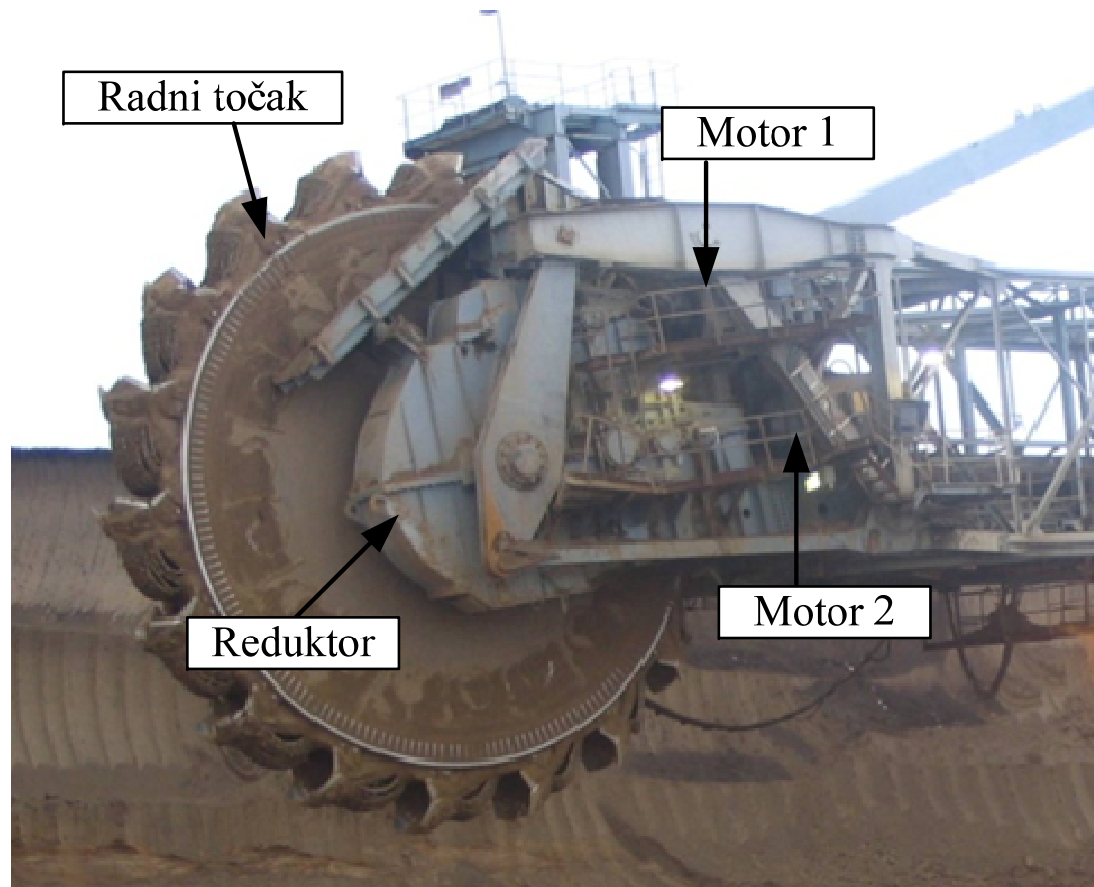


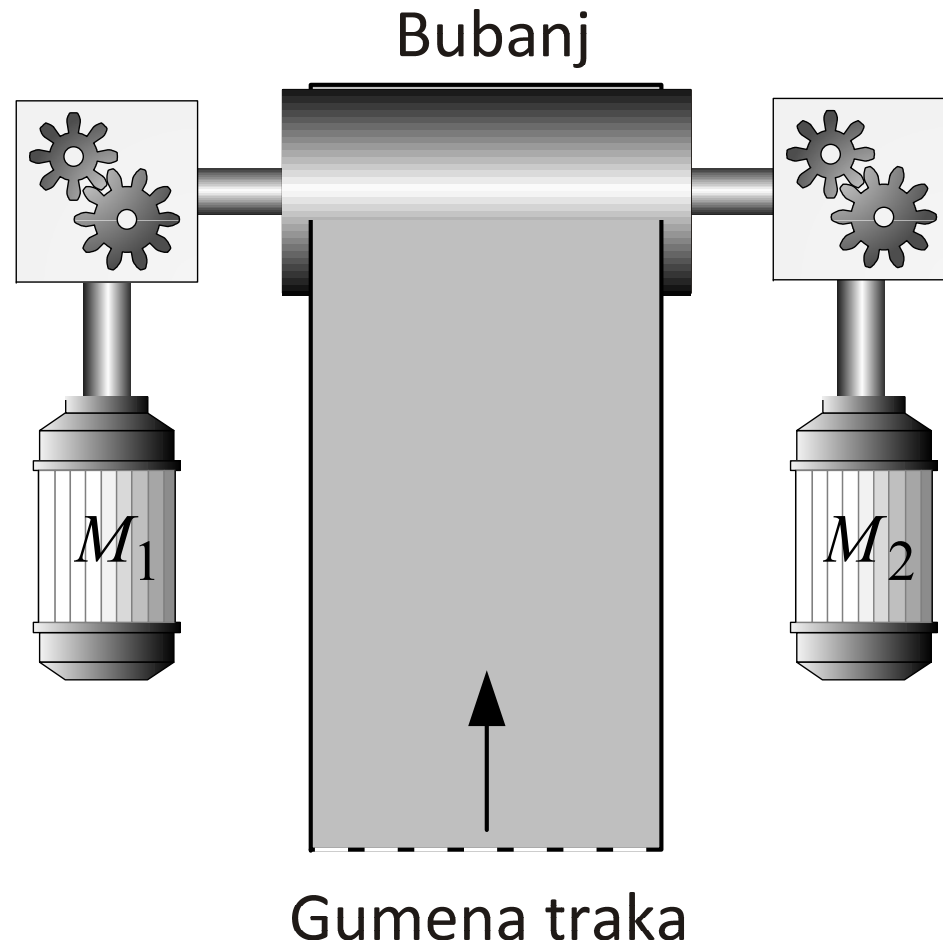
Višemotorni pogoni sa krutom mehaničkom vezom pogonskih vratila

- ***Apsolutno kruto mehanički povezani pogon***



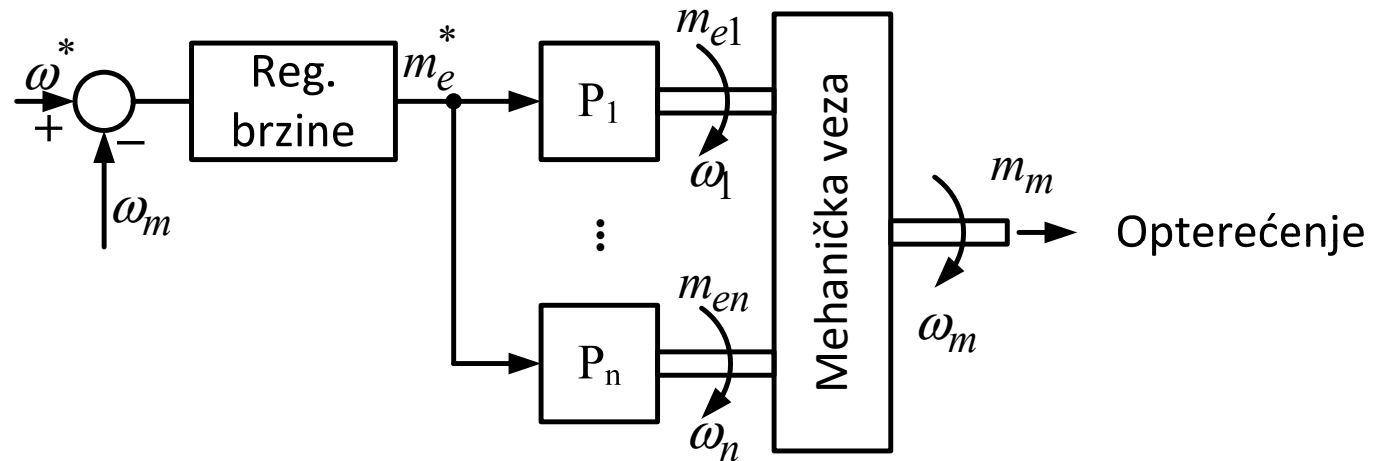
Kruta mehanička veza

Pogonski bubanj transportera sa gumenom trakom sa dva motora



Kruta mehanička veza

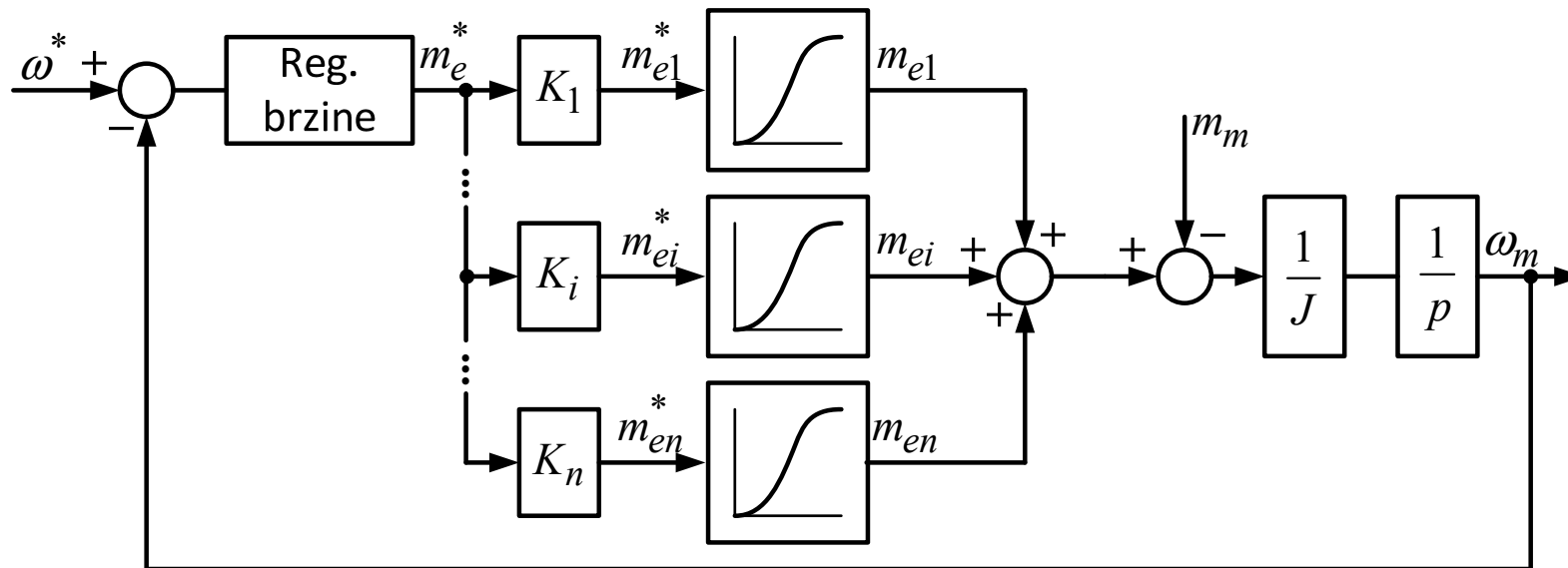
Princip upravljanja



$$m_e^* = \sum_{i=1}^n m_{ei}^*$$

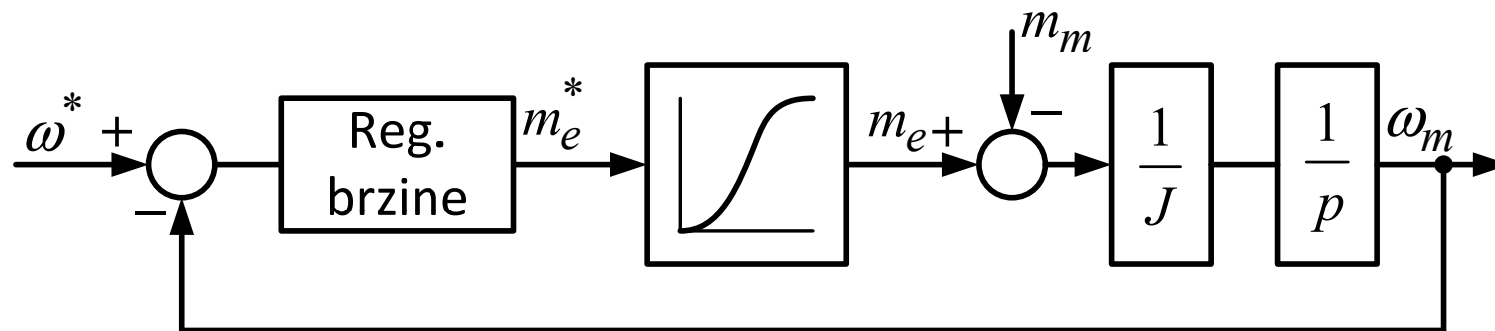
$$m_{ei}^* = \frac{m_e^*}{\sum_{j=1}^n m_{nomj}} \quad \text{za } i = 1 \div n$$

Blok dijagram višemotornog pogona sa krutom mehaničkom vezom



$$K_i = \frac{m_{enomi}}{\sum_{i=1}^n m_{enomi}}$$

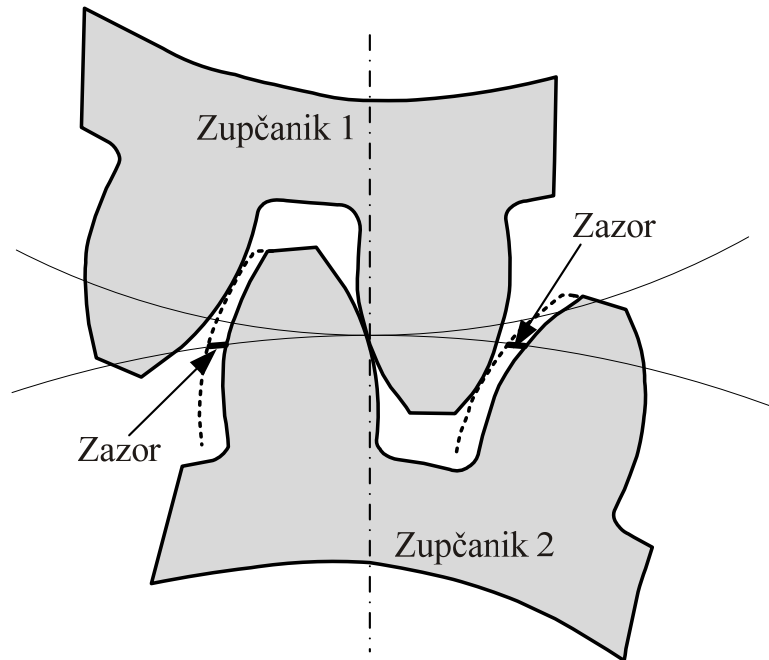
Ekvivalentni blok dijagram višemotornog pogona sa krutom mehaničkom vezom



Kruto mehanički povezani pogoni sa zupčastim prenosom

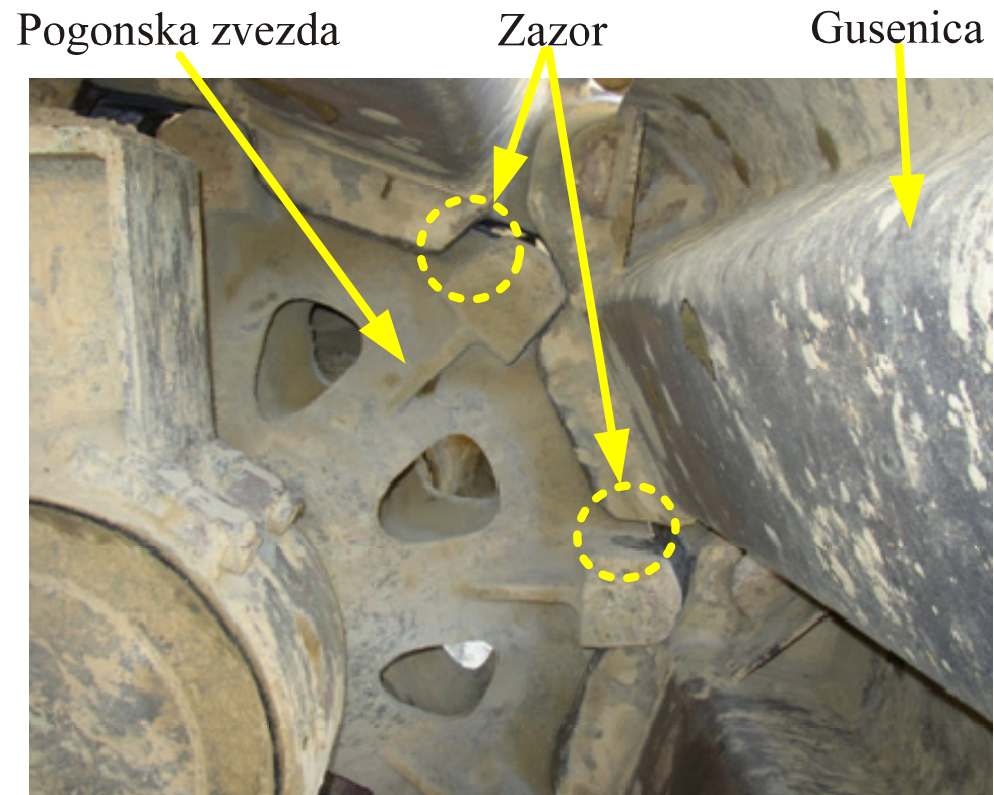
$$m_1 \cdot \omega_1 = m_2 \cdot \omega_2$$

$$I = \frac{Z_2}{Z_1} = \frac{\omega_1}{\omega_2} = \frac{m_2}{m_1}$$

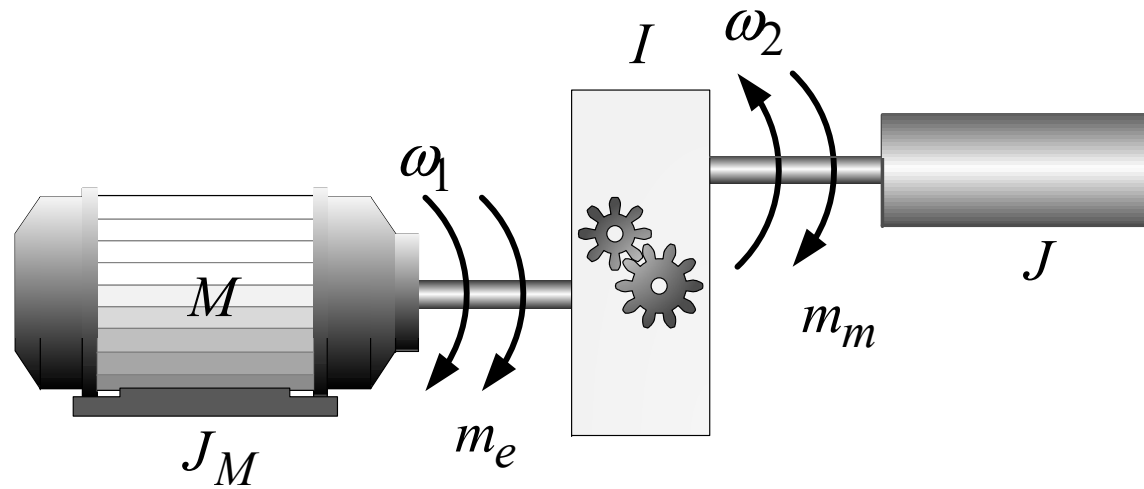


Zazor !

Zazor



Pogon sa zupčastim prenosom



Sistem jednačina

$$J_m \frac{d\omega_1}{dt} = m_e - K_{tr1} \cdot \omega_1 - m_c$$

$$J' \frac{d\omega_2'}{dt} = m_c - K'_{tr2} \cdot \omega_2' - m'_m$$

$$m'_m = \frac{m_m}{I}; \quad \omega_2' = \omega_2 \cdot I; \quad J' = \frac{J}{I^2}; \quad K'_{tr2} = \frac{K_{tr2}}{I}$$

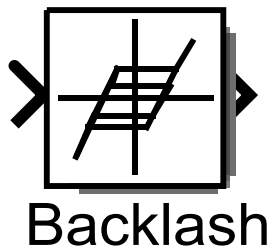
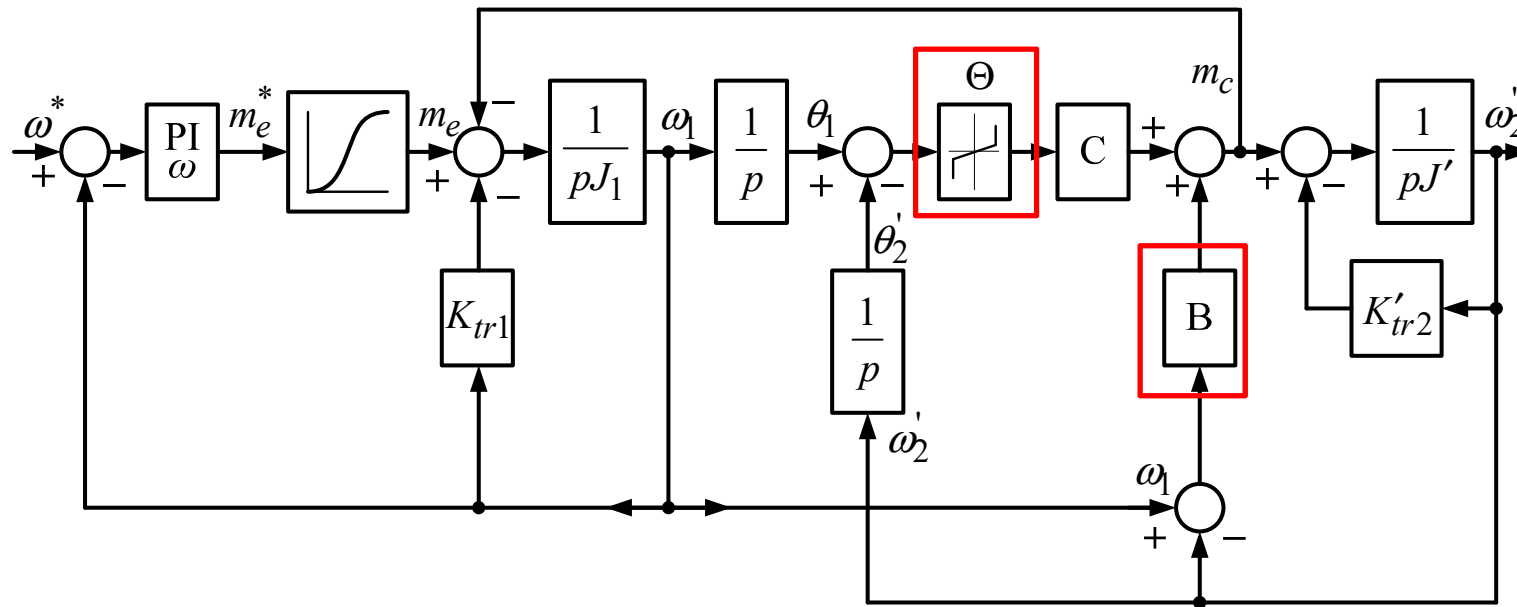
$$m_c = C \cdot \Theta(\theta_1 - \theta_2') + B(\omega_1 - \omega_2')$$

$$\frac{d\theta_1}{dt} = \omega_1 \quad \frac{d\theta_2'}{dt} = \omega_2'$$

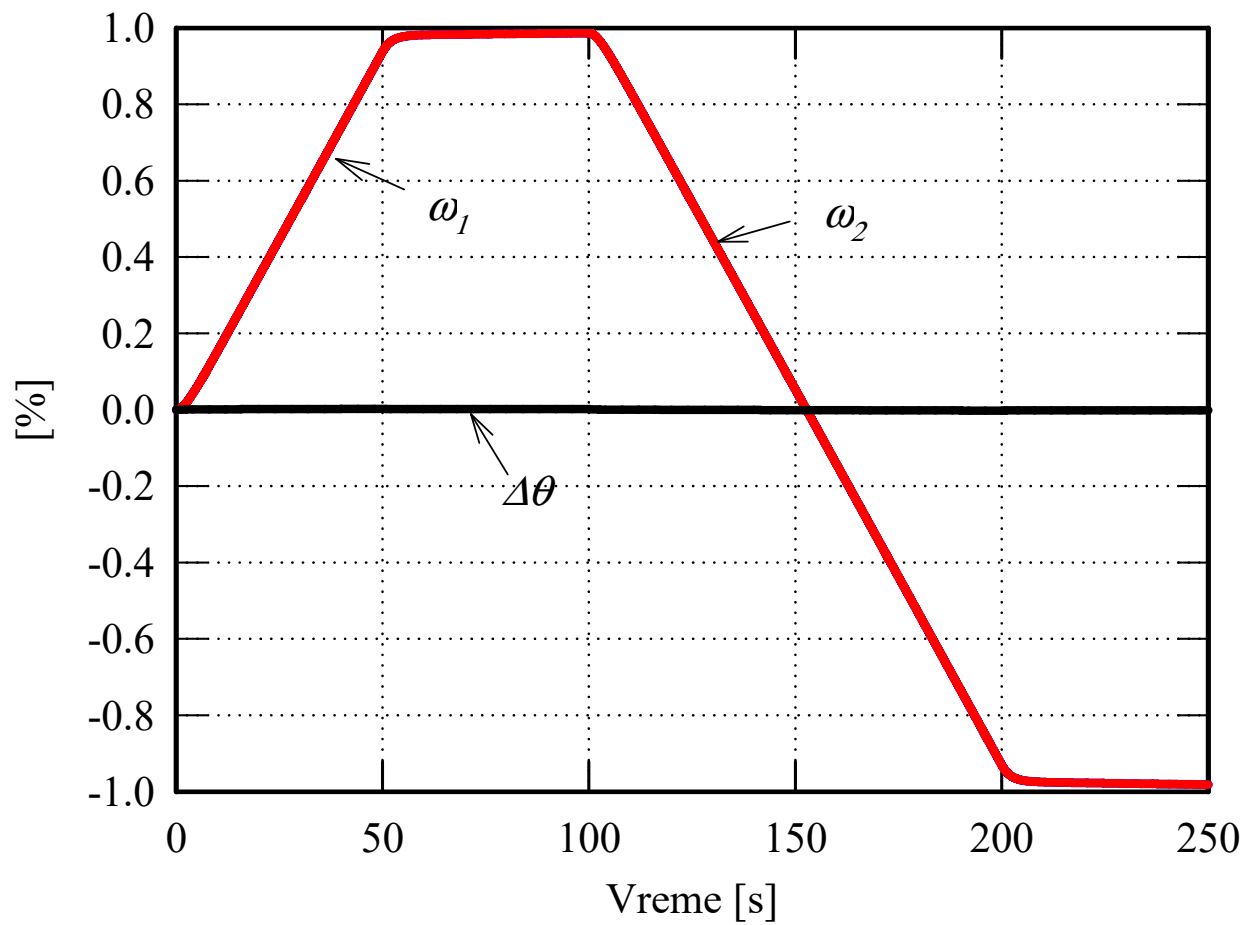
?

$$\Theta(\theta_1 - \theta_2') = \begin{cases} 0 & \text{za } |\theta_1 - \theta_2'| \leq \frac{\Delta\theta}{2} \\ (\theta_1 - \theta_2') - \text{sgn}(\theta_1 - \theta_2') \cdot \frac{\Delta\theta}{2} & \text{za } |\theta_1 - \theta_2'| > \frac{\Delta\theta}{2} \end{cases}$$

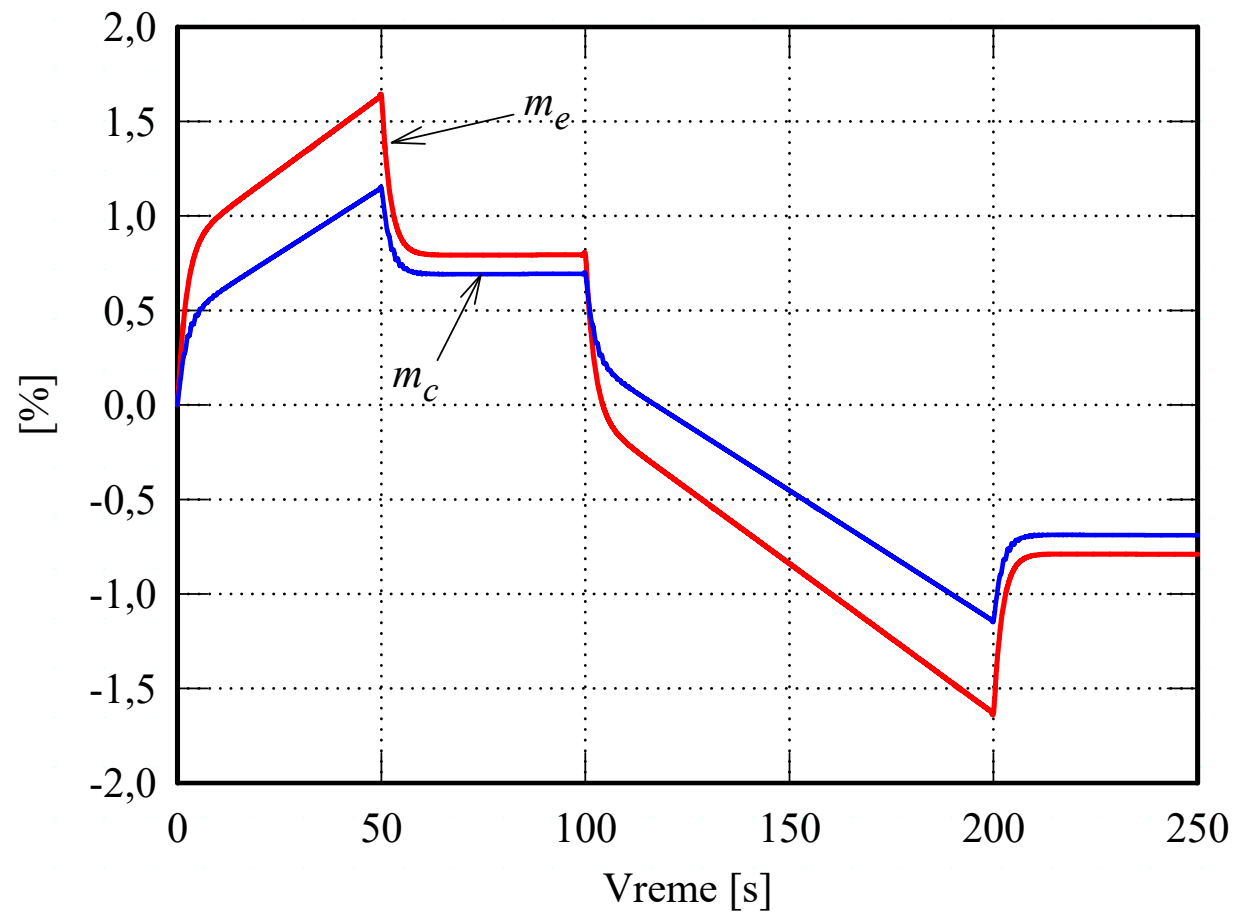
Blok dijagram regulisanog pogona sa zupčastim prenosom



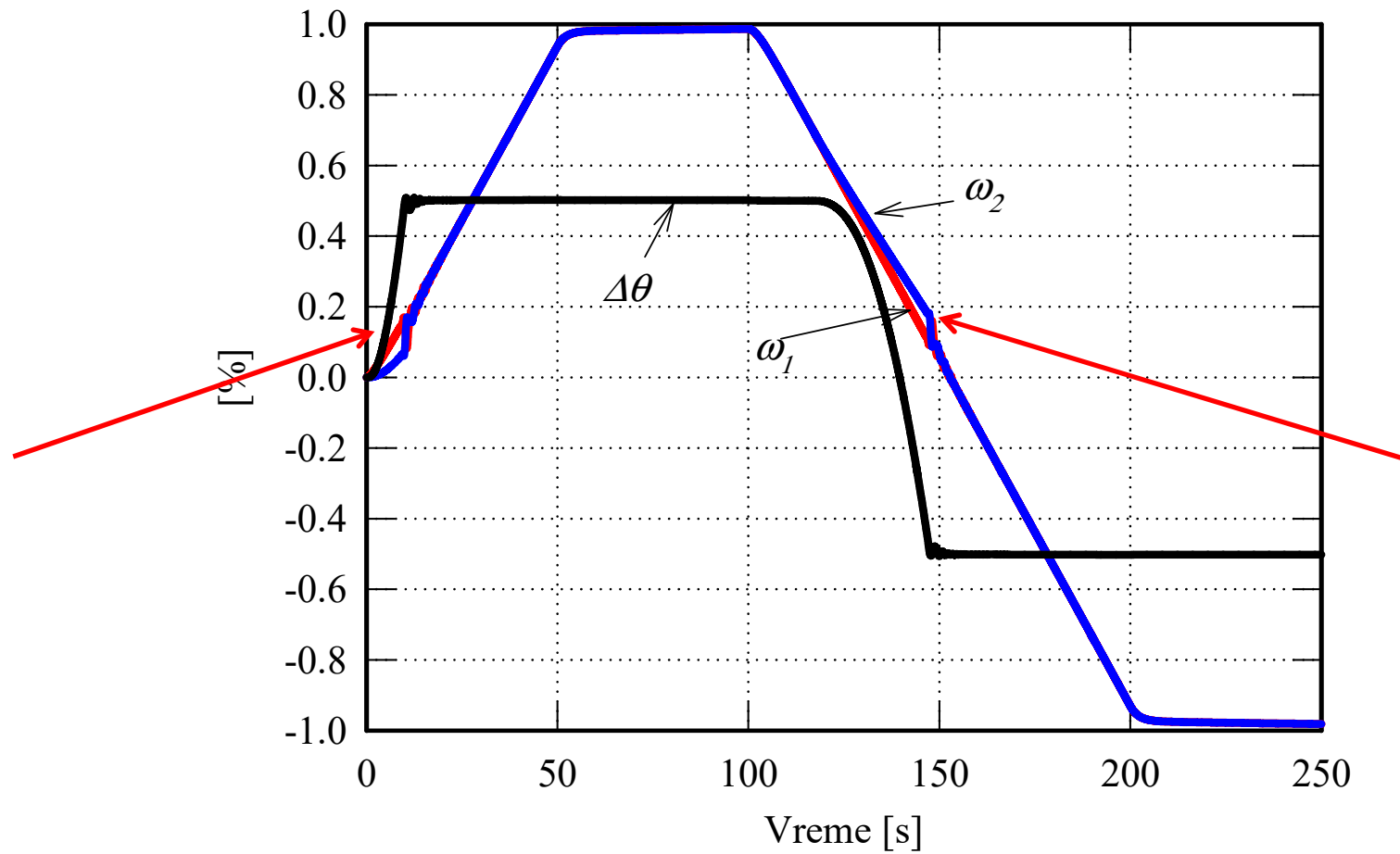
Ponašanje pogona bez zazora - brzine



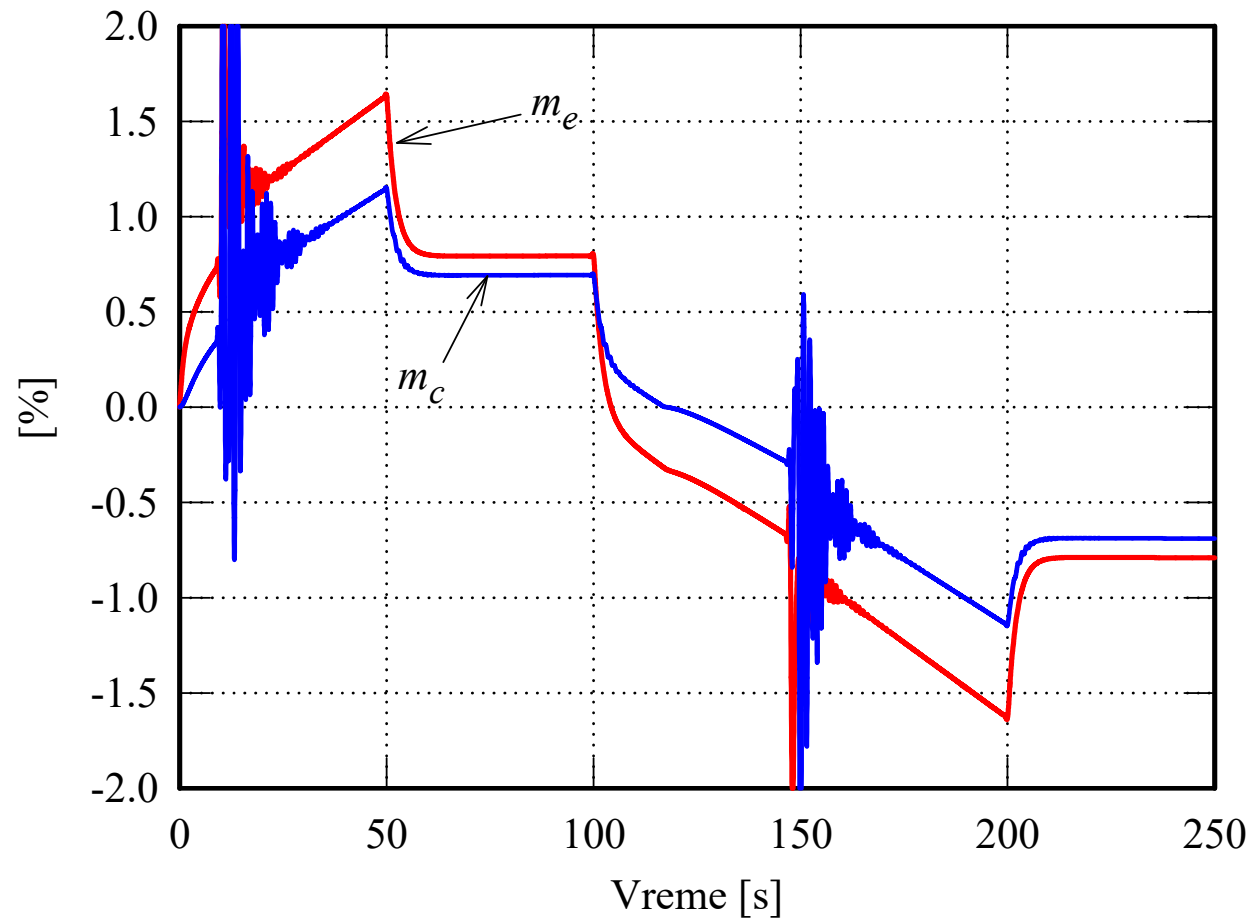
Ponašanje pogona bez zazora - momenti



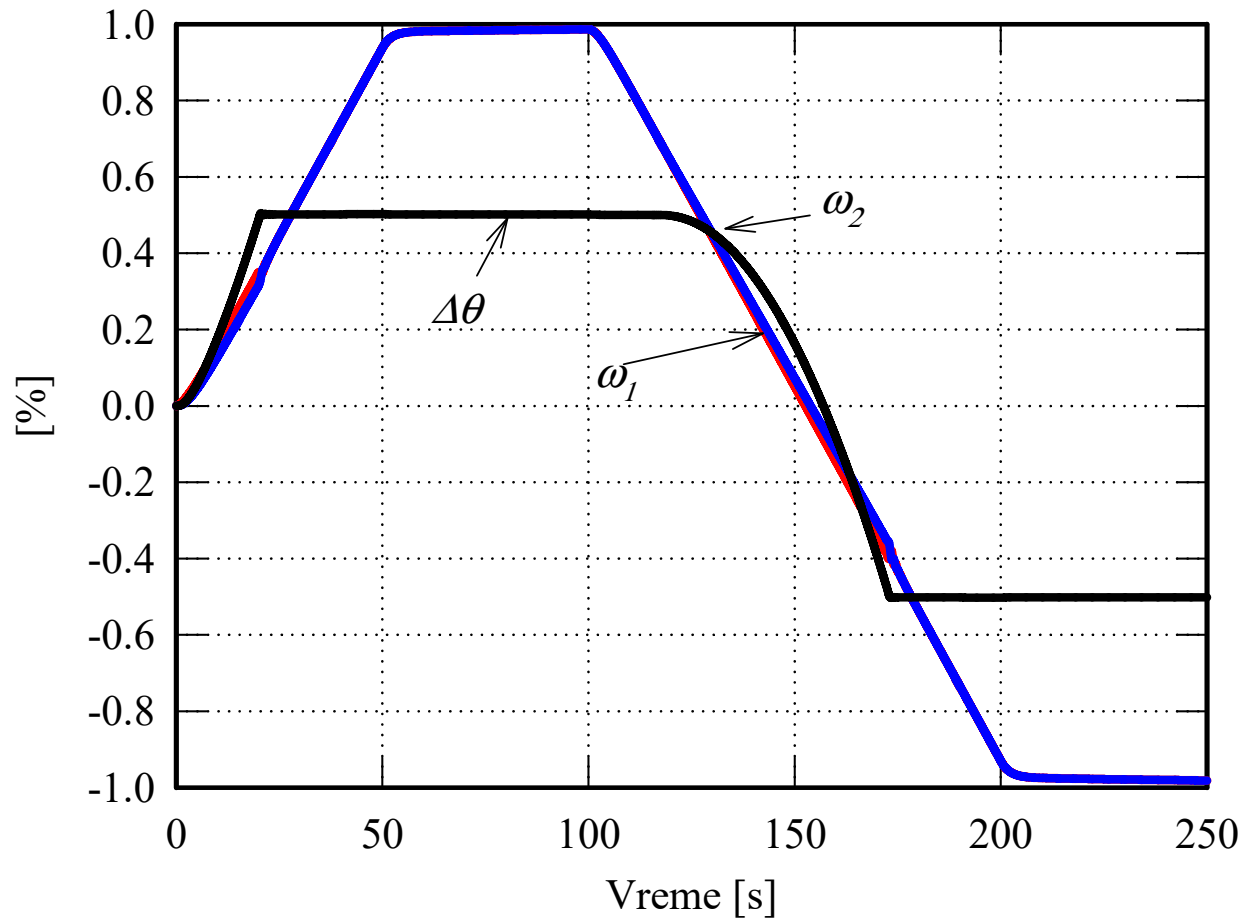
Ponašanje pogona sa malim zazorom - brzine



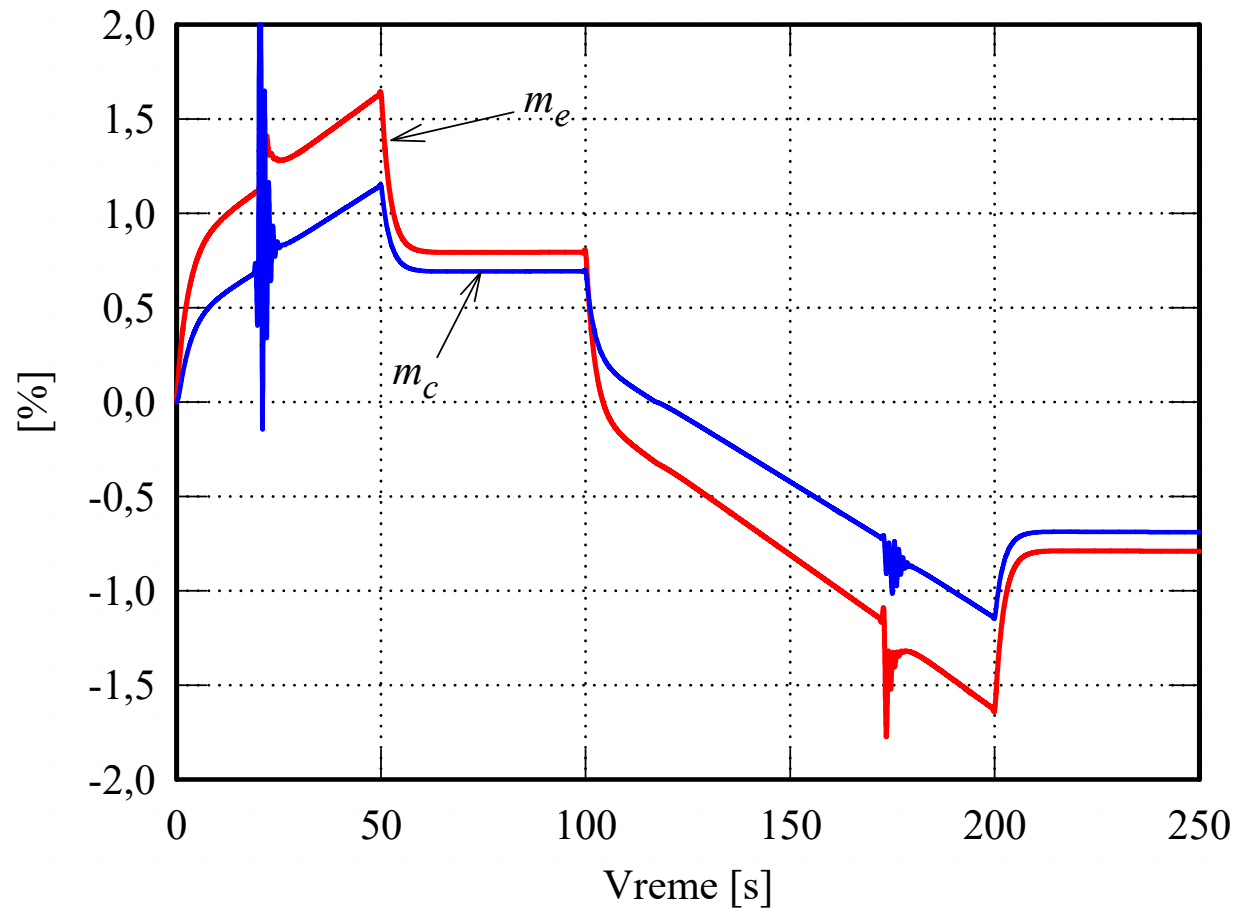
Ponašanje pogona sa malim zazorom - momenti



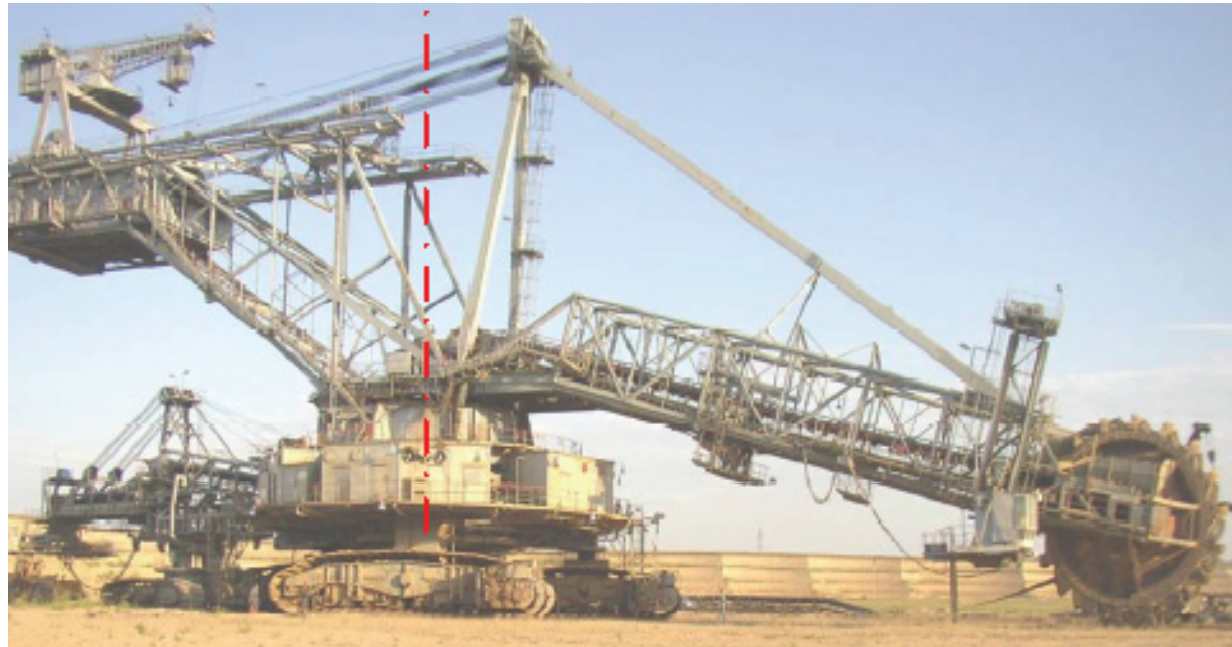
Ponašanje pogona sa malim zazorom i četiri puta većom konstantom viskoznosti - brzine



Ponašanje pogona sa malim zazorom i četiri puta većom konstantom viskoznosti - momenti

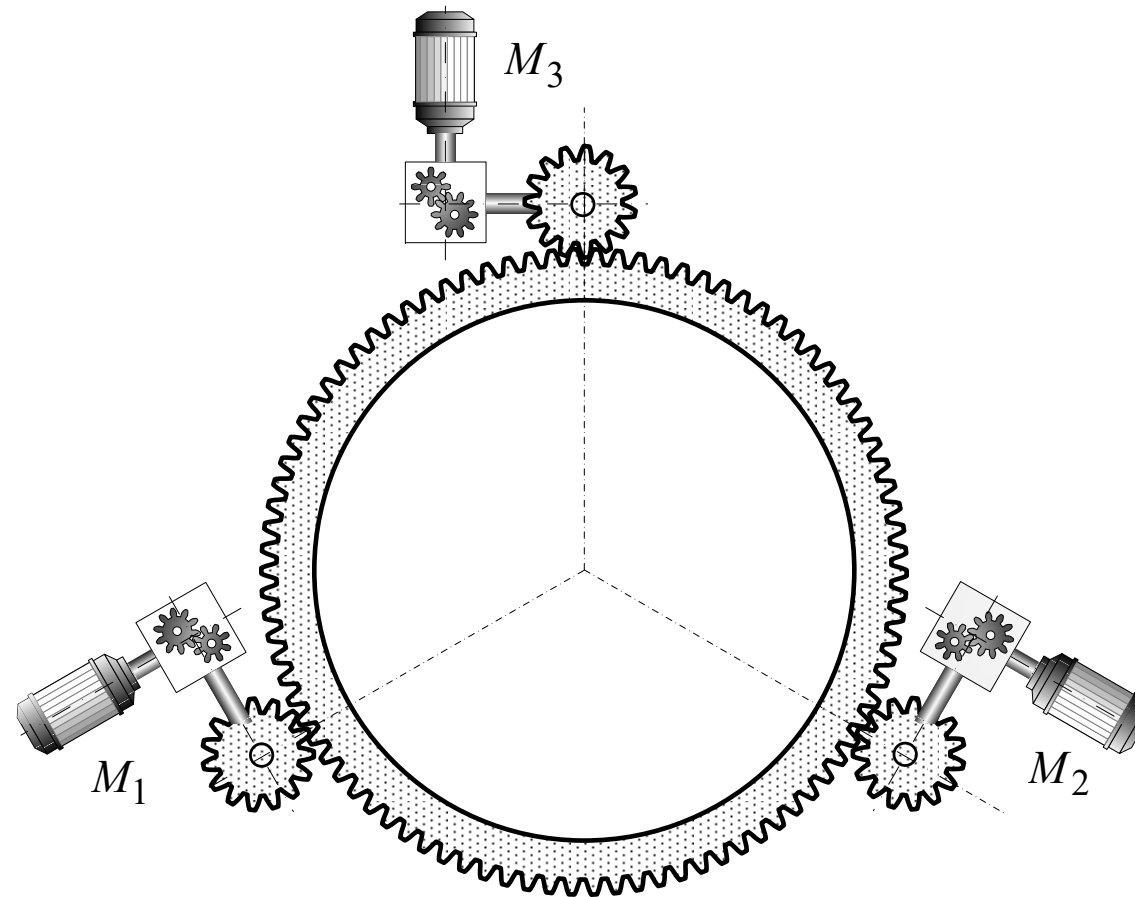


Pogon obrtne platforme



Rotorni bager SRs2000

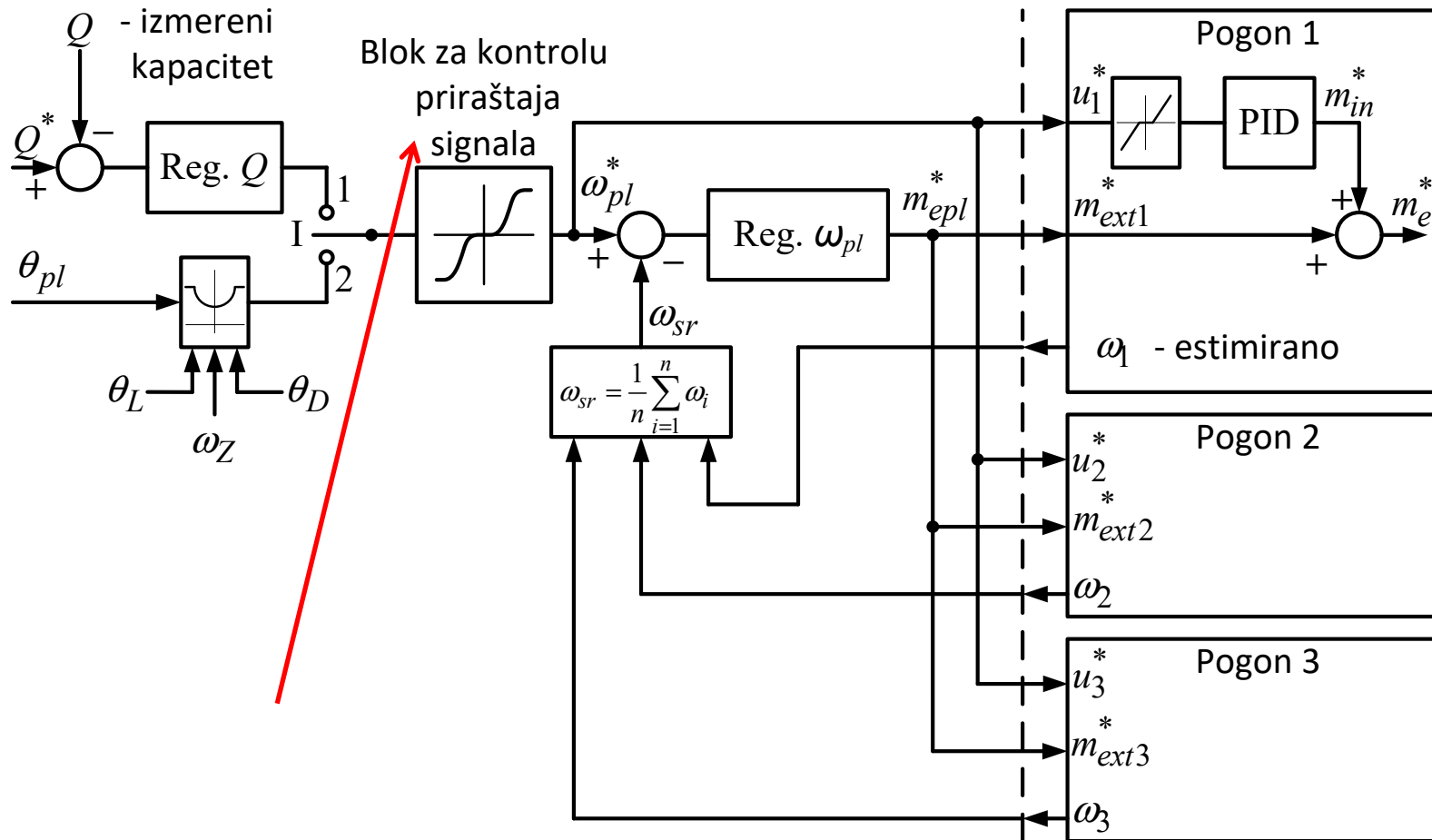
Raspored pogona obrtne platforme primer bagera SRs2000



Programski rad

$$\omega_{pl}(\theta_{pl}) = \begin{cases} \frac{\omega_z}{\cos \theta_L} & \text{za } \theta_{pl} > \theta_L \\ \frac{\omega_z}{\cos \theta_{pl}} & \text{za } \theta_L > \theta_{pl} > \theta_D \\ \frac{\omega_z}{\cos \theta_D} & \text{za } \theta_{pl} > \theta_D \end{cases}$$

Upravljačka struktura pogona kružnog kretanja bagera

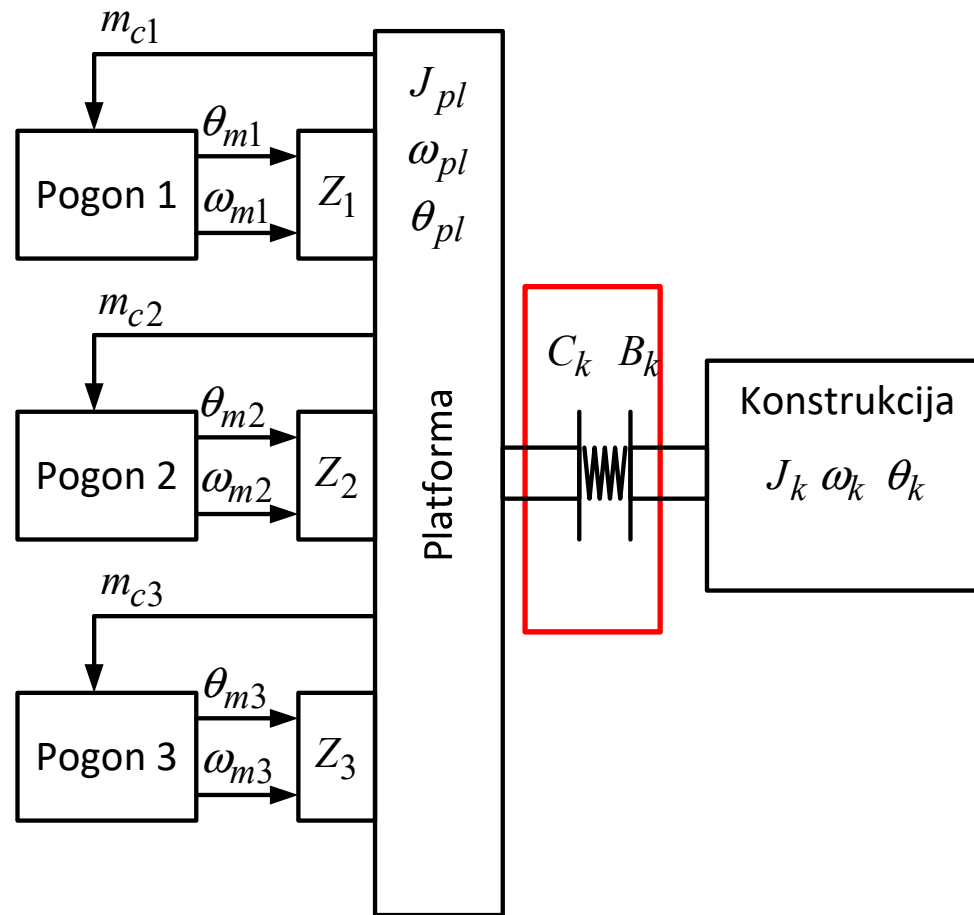


Analiza ponašanja platforme pri kružnom kretanju

Podela na podsisteme:

1. Podsystem pogon 1 koji je povezan sa platformom zupčastim prenosom
2. Podsystem pogon 2 koji je povezan sa platformom zupčastim prenosom
3. Podsystem pogon 3 koji je povezan sa platformom zupčastim prenosom
4. Podsystem platforme
5. Podsystem konstrukcije na platformi

Struktura modela pogona kružnog kretanja bagera



Potrebne jednačine

$$J_{mi} \frac{d\omega_{mi}}{dt} = m_{ei} - K_{tri} \cdot \omega_{mi} - m_{ci} \quad i = 1 \div 3$$

$$\frac{d\theta_{mi}}{dt} = \omega_{mi} \quad i = 1 \div 3$$

Za motore

$$J_{pl} \frac{d\omega_{pl}}{dt} = \sum_{i=1}^3 m_{ci} - K_{trpl} \cdot \omega_{pl} - m_{cpl-k}$$

$$\frac{d\theta_{pl}}{dt} = \omega_{pl}$$


Za platformu

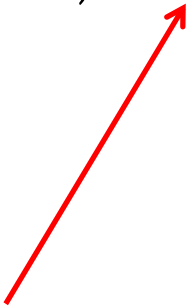
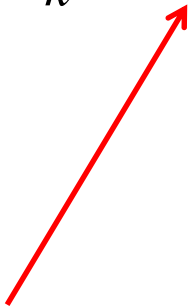
$$J_k \frac{d\omega_k}{dt} = m_{cpl-k} - K_{trk} \cdot \omega_k$$

$$\frac{d\theta_k}{dt} = \omega_k$$

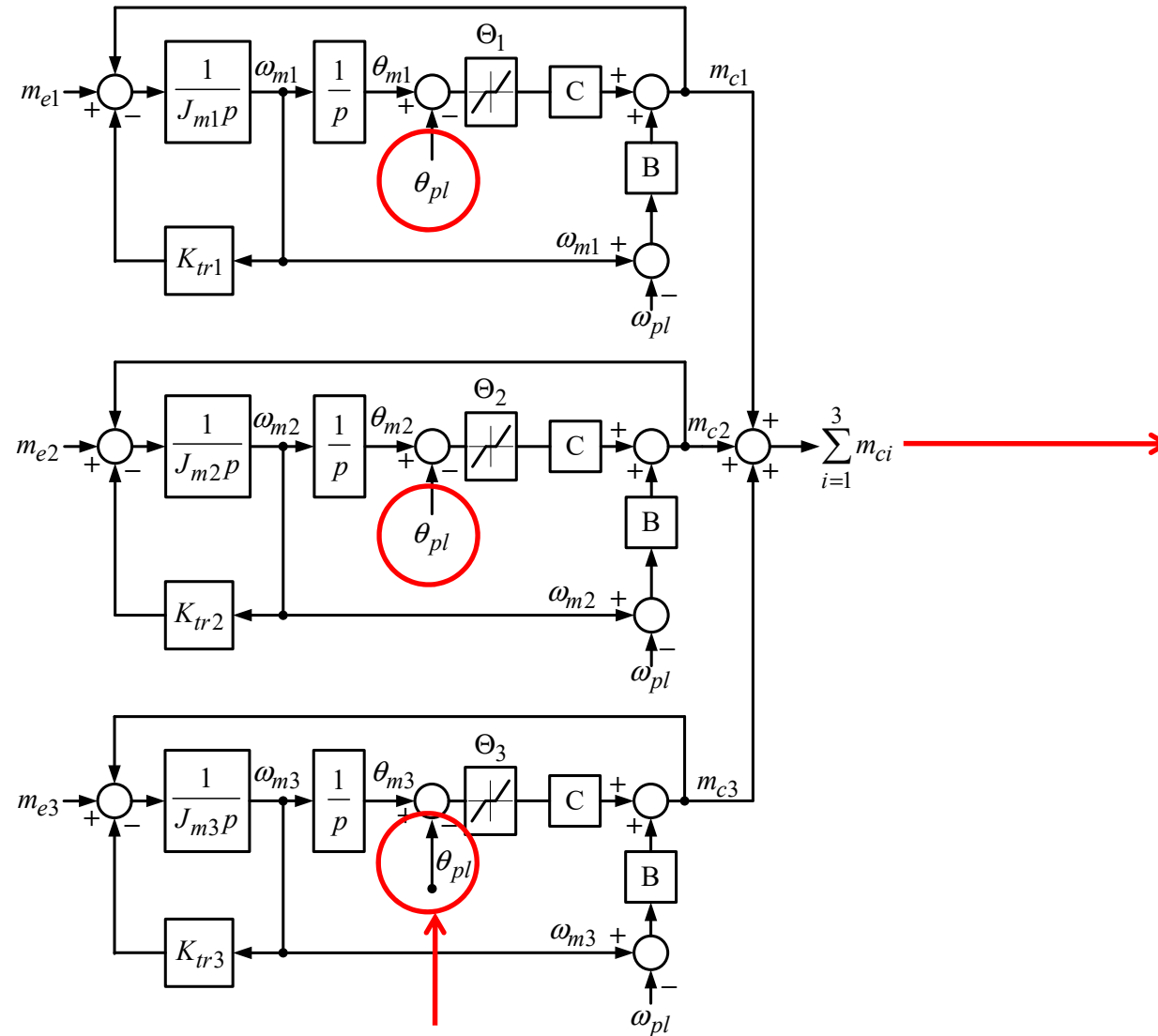
Za konstrukciju

Momenti međuveza


$$m_{ci} = C \cdot \Theta_i (\theta_{mi} - \theta_{pl}) + B (\omega_{mi} - \omega_{pl}) \quad i = 1 \div 3$$


$$m_{cpl-k} = C_k (\theta_{pl} - \theta_k) + B_k (\omega_{pl} - \omega_k)$$

Blok dijagram modela - pogoni



Kruta mehanička veza

Blok dijagram modela – platforma i konstrukcija

