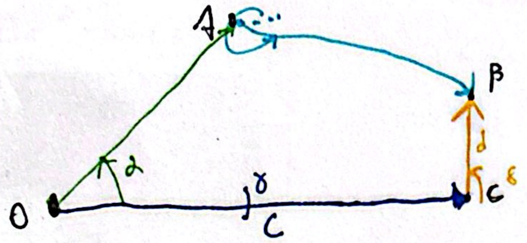


$a = 1m$ $\quad \alpha = 45°$ $\quad \dot\alpha = -2\,rad/s$ $\quad \ddot\alpha = -1\,rad/s^2$

$b = 2m$ $\quad \beta = 345°$ $\quad \dot\beta, \ddot\beta \neq 0$

$c = \_$ $\quad \gamma = 0°$ FISSO

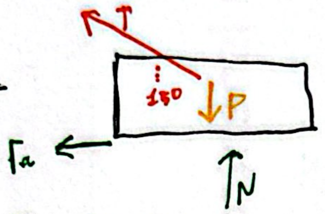
d, δ FISSI

$$\begin{cases} a\cos\alpha + b\cos\beta = c + d\cos\delta \\ a\sin\alpha + b\sin\beta = d\sin\delta \end{cases} \rightarrow \begin{cases} -a\dot\alpha\sin\alpha - b\dot\beta\sin\beta = \dot c \\ a\dot\alpha\cos\alpha + b\dot\beta\cos\beta = 0 \end{cases} \qquad \begin{cases} \dot c = 0{,}897\,m/s \\ \dot\beta = 0{,}366\,rad/s \end{cases}$$

$$\begin{cases} -a\ddot\alpha\sin\alpha - a\dot\alpha^2\cos\alpha - b\ddot\beta\sin\beta - b\dot\beta^2\cos\beta = \ddot c \\ a\ddot\alpha\cos\alpha - a\dot\alpha^2\sin\alpha + b\ddot\beta\cos\beta - b\dot\beta^2\sin\beta = 0 \end{cases} \qquad \begin{cases} \ddot c = 0{,}101\,m/s^2 \\ \ddot\beta = 0{,}696\,rad/s^2 \end{cases}$$

$\vec v_M = \dot c\,\hat x = (0{,}897\,\hat x)\,m/s$ $\quad \vec a_M = \ddot c\,\hat x = (0{,}101\,\hat x)\,m/s^2$

! MOTO RETTILINEO $\Rightarrow a_M^{(n)} = 0$

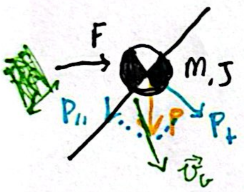


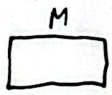
$\rightarrow v$

$\rightarrow a$

$$\begin{array}{l} x \\ \\ y \end{array}\begin{cases} -Fa - T\cos(15) = M a_M \quad (\mu N) \\ N + T\sin(15) - Mg = 0 \end{cases}$$

$\rightarrow$ $T = -22{,}57\,N$ $\qquad N = 103{,}94\,N$ $\qquad Fa = 20{,}79\,N$





(VEDI DISEGNO PRECEDENTE)

$\vec v_G = \vec v_0 + \vec{\dot\alpha} \times (G - O)$ $\quad |v_G| = \dot\alpha\, a/2 = 0{,}5\,m/s$ $\quad a_G = a_0 + \vec{\ddot\alpha} \times (G-O) - \dot\alpha^2 (G-O)$ $\quad |a_G^{(c)}| = \dot\alpha\, a/2 = 0{,}5\,m/s^2$

$\frac{d}{dt}K = M v_G a_G + J\dot\alpha\ddot\alpha + M v_M a_M = 1{,}61\,W$

$\vec v_G = \cancel{\vec v_0} + \dot\alpha\hat k \times \frac{a}{2}(\cos(45)\hat x + \sin(45)\hat y)$

$= -\frac{a}{2}\,(\hat k \times \hat x\, \frac{\sqrt{2}}{2} + \hat k \times \hat y \cdot \frac{\sqrt{2}}{2})$
$0{,}5$

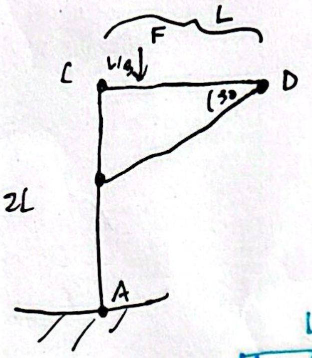
$= 0{,}5\,(+\frac{\sqrt{2}}{2}\hat x - \frac{\sqrt{2}}{2}\hat y)$

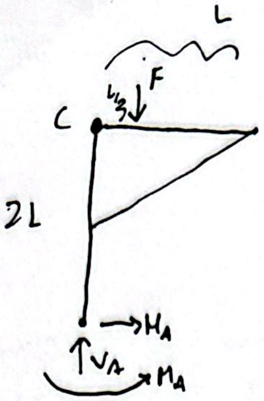
$\sum P = \vec P_{//} \cdot \vec v_G + \vec F \cdot \vec v_G + - Fa \cdot v_B$

$= mg\, v_G\cos(\alpha) + F v_G \cos(\alpha + 180°) - Fa\, v_B$

$F = 37{,}68\,N$

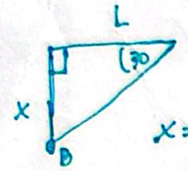
$n = 3\cdot 3 - (3_A + 2_C + 2_D + 2_B) = 0$:-)



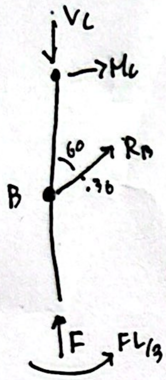


$$M_C \begin{cases} H_A = 0 \\ V_A = F \\ -F\cdot L/3 - (2L H_A) + M_A = 0 \end{cases}$$

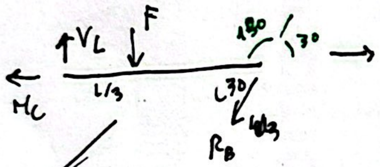
$H_A = 0 \quad V_A = F \quad M_A = FL/3$

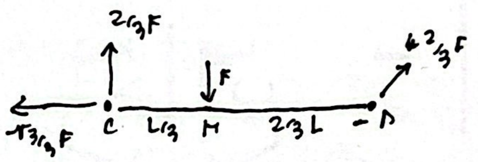


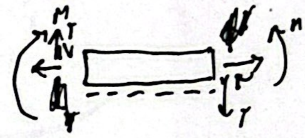
$x = L\cdot\cos(30) = \sqrt{3}/3\, L$

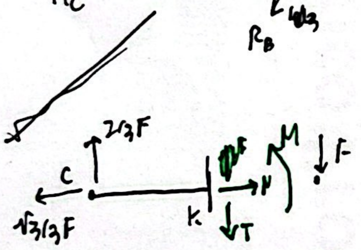


$$M_B \begin{cases} H_C + R_B \cos(30) = 0 \\ -V_C + R_B \sin(30) + F = 0 \\ FL/3 - \frac{\sqrt{3}}{3} L H_C = 0 \end{cases} \qquad \begin{cases} R_B = -2/3\, F \\ V_C = 2/3\, F \\ H_C = \sqrt{3}/3\, F \end{cases}$$

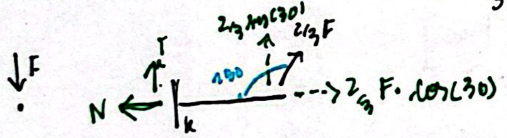






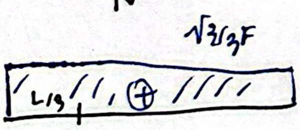


$$M_K \begin{cases} N = \sqrt{3}/3\, F \\ T = 2/3\, F \\ M = \frac{2}{3} F x \end{cases} \quad M(0) = 0 \quad M(L/3) = \frac{2}{9} FL$$

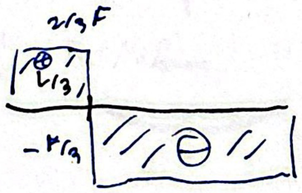


$$M_K \begin{cases} N = \sqrt{3}/3\, F \\ T = -F/3 \\ -M + \frac{2}{3} F x \cdot \sin(150) = 0 \end{cases} \quad M(0) = 0 \quad M(2/3\, L) = \frac{2}{9} F\cdot$$

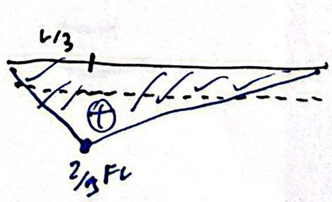
N

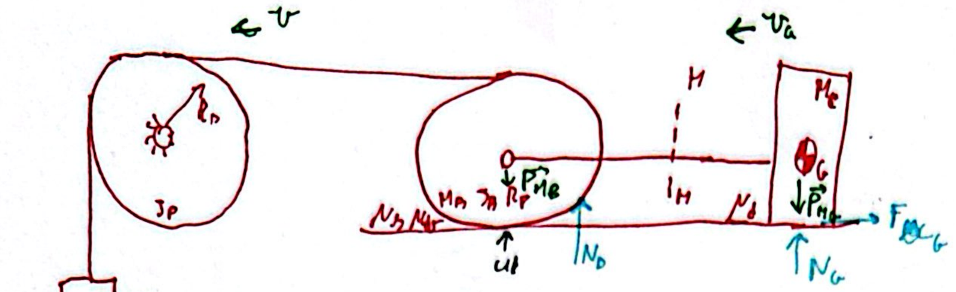


T



M





LEGAMI CINEMATICI

$$\begin{cases} \omega_p = \tau \omega_m \quad \dot\omega_p = \tau \dot\omega_m \\ v = \cancel{v_P} + \omega_v R_p = \tau R_p \omega_m \quad a^{(t)} = \tau R_p \dot\omega_m \\ v = \cancel{v_{A/R}} + 2R_B \omega_B \rightarrow \omega_B = \tau \dfrac{R_p}{2R_B}\omega_m \quad \dot\omega_B = \tau \dfrac{R_p}{2R_B}\dot\omega_m \\ v_G = \cancel{v_{A/R}} + R_B\omega_B = \tau \dfrac{R_p}{2}\omega_m \quad a_G^{(t)} = \tau\dfrac{R_p}{2}\dot\omega_m \end{cases}$$

$$\Sigma P^{(c)} = M_A g v - \overset{N_v N_B}{Fa_v}\,\omega_B R_B - Fa_G v_G$$
$$= M_A g \cdot \tau R_p \omega_m - N_v M_B g R_B \tau \frac{R_p \omega_m}{2R_B} - N_d M_C g \cdot \tau \frac{R_p}{2}\omega_m$$
$$= \tau R_p (M_A g - N_v M_B g/2 - N_d M_C g/2)\omega_m = 4{,}25\,\omega_m$$

$$\frac{d}{dt}K = M_A v a + J_p \dot\omega_v \omega_v + M_B v_G a_G + J_B \dot\omega_B \omega_B + M_C v_G a_G$$
$$= M_A \tau^2 R_p^2 \dot\omega_m \omega_m + \tau^2 J_p \dot\omega_m \omega_m + M_B \tau^2 R_p^2/4\, \dot\omega_m\omega_m + J_B \tau^2 \left(\frac{R_p}{2R_B}\right)^2 \dot\omega_m\omega_m + M_C \tau^2 R_p^2/4\,\dot\omega_m\omega_m$$
$$= \tau^2\left(M_A R_p^2 + J_p + (M_B+M_C) R_p^2/4 + J_B\left(\frac{R_p}{2R_B}\right)^2\right)\dot\omega_m\omega_m = 0{,}036\,\dot\omega_m\omega_m$$

BILANCIO DI POTENZE: $P_1 + P_2 + P_T = 0 \rightarrow (C_m\omega_m - J_m\dot\omega_m\omega_m) + (4{,}25\,\omega_m - 0{,}036\,\dot\omega_m\omega_m) + P_2 = 0$

CASO 1: REGIME $\quad C_m?\ \omega_m?$

$C_m\omega_m + 4{,}25\,\omega_m + P_2 = 0 \qquad \cdot P_1 = C_m\omega_m \gtrless 0? \qquad P_2 = 4{,}25\,\omega_m > 0 \rightarrow$ MOTO RETROGRADO

$\rightarrow P_2 = -(1-\eta_r)\cdot 4{,}25\,\omega_m \qquad C_m\omega_m + 4{,}25\,\omega_m - (1-\eta_r)\,4{,}25\,\omega_m = 0 \qquad C_m = -3{,}4\ \mathrm{Nm}$

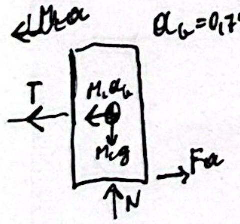
$C_m = 25 - 0{,}1\,\omega_m \Rightarrow \omega_m = 284\ \mathrm{rad/s}$

CASO 2: $a = 1{,}5\ \mathrm{m/s^2}$ $\quad C_m? \qquad \dot\omega_m = 30\ \mathrm{rad/s^2}$

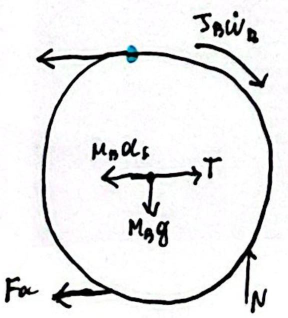
$P_1 = (C_m - 15)\,\omega_m \gtrless 0? \qquad P_2 = 3{,}17\,\omega_m > 0 \rightarrow$ MOTO RETROGRADO

$(C_m - 15)\,\omega_m + 3{,}17\,\omega_m - (1-\eta_r)\cdot 3{,}17\,\omega_m = 0 \rightarrow C_m = 12{,}46\ \mathrm{Nm} \qquad P_1 < 0$ ✓

$a_G = 0{,}75\ \mathrm{m/s^2}$



$$\begin{cases} T - Fa = M_C a_G \\ N = M_C g \end{cases} \qquad T = M_C(a_G + N_d g) = 28{,}28\ \mathrm{N}$$



$\Sigma M = 0 \qquad -J_B\dot\omega_B + M_B a_G R_B + RT - N_v N \omega_B R_B - Fa \cdot 2R = 0$

$\Rightarrow Fa = 16{,}16\ \mathrm{N}$

$Fa_{lim} = N_s \cdot N = 34{,}93\ \mathrm{N} \qquad Fa \le Fa_{lim}$ ✓