Importante

Monday, 3 January 2022 15:13

TEOREMI DI RIVALS

$V_B = V_A + \dot{\theta}\underline{k} \times (B-A)$

$a_B = a_A + \ddot{\theta}\underline{k} \times (B-A) - \dot{\theta}^2 (B-A)$

VELOCITÀ RISPETTO AL CIR

$V = \omega R$

TEOREMA DI KÖNIG

$E_c = \frac{1}{2} m v_G^2 + \frac{1}{2} J \omega^2$ VELOCITÀ RIFERITA AL CDM ROTOTRASLAZIONE

TEOREMA DELL' ENERGIA CINETICA

$$\frac{dE_c}{dt} = -W_{IN}$$

$$\frac{d}{dt}\left(\sum \frac{m_i V_i^2}{2} + \sum \frac{J_i \omega_i^2}{2} \right) = \sum m_i g V_i + \sum \Delta P_i S_i V_i + \sum F_i V_i + \sum C_i \omega_i$$

ENERGIA CINETICA DI UN SOLO CORPO

$\boxed{\begin{array}{l} W_c = C\underline{k} \cdot \omega\underline{k} = C\omega \\ W_G = -mg\,a \cdot V_G = -mg V_y \end{array}}$

$$m \bar{v} \cdot \bar{a} + J \omega \dot{\omega} = m \bar{g} \cdot \bar{v} + \Delta P S \bar{M} \cdot \bar{v}_1 + \bar{F} \cdot \bar{v} + C\omega$$

$$m (v_x a_x + v_y a_y) + J \omega \dot{\omega} = m g v_y + \Delta P S (m_x v_x + m_y v_y) + (F_x v_x + F_y v_y) + C\omega$$

PULSAZIONE PROPRIA

$$\omega = \begin{cases} \sqrt{\frac{K^*}{m^*}} & \text{SE } x \text{ LIBERA} \\ \sqrt{\frac{K^*}{J^*}} & \text{SE } \vartheta \text{ LIBERA} \end{cases}$$

COEFFICIENTE DI SMORZAMENTO

$$h = \frac{r^*}{r_c} = \frac{r^*}{2 m^* \omega}$$

FORZANTE ARMONICA (REGIME)

$x_P(t) = \chi_0 \cos(\Omega t + \varphi)$

$\delta_{ST} = F_0 / K$

$$\varphi = \arctan\left(-\frac{r\Omega}{K - m\Omega^2}\right)$$

$$\chi_0 = \frac{F_0}{\sqrt{(K - m\Omega^2)^2 + (r\Omega)^2}} = \frac{\delta_{ST}}{\sqrt{(1-a^2)^2 + 4a^2h^2}}$$

$$\chi_0 = \frac{\delta_{ST}}{2h} \quad \text{SE} \quad \omega = \Omega$$

FORZANTE COSTANTE

$$|\chi_{ST}| = \frac{F_0}{K}$$

Imo PRINCIPIO DINAMICA

(EQUIVALENTI)

$v = \text{cost} \longrightarrow \sum \mathbb{F} = 0 \quad , \quad \frac{\partial E_c}{\partial t} = 0 \quad , \quad a = 0$

ROTAZIONE RELATIVA

SE SISTEMA RUOTA DI Ω

$\omega_{ASS} = \omega_{REL} + \Omega$

EQUAZIONI DI MOTO

$m\ddot{x} + Kx = 0$

$x(t) = A\cos(\omega t) + B\sin(\omega t)$

OMOGENEA

$m\ddot{x} + r\dot{x} + Kx = 0$

$h < 1$: $\quad \vartheta = \frac{r}{2m} \quad \omega_D = \omega\sqrt{1-h^2}$

$x(t) = e^{-\vartheta t}\left[A\cos(\omega_D t) + B\sin(\omega_D t)\right]$

$h = 1$: $\quad \vartheta = -\frac{r}{2m}$

$x(t) = A e^{-\vartheta t} + B \cdot t\, e^{-\vartheta t}$

$h > 1$: $\quad \vartheta_{1,2} = -\frac{r}{2m} \pm \sqrt{\left(\frac{r}{2m}\right)^2 - \frac{K}{m}}$

$x(t) = A e^{-\vartheta_1 t} + B e^{-\vartheta_2 t}$

$m\ddot{x} + r\dot{x} + Kx = F_0$ COSTANTE

$x(t) = x_0(t) + \frac{F_0}{K}$

$m\ddot{x} + r\dot{x} + Kx = F_0 \cos(\omega t)$ ARMONICA

$$X_0 = \frac{F_0}{\sqrt{(K - m\Omega^2)^2 + (\Omega r)^2}}$$

$$\varphi = \arctan\left(-\frac{\Omega r}{K - m\Omega^2}\right)$$

$x(t) = x_0(t) + X_0 \cos(\Omega t + \varphi)$

COEFFICIENTE DI AMPLIFICAZIONE DINAMICA

$$\left|\frac{X_0}{X_{ST}}\right| = \frac{1}{\sqrt{(1-a^2)^2 + (2ha)^2}}$$

MODELLO MTU

$W_1 + W_2 + W_P = 0$

$$W_m - \left.\frac{\partial E_c}{\partial t}\right|_m + W_U - \left.\frac{\partial E_c}{\partial t}\right|_U + W_P = 0$$

$W_K = M_K \omega_K$

$E_c = \frac{J_K \omega_K^2}{2}$

$\frac{\partial E_c}{\partial t} = J_K \omega_K \dot{\omega}_K$

$\eta = \frac{W_2}{W_1} \longrightarrow W_2 = \eta W_1$

$\tau = \frac{\omega_U}{\omega_m} = \frac{\dot{\omega}_U}{\dot{\omega}_m} \longrightarrow \omega_U = \tau \omega_m$

$W_P = -W_1 + W_2 = -(1-\eta) W_1$

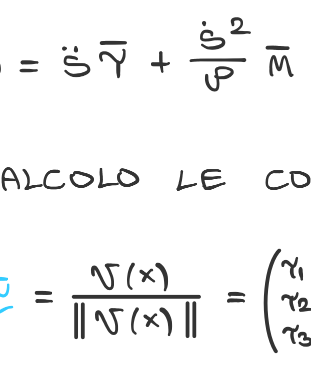
ALLO SPUNTO $M_U = 0$

A REGIME $\dot{\omega}_m = 0$

ROTAZIONE ALBERO MOTORE

$$T = \frac{P}{v} = \frac{2\pi}{\omega_U} \longrightarrow v = \frac{P\omega_U}{2\pi} = \frac{P\tau}{2\pi}\omega_m$$

ROTAZIONE E DIREZIONE (+)



ACCELERAZIONE TANGENZIALE E NORMALE

$$a = \ddot{s}\bar{\tau} + \frac{\dot{s}^2}{\rho}\bar{m}$$

CALCOLO LE COMPONENTI

$$\bar{\tau} = \frac{v(x)}{\|v(x)\|} = \begin{pmatrix} \tau_1 \\ \tau_2 \\ \tau_3 \end{pmatrix}$$

$$\ddot{s} = a \cdot \bar{\tau} = \begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix} \cdot \begin{pmatrix} \tau_1 \\ \tau_2 \\ \tau_3 \end{pmatrix}$$

$$m = \bar{\tau} \times \bar{k} = \begin{vmatrix} \bar{i} & \bar{j} & \bar{k} \\ \tau_1 & \tau_2 & \tau_3 \\ 0 & 0 & 1 \end{vmatrix} = \begin{pmatrix} m_1 \\ m_2 \\ m_3 \end{pmatrix}$$

$$\frac{\dot{s}^2}{\rho} = a \cdot \bar{m} = \begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix} \cdot \begin{pmatrix} m_1 \\ m_2 \\ m_3 \end{pmatrix}$$