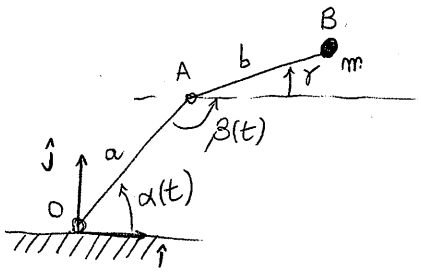
MECCANICA APPLICATA ALLE MACCHINE

SITO GUIGGIANI x ESERCIZI

CALLEGARI PELUCANO FANGHELLA

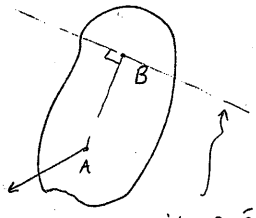
MATHEMATICA WOLFRAM



$\dot{\alpha} = \omega_1$ costanti

$\dot{\beta} = \omega_2$

$\underline{V}_B = \underline{V}_A + \underline{\omega} \wedge \underline{AB}$



V_B può differire da V_A solo x una componente su questa retta

ω è una caratteristica del corpo

$\vec{V}_A = \dot{\alpha}\hat{k} \wedge \vec{OA}$ (1)

$\underline{V}_B = \underline{V}_A + (\dot{\alpha}+\dot{\beta})\hat{k} \wedge \underline{AB}$

ω assoluta

$\underline{V}_B = \underline{V}_B^{\,t} + \underline{V}_B^{\,r} = \dot{\alpha}\underline{k} \wedge (\underline{OB'}) + \dot{\beta}\hat{k} \wedge \underline{AB}$ (2) con rif solidale a α

punto del sis di rif coincidente con B all'istante $= OB$

prendo un sis di rif con origine A e assi $\parallel$ ai fissi

$\underline{V}^t = \underline{V}_A = \dot{\alpha}\underline{k} \wedge \underline{OA}$

$\underline{V}^r = (\dot{\alpha}+\dot{\beta})\underline{k} \wedge \underline{AB}$

dim che (1) = (2)

$(2) = \dot{\alpha}\hat{k} \wedge (\underline{OA} + \underline{AB}) + \dot{\beta}\hat{k} \wedge \underline{AB} = \dot{\alpha}\hat{k} \wedge \underline{OA} + (\dot{\alpha}+\dot{\beta})\hat{k} \wedge \underline{AB}$

$$\begin{cases} x_B = a\cos\alpha + b\cos(\alpha+\beta-\pi) = a\cos\alpha + b\cos\gamma \\ y_B = a\,\mathrm{SEN}\alpha + b\,\mathrm{SEN}(\alpha+\beta-\pi) = a\,\mathrm{SEN}\alpha + b\,\mathrm{SEN}\gamma \end{cases}$$

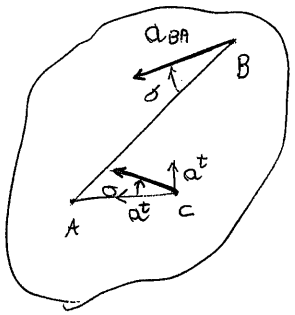
γ $\quad \dot{\gamma} = \dot{\beta} + \dot{\alpha}$

se $\dot{\alpha} = -\dot{\beta}$ B ha una traiettoria CIRCOLARE

t. di Rivals $\quad \underline{a}_B = \underline{a}_A + \underline{a}_{BA} = \underline{a}_A + \underline{a}_{BA}^{\,n} + \underline{a}_{BA}^{\,t} =$

$= \underline{a}_A - \omega^2 \underline{AB} + \dot{\omega}\hat{k} \wedge \underline{AB}$ nel piano

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acc. di B rispetto ad A

σ è lo stesso per i vari punti $\quad \sigma = 0 \iff \dot{\omega} = 0$

$$tg(\sigma) = \frac{\dot{\omega}}{\omega^2}$$

prendendo σ orario e $\dot{\omega}$ positivo

$$a_P = a_P^{tr} + a_P^{r} + a_P^{co}$$

$\downarrow$ a_A $\qquad$ $\updownarrow$ per ~~ipotesi~~ centrato in A

$$a_B = -\dot{\alpha}^2 \underline{OA} + \ddot{\alpha}\hat{k} \wedge \underline{OA} - (\dot{\beta} + \dot{\alpha})^2 \underline{AB} + (\ddot{\beta} + \ddot{\alpha})\hat{k} \wedge \underline{AB} \quad (1) \text{ risolvo}$$

deve essere uguale a

~~$A(\dot{\alpha})^2 \underline{OB} + (\beta + \dot{\alpha})\hat{k} \wedge \underline{OB}$~~

trascinamento rel coriolis

$$-\dot{\alpha}^2 \underline{OB} + \ddot{\alpha}\hat{k} \wedge \underline{OB} - \dot{\beta}^2 \underline{AB} + \ddot{\beta}\hat{k} \wedge \underline{AB} + 2\dot{\alpha}\hat{k} \wedge (\dot{\beta}\hat{k} \wedge \underline{AB})$$

per il sis di rif solidale a a

$$= -\dot{\alpha}^2 \underline{OA} - \dot{\alpha}^2 \underline{AB} + \ddot{\alpha}\hat{k} \wedge \underline{OA} + \ddot{\alpha}\hat{k} \wedge \underline{AB} - \dot{\beta}^2 \underline{AB} + \ddot{\beta}\hat{k} \wedge \underline{AB} + -2\dot{\alpha}\dot{\beta}\underline{AB} \quad (2)$$

(1) = (2) ✓

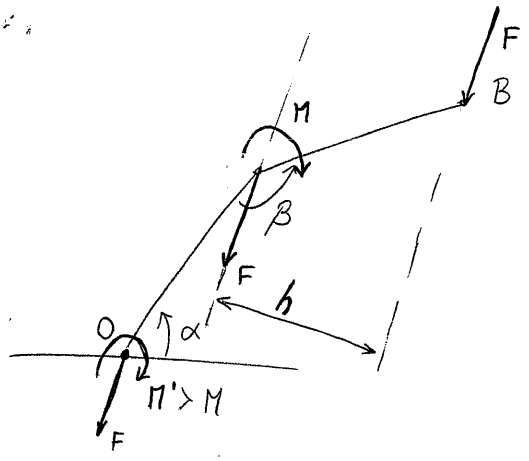
$\underline{V}$ = vettore **libero** $\qquad$ QDM = vettore applicato

$\underline{Q} = m\underline{V}$ ↖ rende il vett. applicato

$\underline{F} = m\underline{a}$ $\qquad$ $\underline{a}$ = libero

$\underline{F}$ = applicato alla massa

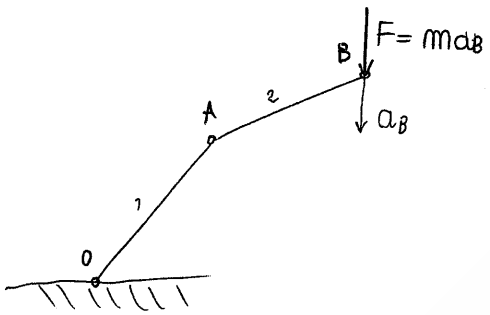
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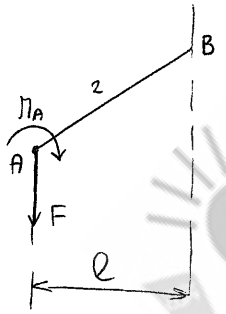


voglio che B abbia accelerazione a_B

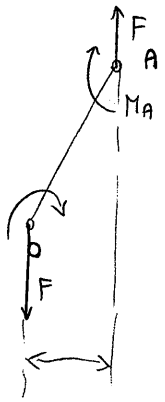
in A dovrà dare una forza e un momento

$M = F \cdot h$





$M_A = F\ell$



$M_O = F \cdot q + M_A = F(\ell + q)$

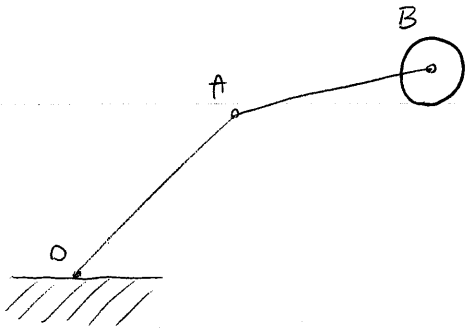
F

equivalente a una forza F applicata in B

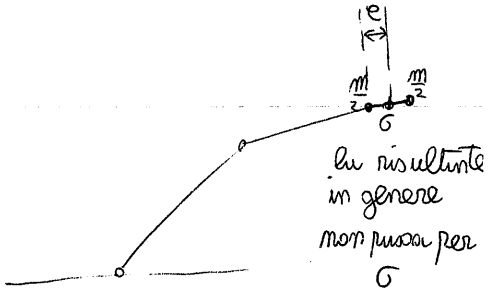
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sostituisco m con un disco della stessa massa

$F = m a_G$ ma la forza non è applicata in G sarà spostata rispetto a G in modo da dare un α al corpo



equivalente a

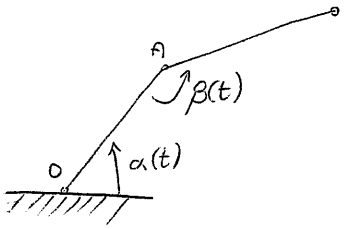


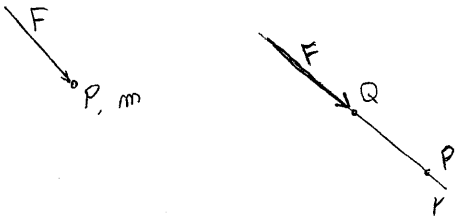
la risultante in genere non passa per G

$J = 2 \cdot \frac{m}{2} e^2$

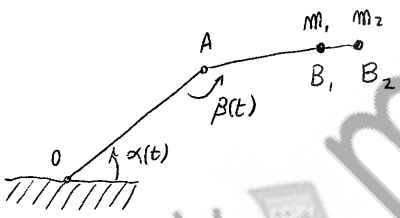
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MAM





$\underline{QP} \wedge \underline{F} = 0$

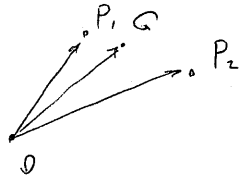


$\underline{F}_1$	m_1	$\underline{F}_1 = m_1 \underline{a}_1$	B_1
$\underline{F}_2$	m_2	$\underline{F}_2 = m_2 \underline{a}_2$	B_2

- I cord.

$$\underline{F}_1 + \underline{F}_2 = m_1 \underline{a}_1 + m_2 \underline{a}_2$$

baricentro



definisco

$$\underline{OG} = \frac{\underline{OP}_1 \cdot m_1 + \underline{OP}_2 \cdot m_2}{m_1 + m_2} \qquad m = m_1 + m_2$$

$$m \underline{a}_G = m_1 \underline{a}_1 + m_2 \underline{a}_2$$

$$\underline{R} = \underline{F}_1 + \underline{F}_2 \qquad \boxed{\underline{R} = m \underline{a}_G}$$



a_G è la stessa

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