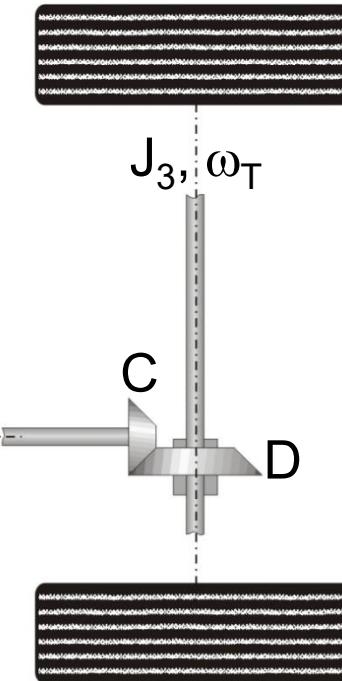
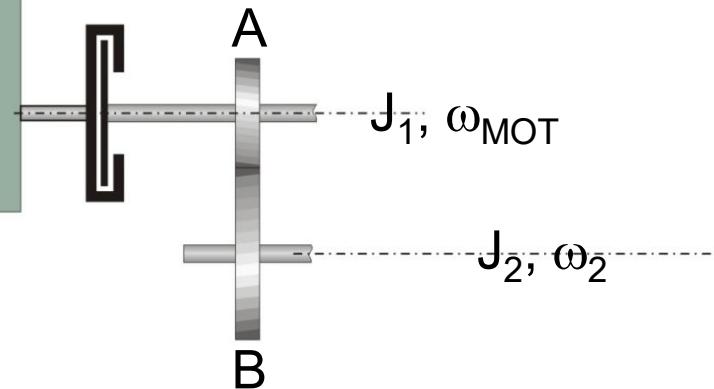
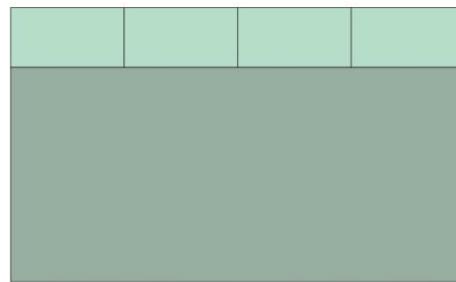


Obimna sila pri ubrzanom kretanju



$$J_1 \cdot \dot{\omega}_{MOT} = M_{MOT} - M_A$$

$$J_2 \cdot \dot{\omega}_2 = M_B - M_C$$

$$J_3 \cdot \dot{\omega}_T = M_T - F_O^{(a)} \cdot r_D$$

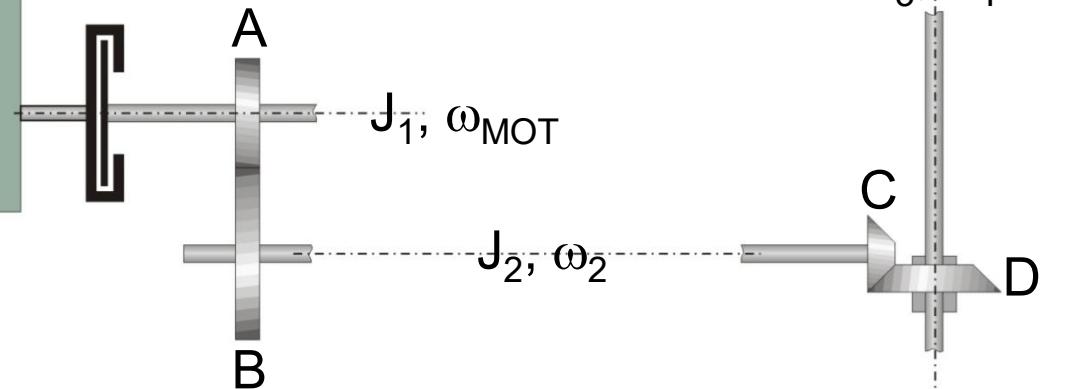
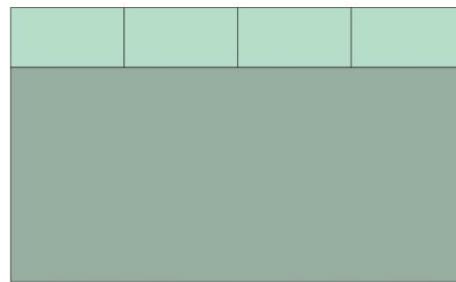
$$F_O^{(a)} = m \cdot a + F_f + F_W \pm F_a$$

(Označavanje: $M_D \equiv M_T$)

$F_O^{(a)}$ je pogonska sila na račun koje se savlađuju otpori kretanja vozila, izuzimajući ubrzanja obrtnih masa.

Kolika obimna sila stoji na raspolaganju pri ubrzanom kretanju - $F_O^{(a)} = ?$

Obimna sila pri ubrzanim kretanju



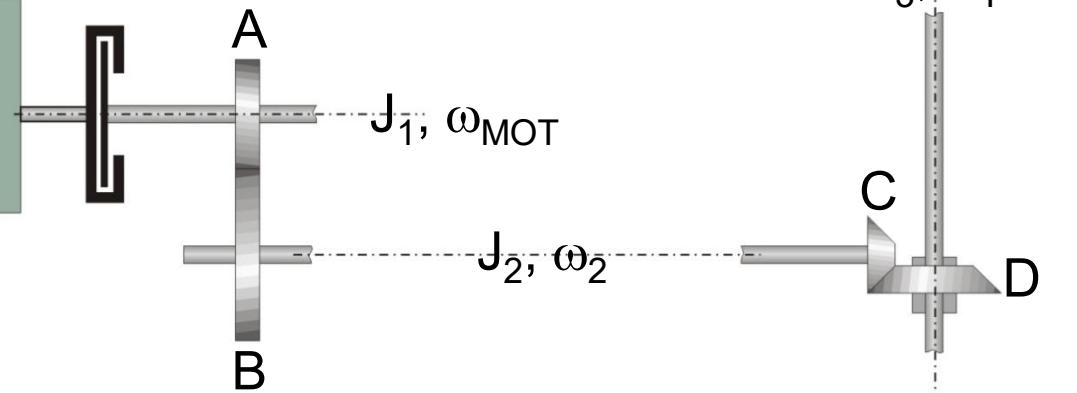
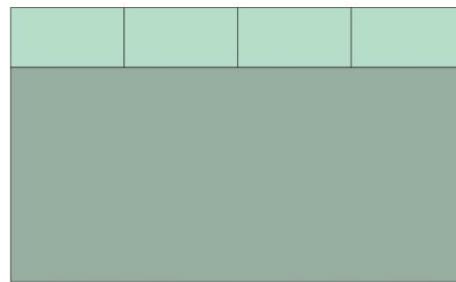
$$J_1 \cdot \dot{\omega}_{MOT} = M_{MOT} - M_A$$

$$J_2 \cdot \dot{\omega}_2 = M_B - M_C$$

$$J_3 \cdot \dot{\omega}_T = M_T - F_O^{(a)} \cdot r_D$$

Potrebno je izraziti sve brojove obrtaja / ugaone brzine u funkciji ω_T , i sve momente u funkciji M_T , koristeći prenosne odnose.

Obimna sila pri ubrzanim kretanju



$$J_1 \cdot \dot{\omega}_{MOT} = M_{MOT} - M_A$$

$$J_2 \cdot \dot{\omega}_2 = M_B - M_C$$

$$J_3 \cdot \dot{\omega}_T = M_T - F_O^{(a)} \cdot r_D$$

Relacije za zupčaste parove:

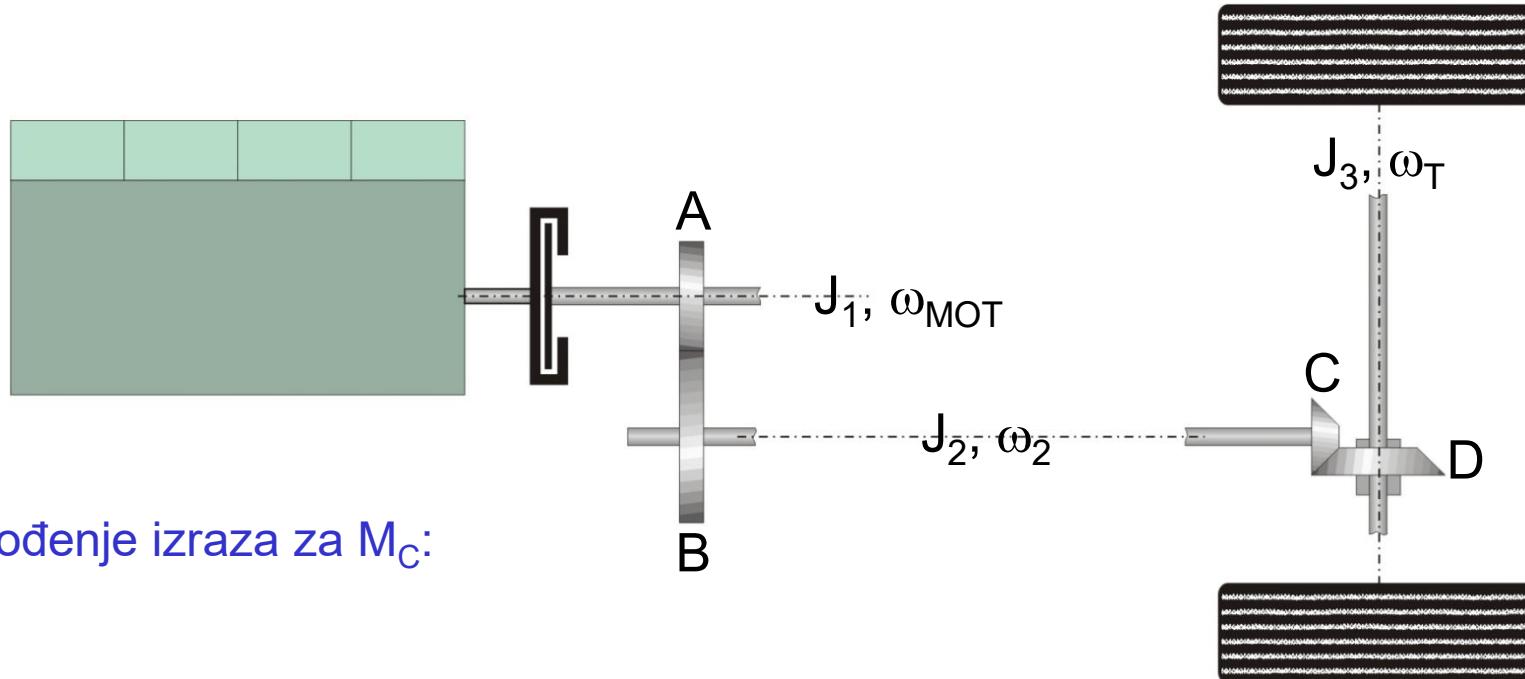
$$M_B = i_{AB} \cdot \eta_{AB} \cdot M_A$$

$$\dot{\omega}_2 = \frac{\dot{\omega}_{MOT}}{i_{AB}}$$

$$M_T = i_{CD} \cdot \eta_{CD} \cdot M_C$$

$$\dot{\omega}_T = \frac{\dot{\omega}_2}{i_{CD}}$$

Obimna sila pri ubrzanim kretanju

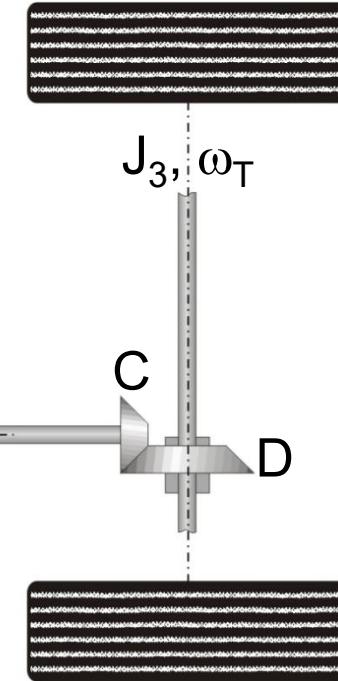
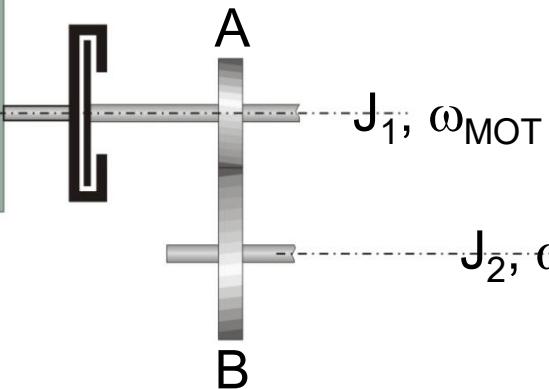
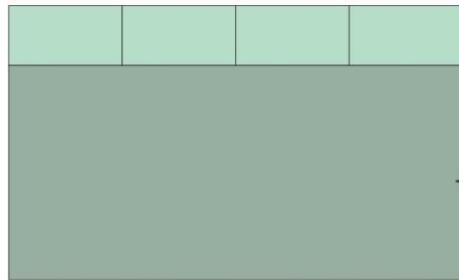


Izvođenje izraza za M_C :

$$\begin{aligned}
 J_1 \cdot \dot{\omega}_{\text{MOT}} &= M_{\text{MOT}} - M_A \\
 J_2 \cdot \dot{\omega}_2 &= M_B - M_C \\
 M_B &= i_{AB} \cdot \eta_{AB} \cdot M_A
 \end{aligned}
 \rightarrow M_C = i_{AB} \cdot \eta_{AB} \cdot (M_{\text{MOT}} - J_1 \cdot \dot{\omega}_{\text{MOT}}) - J_2 \cdot \dot{\omega}_2$$

$\underbrace{M_A}_{M_B}$

Obimna sila pri ubrzanim kretanju



Izvođenje izraza za $F_O^{(a)}$:

$$M_C = i_{AB} \cdot \eta_{AB} \cdot (M_{MOT} - J_1 \cdot \dot{\omega}_{MOT}) - J_2 \cdot \dot{\omega}_2$$

$$J_3 \cdot \dot{\omega}_T = M_T - F_O^{(a)} \cdot r_D$$

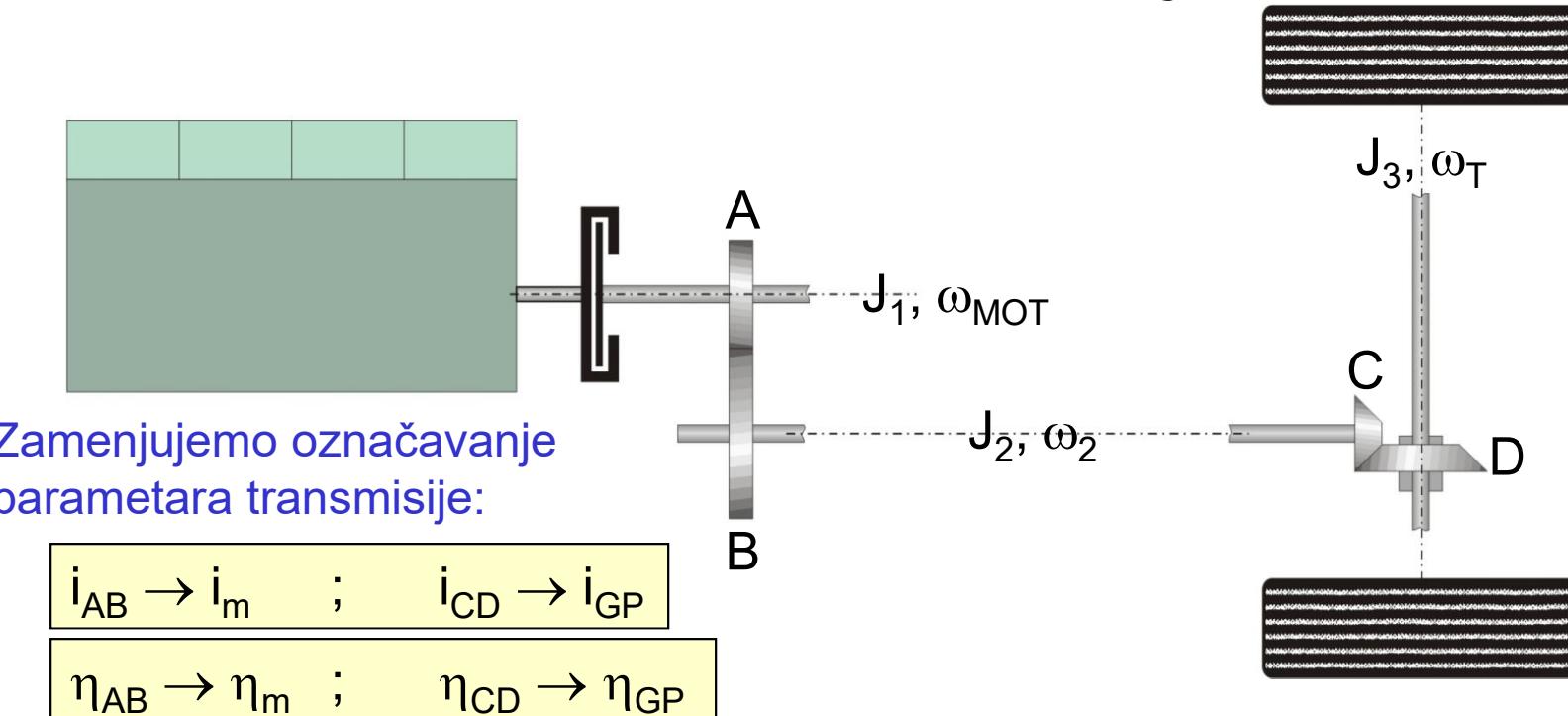
$$\underline{M_T = i_{CD} \cdot \eta_{CD} \cdot M_C}$$

$$F_O^{(a)} \cdot r_D = i_{CD} \cdot \eta_{CD} \cdot [i_{AB} \cdot \eta_{AB} \cdot (M_{MOT} - J_1 \cdot \dot{\omega}_{MOT}) - J_2 \cdot \dot{\omega}_2] - J_3 \dot{\omega}_T$$

M_C

M_T

Obimna sila pri ubrzanim kretanju



SA PRETHODNOG SLAJDA:

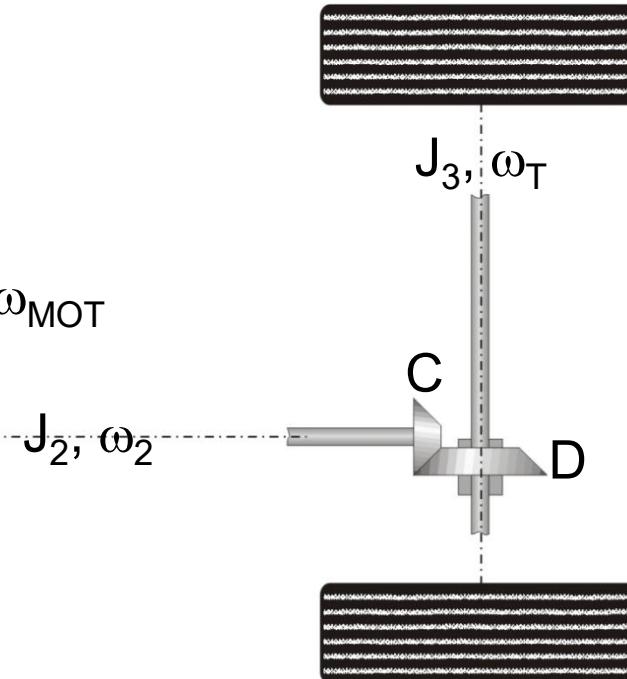
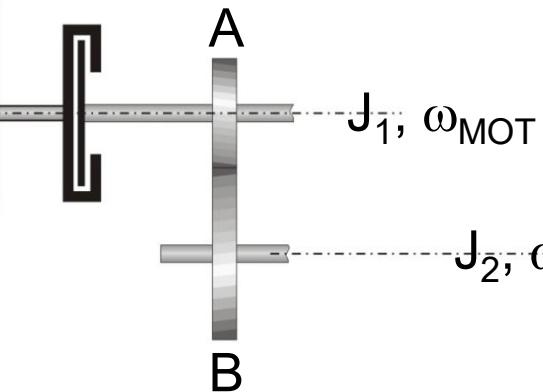
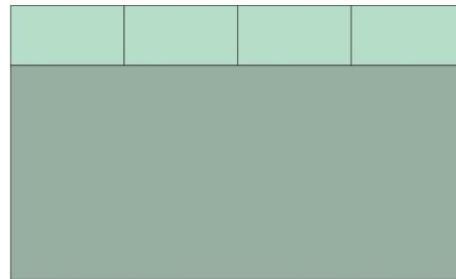
$$F_O^{(a)} \cdot r_D = i_{CD} \cdot \eta_{CD} \cdot [i_{AB} \cdot \eta_{AB} \cdot (M_{MOT} - J_1 \cdot \dot{\omega}_{MOT}) - J_2 \cdot \dot{\omega}_2] - J_3 \dot{\omega}_T$$



SA ZAMENJENIM OZNAKAMA

$$F_O^{(a)} \cdot r_D = i_{GP} \cdot \eta_{GP} \cdot [i_m \cdot \eta_m \cdot (M_{MOT} - J_1 \cdot \dot{\omega}_{MOT}) - J_2 \cdot \dot{\omega}_2] - J_3 \dot{\omega}_T$$

Obimna sila pri ubrzanim kretanju



Izražavamo sve ugaone
brzine preko ω_T :

$$\dot{\omega}_2 = \frac{\dot{\omega}_{MOT}}{i_m} \quad \dot{\omega}_T = \frac{\dot{\omega}_2}{i_{GP}} \Rightarrow$$

$$\Rightarrow \dot{\omega}_2 = i_{GP} \cdot \dot{\omega}_T \quad | \quad \dot{\omega}_{MOT} = i_m \cdot i_{GP} \cdot \dot{\omega}_T = i_{TR} \cdot \dot{\omega}_T \quad i_{GP} \cdot i_m = i_{TR} \quad \eta_{GP} \cdot \eta_m = \eta_{TR}$$

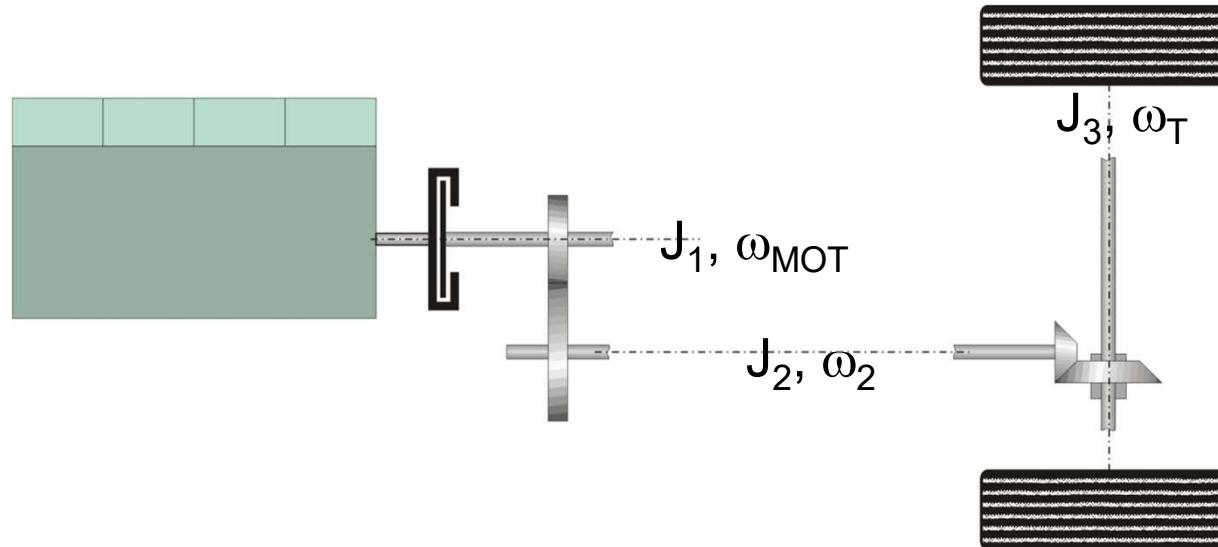
$$\underline{\underline{F_O^{(a)} \cdot r_D = i_{GP} \cdot \eta_{GP} \cdot [i_m \cdot \eta_m \cdot (M_{MOT} - J_1 \cdot \dot{\omega}_{MOT}) - J_2 \cdot \dot{\omega}_2] - J_3 \dot{\omega}_T =}}$$

$$= i_{TR} \cdot \eta_{TR} \cdot M_{MOT} - i_{TR}^2 \cdot \eta_{TR} \cdot J_1 \cdot \dot{\omega}_T - i_{GP}^2 \cdot \eta_{GP} \cdot J_2 \cdot \dot{\omega}_T - J_3 \dot{\omega}_T =$$

$$= i_{TR} \cdot \eta_{TR} \cdot M_{MOT} - (J_3 + \eta_{GP} \cdot i_{GP}^2 \cdot J_2 + \eta_{TR} \cdot i_{TR}^2 \cdot J_1) \cdot \dot{\omega}_T$$

Sređivanje,
grupisanje →

Obimna sila pri ubrzanim kretanju



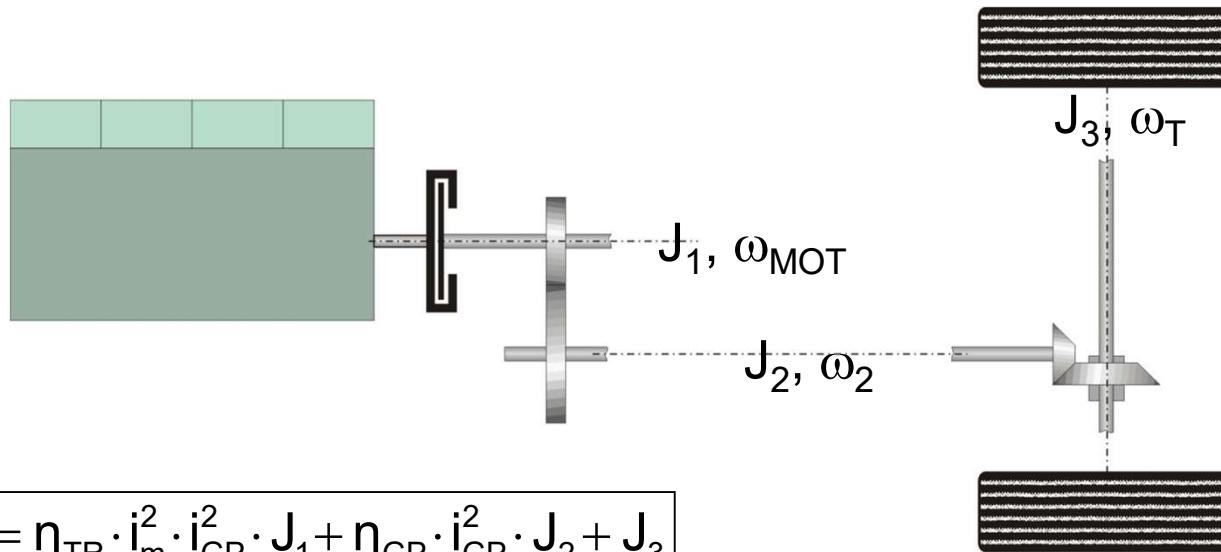
$$F_O^{(a)} \cdot r_D = i_{TR} \cdot \eta_{TR} \cdot M_{MOT} - (J_3 + \eta_{GP} \cdot i_{GP}^2 \cdot J_2 + \eta_{TR} \cdot i_{TR}^2 \cdot J_1) \cdot \dot{\omega}_T$$

$\underbrace{J_3 + \eta_{GP} \cdot i_{GP}^2 \cdot J_2 + \eta_{TR} \cdot i_{TR}^2 \cdot J_1}_{J_{RED}}$

$$J_3 + \eta_{GP} \cdot i_{GP}^2 \cdot J_2 + \eta_{TR} \cdot i_{TR}^2 \cdot J_1 = J_{RED}$$

MOMENTI INERCIJE SVIH ROTACIONIH
MASA REDUKOVANI NA POGONSKI
TOČAK ➤

Redukovani moment inercije



- J_1 – suma momenata inercije svih rotacionih masa koje se obrću ugaonom brzinom motora
- J_2 – suma momenata inercije svih rotacionih masa koje se obrću ugaonom brzinom izlaznog vratila menjачa
- J_3 – suma momenata inercije svih rotacionih masa koje se obrću ugaonom brzinom točkova

Opšti princip redukovanja momenta inercije na vratilo spregnuto preko prenosnog odnosa i: $J_{RED} = i^2 \cdot J$

Obimna sila pri ubrzanim kretanju

Izveli smo:

$$F_O^{(a)} \cdot r_D = i_{TR} \cdot \eta_{TR} \cdot M_{MOT} - (J_3 + \eta_{GP} \cdot i_{GP}^2 \cdot J_2 + \eta_{TR} \cdot i_{TR}^2 \cdot J_1) \cdot \dot{\omega}_T$$

J_{RED}



$$F_O^{(a)} \cdot r_D = i_{TR} \cdot \eta_{TR} \cdot M_{MOT} - J_{RED} \cdot \dot{\omega}_T$$



$$F_O^{(a)} = \frac{i_{TR} \cdot \eta_{TR} \cdot M_{MOT}}{r_D} - \frac{J_{RED} \cdot \dot{\omega}_T}{r_D}$$

→ OBIMNA SILA PRI UBRZANOM KRETANJU