ECCITAZIONE

$\phi = K_\phi i_e$ $\quad K_\phi, i_e$ sono costanti. anche ϕ lo è

ARMATURA

$$L_a \frac{di_a}{dt} = v_a - R_a i_a \phi - E$$

$$E = k \phi \omega_m = K_\omega \omega_m$$

$$\tau_m = \underbrace{k' \phi}_{K_\tau} i_a \rightarrow i_a = \frac{\tau_m}{K_\tau}$$

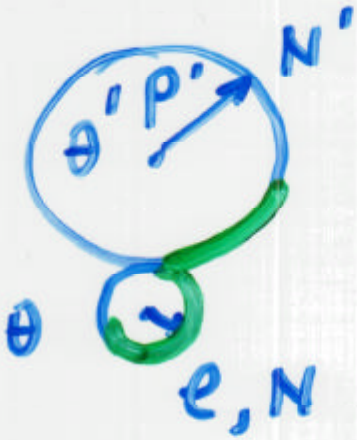
$\sim 1 < 1$

$$E i_a = K_\omega \omega_m \frac{\tau_m}{K_\tau} = \boxed{\frac{K_\omega}{K_\tau}} \omega_m \tau_m$$

τ_p perse $= J_m \ddot{\theta}_m + \beta_m \dot{\theta}_m$

$\tau_m - \tau_p = \tau_r$ rese

MOTORIDUTTORE (IDEALE)



$$\frac{\rho'}{\rho} = \frac{N'}{N} = r$$

1:25

$$\rho'\theta' = \rho\theta$$

$$\frac{\rho'}{\rho} = \frac{\theta}{\theta'}$$

$$\frac{\dot\theta}{\dot\theta'} = \frac{\omega}{\omega'} = \frac{\rho'}{\rho} = r$$

$$\boxed{\omega_m = r\,\omega'_m}$$

$r > 1$?
$r < 1$? nei robot

$\tau_r\,\omega_m$ potenza meccanica

↓ Rendimento = 1

$\tau'_r\,\omega'_m$

$$\tau_r\,\omega_m = \tau'_r\,\omega'_m$$

$$\tau_r\, r\,\omega'_m = \tau'_r\,\omega'_m$$

$$\boxed{\tau_r = \frac{1}{r}\,\tau'_r}$$

$$\tau'_r = r\,\tau_r = r(\tau_m - \tau_p)$$

$$= r\left[\tau_m - J_m\dot{\omega}_m - \beta_m\omega_m\right]$$

$$= r\left[\tau_m - J_m r\dot{\omega}'_m - \beta_m r\omega'_m\right]$$

$$= r\,\tau_m - r^2 J_m\dot{\omega}'_m - \beta_m r^2\omega'_m$$

— o —

$$\boxed{\tau} = H(q)\ddot{q} + C(q,\dot{q})\dot{q} + g(q) + J^T(q)F_e + B(q)\dot{q}$$

forze contatto — attriti viscosi

j-esimo elemento

$$\tau'_{r,i} = \sum_j H_{ij}\ddot{q}_j + \sum_j\sum_k h_{ijk}\dot{q}_j\dot{q}_k + g_i + \beta_{ki}\dot{q}_i + \tau'_{F,i}$$

$$\tau'_{r,i} = H_{ii}\ddot{q}_i + \beta_{b,i}\dot{q}_i + \sum_{j\neq i} H_{ij}\ddot{q}_j \leftarrow \tau'_{n,i}$$

$$+ \sum_j \sum_k h_{ijk}\dot{q}_j\dot{q}_k \leftarrow \tau'_{c,i}$$

$$H_{ii}\frac{\ddot{\theta}_m}{r_i} + \beta_{bi}\frac{\dot{\theta}_m}{r_i} + g_i \leftarrow \tau'_{g,i}$$

$$+ \tau'_{F,i} \leftarrow \tau'_{F,i}$$

$J_{b,i}$

$$\tau'_{r,i} = \frac{H_{ii}}{r_i}\ddot{\theta}_m + \frac{\beta_{bi}}{r_i}\dot{\theta}_m + \text{termini di disturbo } \tau'_{d,i}$$

lascio indice i — STRUTTURATI

J_t

$$\tau_m = \tau_r + \tau_p = \left(\frac{1}{r^2}J_b + J_m\right)\ddot{\theta}_m$$

β_t

$$+ \left(\frac{1}{r^2}\beta_b + \beta_m\right)\dot{\theta}_m$$

$$+ \frac{1}{r}\tau'_d = J_t\ddot{\theta}_m + \beta_t\dot{\theta}_m + \frac{1}{r}\tau'_d$$

$$J_t = \frac{1}{r^2} J_b(\underline{q}) + J_m$$

$$\beta_t = \frac{1}{r^2} \beta_b^{(q)} + \beta_m$$