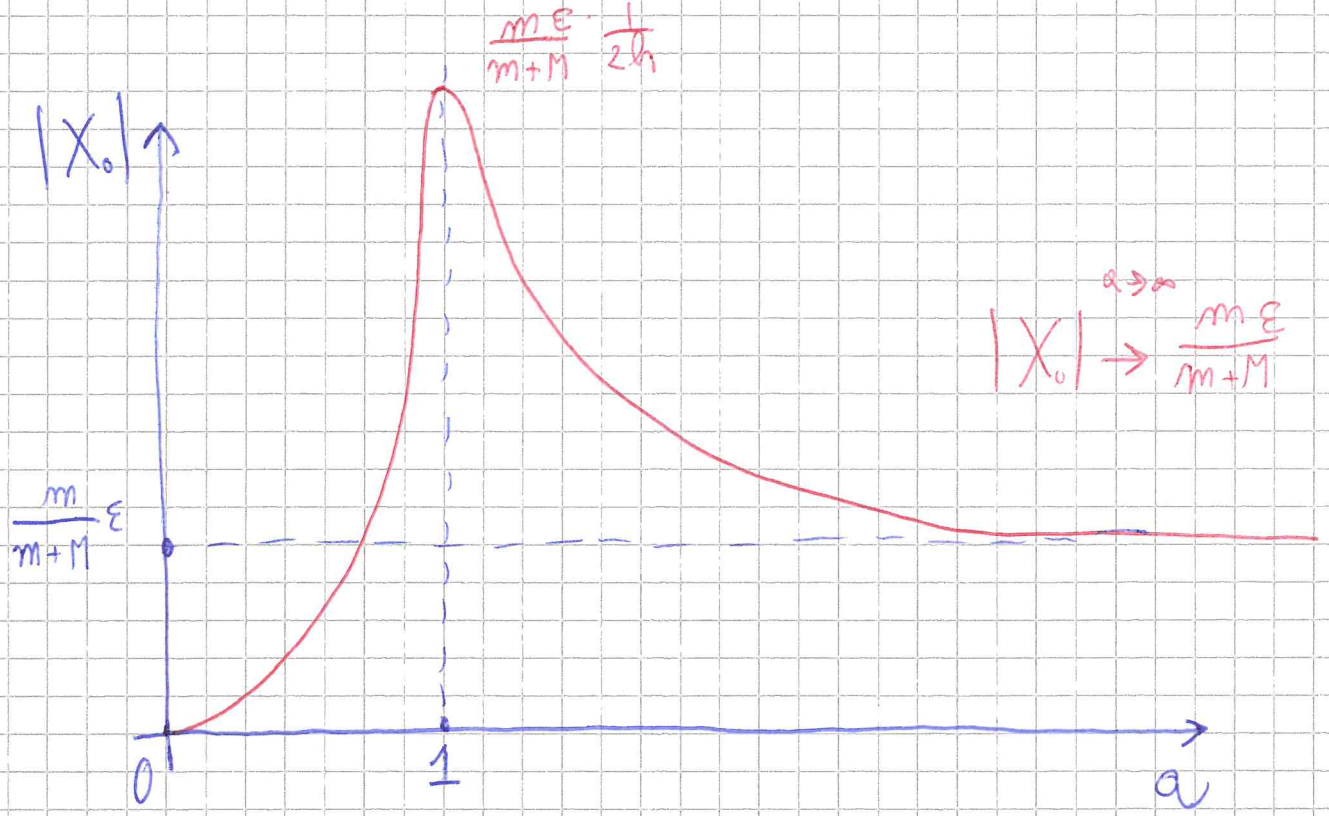
$$\left(-\Omega^2 + i\,2h\omega\Omega + \omega^2\right) X_0 e^{i\Omega T} = \frac{m}{m+M}\varepsilon\Omega^2 e^{i\Omega T}$$

$$a = \frac{\Omega}{\omega}$$

$$\left((1-a^2) + i(2ha)\right) X_0 = \frac{m}{m+M}\varepsilon a^2$$

$$X_0 = \frac{\left(\frac{m}{m+M}\right)\varepsilon\, a^2}{(1-a^2)+i(2h a)}$$

$$|X_0| = \left(\frac{m}{m+M}\right)\varepsilon \sqrt{\frac{a^4}{(1-a^2)^2+(2h a)^2}}$$



$a = 0$

$X_0 = 0$