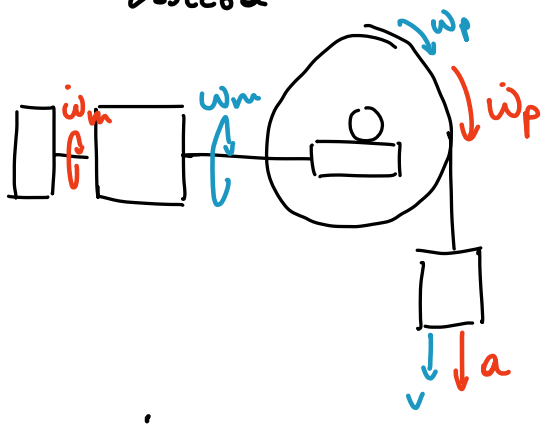
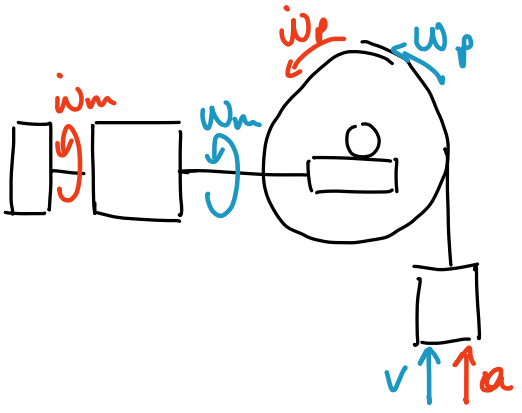
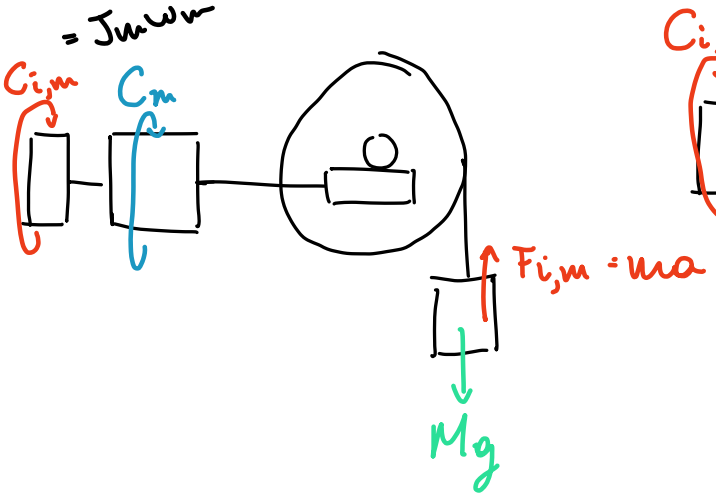
Esercitazione 19 -

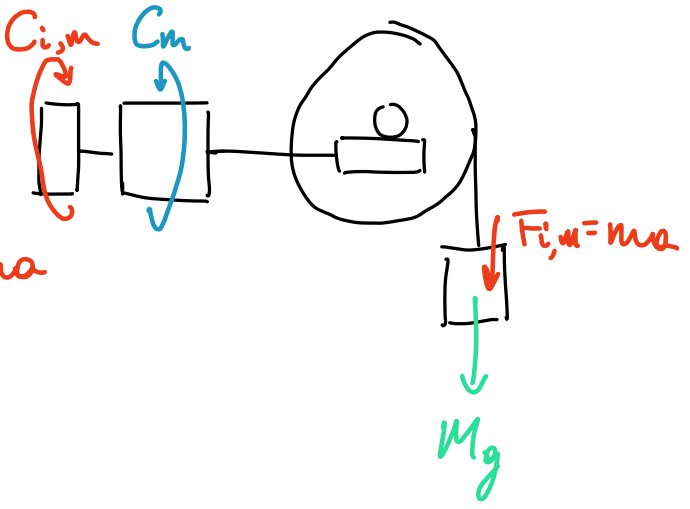
Discesa

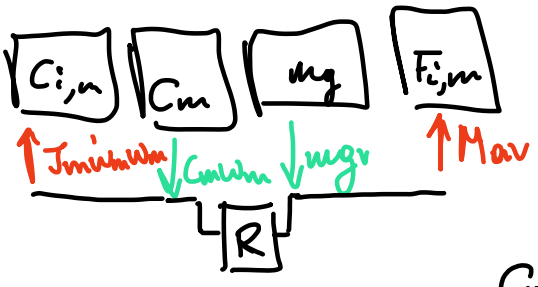


Salita









Ipotesi retrogrado

Ipotesi moto diretto → $C_m \omega_m - J_m \dot{\omega}_m \omega_m > 0$

$\omega_m (C_m - J_m \dot{\omega}_m) > 0$

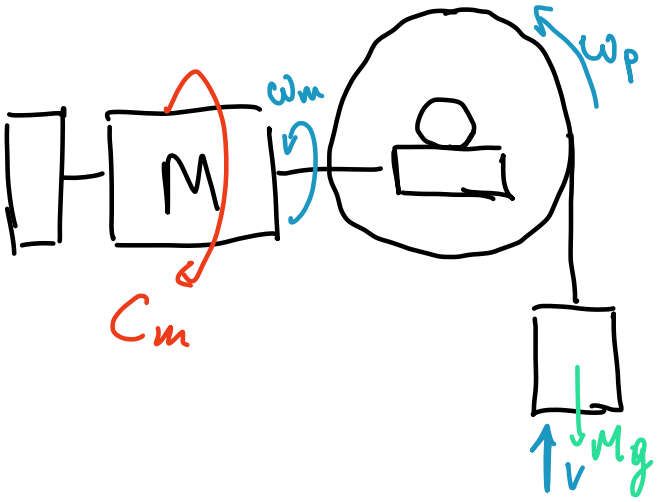
$(C_m \omega_m - J_m \dot{\omega}_m \omega_m)\eta_0 + mgv - mav = 0$

$$\dot{\omega}_m = \frac{C_m + Mg\tau R \eta_R}{J_m + M(\tau r)^2 \eta_R}$$

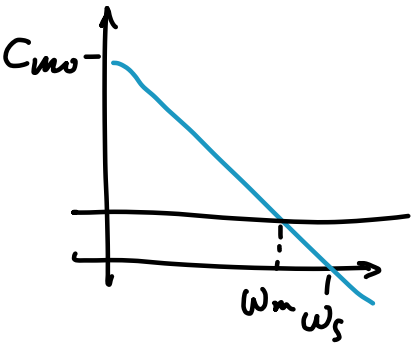
=

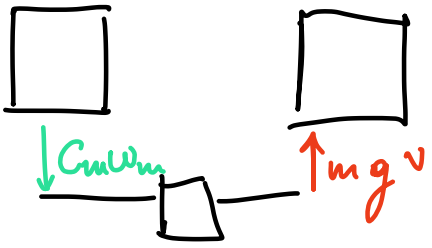
→ Determino $\dot{\omega}_m$, verifico l'ipotesi

$$\dot{\omega}_m = \frac{C_m \eta_0 - mg(\tau R)}{J_m \eta_0 + M(\tau R)^2}$$



Salita a regime





$$mgr\eta_R = C_m\omega_m \quad (\omega_m = \omega_m r\tau R)$$

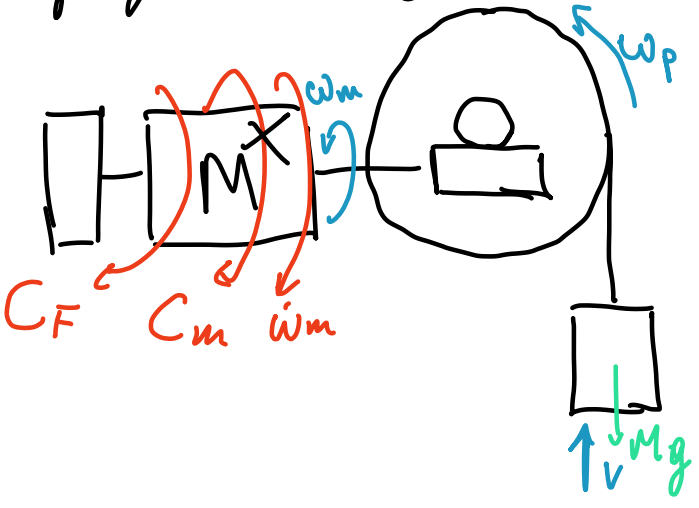
$C_m =$

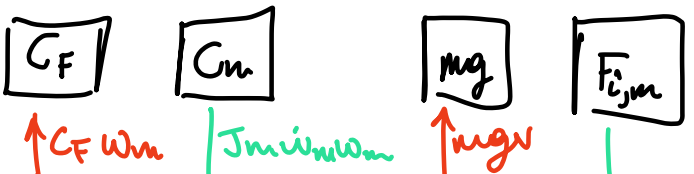
$$C_m\omega_m\eta_d = mg\omega_m r\tau$$

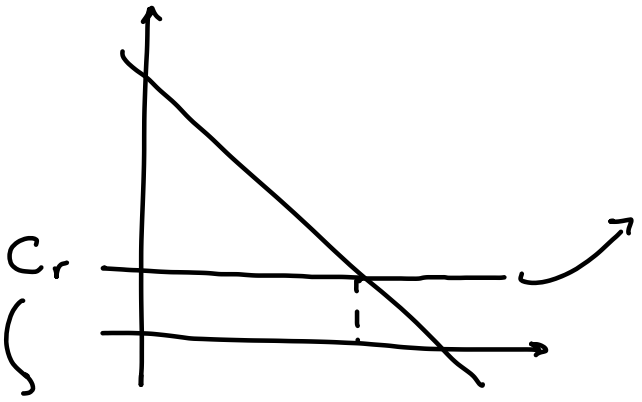
$$C_m(\omega_m) = \frac{mg\tau R}{\eta_D}$$

$$\omega_{mr} = \omega_s\left(1 - \frac{C_m}{C_{mo}}\right)$$

Spengo motore, agisce allora come freno

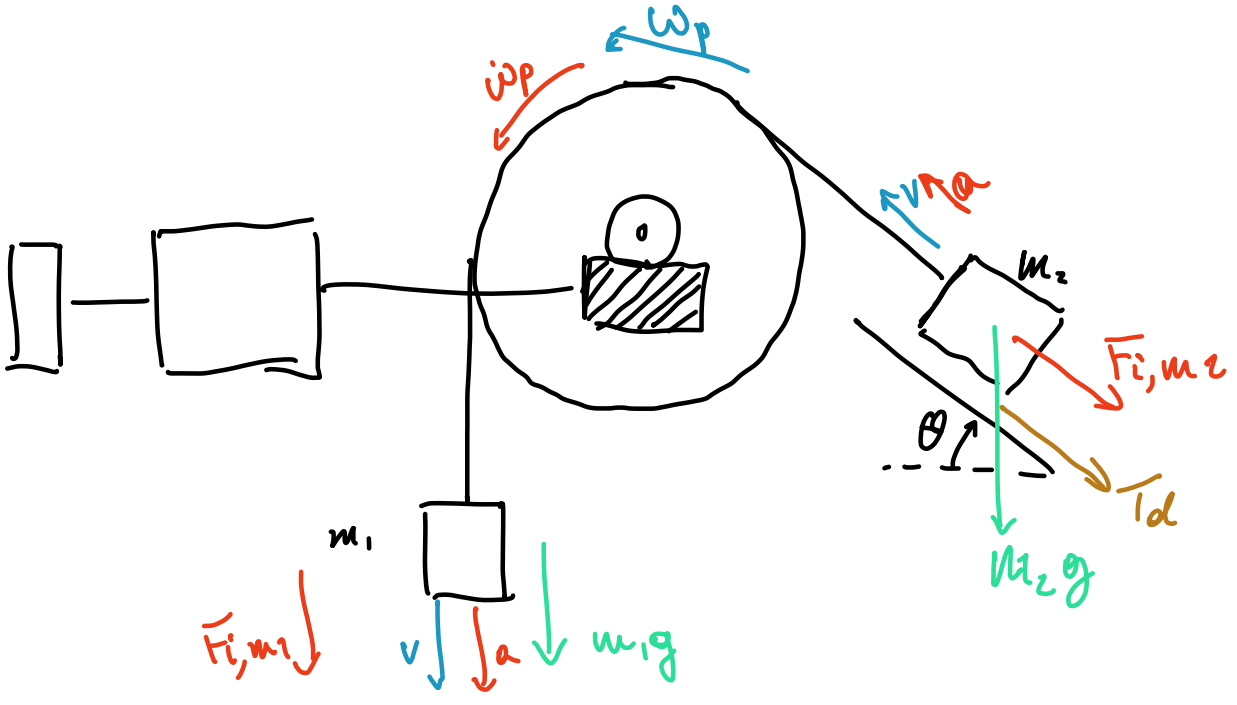


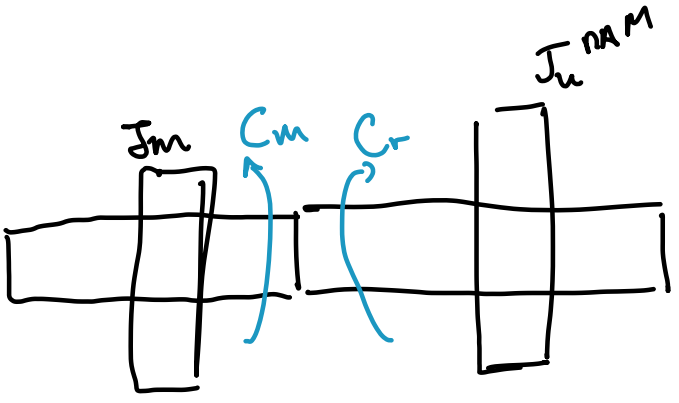




Questa è la coppia resistente, può esser costante o dipendente dal tempo

$$\frac{C_m - C_r}{J_r^T} = \dot{\omega}$$





$$\left(C_m\omega_m - J_m\dot{\omega}_m\omega_m\right)\eta_0 + m_1 g v \frac{\omega_m}{} - m_2 g \sin\alpha \, v \frac{\omega_m}{} - m_2 g \cos\alpha \, f_s \cdot v - m_1 a v - m_2 a v$$

$\omega_m \cdot \quad \omega_m \quad \dot{\omega}_m \omega_m$

ω_m

$$(C_m\omega_m - J_m\dot{\omega}_m\omega_m)\,\eta_d + \cancel{mg\tau R\omega_m} - \cancel{m_2 g \sin\alpha\, \tau R\omega_m} - mg\cos\alpha\, f_0 \tau R\omega_m$$

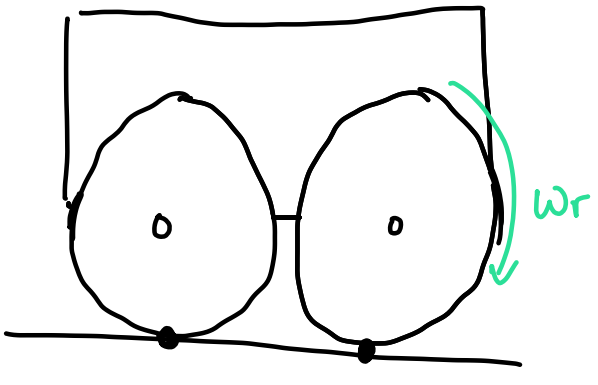
$$-(m_1+m_2)(\tau R)^2\,\dot{\omega}_m\omega_m = 0$$

$$C_m - J_m\dot{\omega}_m - \frac{mg\cos\alpha\,\tau R}{\eta_D} - \frac{(m_1+m_2)(\tau R)^2\dot{\omega}_m}{\eta_D}$$

$$\dot{\omega}_m = \frac{C_m - \overbrace{\frac{mg\cos\alpha\, f_0 \tau R}{\eta_D}}^{\text{Coppia ridotta ad albero motore}}}{\underbrace{J_m + (m_1+m_2)\frac{(\tau R)^2}{\eta_D}}_{J_m^{Rid}}}$$

J_m^{Rid} → Momento d'inerzia ridotto ad albero motore.

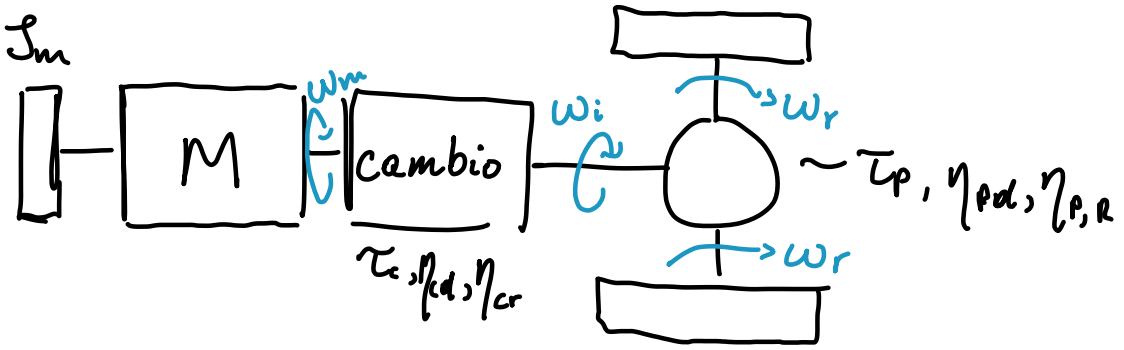
Modello Semplificato di Autovettura

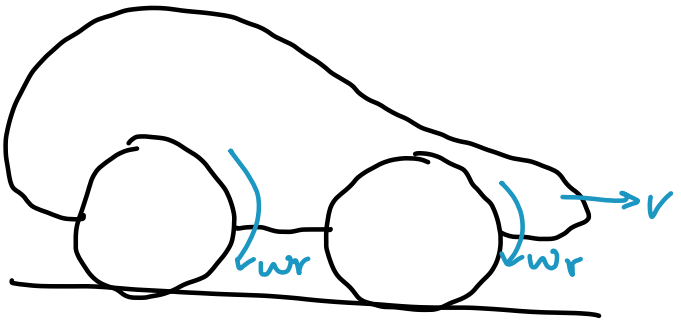


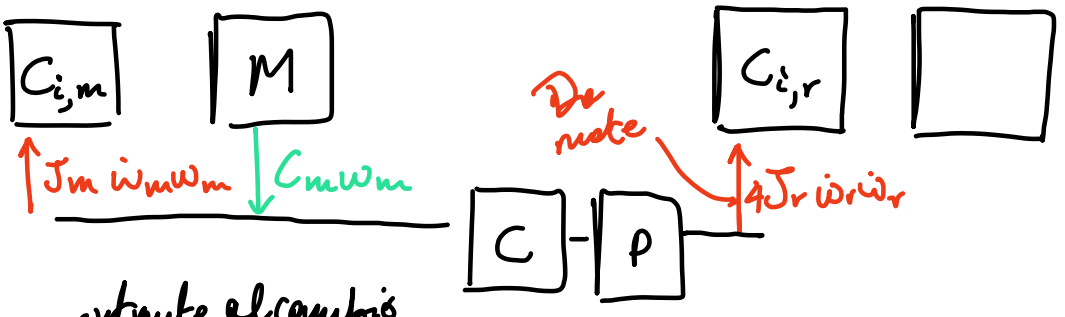
gdl: $3 \cdot 3 = 9$

gdv: $4 \cdot 2 = 8$ gdl

$\omega_r \to \omega_m$







Potenza entrante al cambio

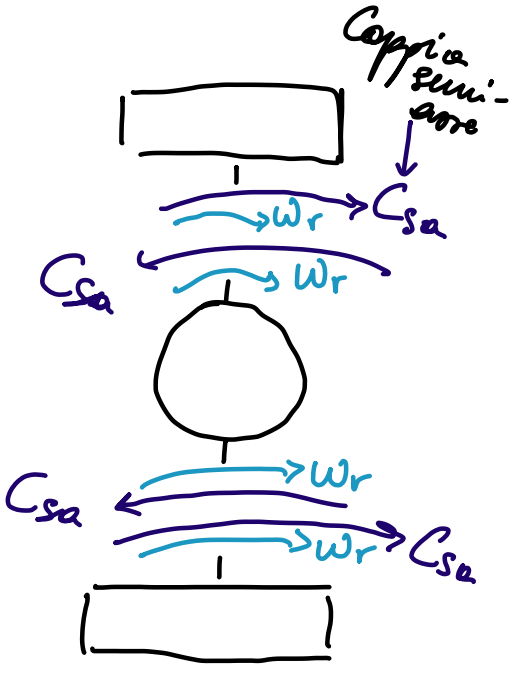
$$W_{ec} = C_m \omega_m - J_m \dot{\omega}_m \omega_m$$

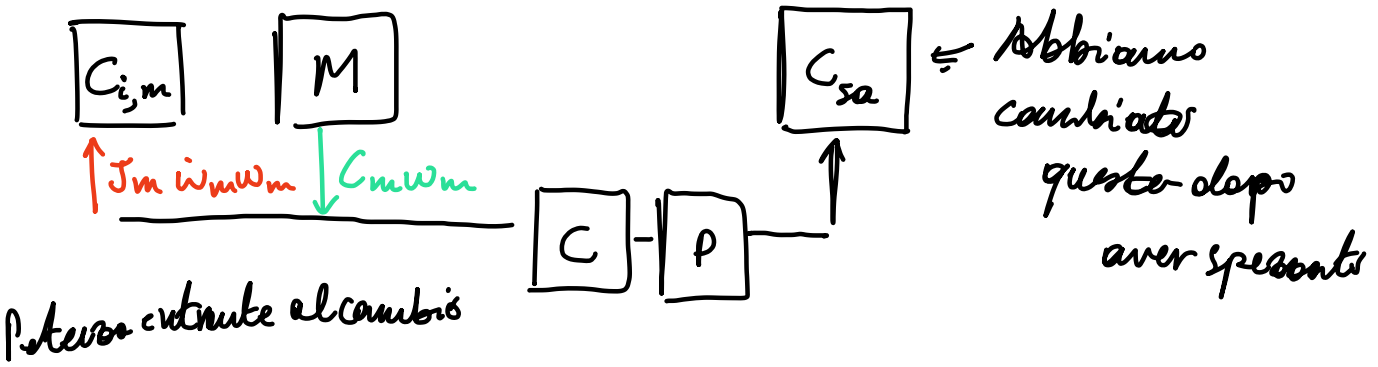
$$W_{uc} = (C_m \dot{\omega}_m \omega_m - J_m \dot{\omega}_m \omega_m)\,\eta_{DC} = W_{ep}$$

W_{uc}: Potenza uscente al cambio

W_{ep}: Potenza Entrante al ponte

$$W_{up} = (C_m \omega_m - J_m \dot{\omega}_m \omega_m)\,\eta_{DC}\,\eta_{DP}$$





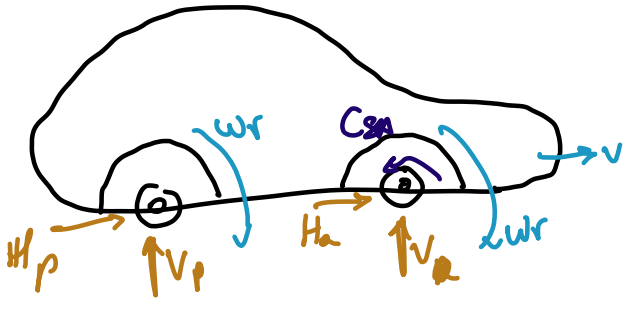
$$(C_m\omega_m - J_m\dot{\omega}_m\omega_m)\,\eta_{dc}\,\eta_{dp} - 2C_{sa}\omega_r = 0$$

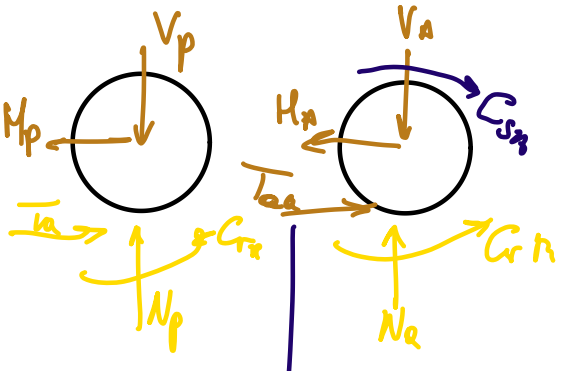
$$\frac{\omega_i}{\omega_m} = \tau_c \qquad \frac{\omega_r}{\omega_i} = \tau_p$$

$$\frac{\omega_i}{\omega_m}\cdot\frac{\omega_r}{\omega_i} = \tau_c\cdot\tau_p \Rightarrow \omega_r = \omega_m\,\tau_p\,\tau_c$$

$$(C_m\omega_m - J_m\dot{\omega}_m\omega_m)\,\eta_{dc}\,\eta_{dp} - 2C_{sa}\,\tau_p\,\tau_c\,\omega_m = 0$$

$$C_{sa} = \frac{(C_m - J_m\dot{\omega}_m)\,\eta_{dc}\,\eta_{dp}}{2\,\tau_p\,\tau_c}$$





Forza più importante