

Podaci o motorima

$$P_n := 5 \text{ kW} \quad I_n := 28 \text{ A} \quad U_n := 220 \text{ V} \quad \omega_n := 1500 \cdot \frac{\text{rpm}}{\text{min}} = 157.08 \cdot \frac{\text{rad}}{\text{s}}$$

$$M_b := \frac{U_n \cdot I_n}{\omega_n} = 39.216 \cdot \text{N} \cdot \text{m} \quad \Psi_{fb} := \frac{U_n}{\omega_n} = 1.401 \text{ Wb} \quad R_b := \frac{U_n}{I_n}$$

$$R_a := 0.39286 \Omega \quad \psi_{fn} := \frac{U_n - R_a \cdot I_n}{\omega_n} = 1.331 \text{ Wb} \quad \psi_{fn-} := 1 - \frac{R_a}{R_b} = 0.95$$

$$m_m := 37.255 \text{ N} \cdot \text{m} \quad V_{ll} := 188 \text{ V} \quad m_{en} := \psi_{fn} \cdot I_n = 37.255 \cdot \text{N} \cdot \text{m}$$

$$u_d(\alpha) := \frac{6 \cdot \sqrt{2}}{2 \cdot \pi} \cdot V_{ll} \cdot \cos(\alpha) \quad U_{d0} := \frac{3 \cdot \sqrt{2}}{\pi} \cdot V_{ll} = 253.889 \text{ V} \quad \frac{U_{d0}}{U_n} = 1.154$$

A) Odrediti brzinu obrtanja ako se ugao paljenja prvog motora podesi na 40 deg. a struja drugog motora podesi na nulu

$$u_{aA} := u_d(40 \text{ deg}) \quad u_{aA} = 194.49 \text{ V} \quad \frac{u_{aA}}{U_n} = 0.884$$

$$\omega_A := \frac{u_{aA}}{\psi_{fn}} - R_a \cdot \frac{m_m}{\psi_{fn}^2} \quad I_{aA} := \frac{m_m}{\psi_{fn}} = 28 \text{ A}$$

$$\frac{\omega_A}{\omega_n} = 0.8779 \quad \omega_A = 137.907 \cdot \frac{\text{rad}}{\text{s}} \quad \omega_A = 1316.917 \cdot \frac{\text{rpm}}{\text{min}}$$

B) Sta ce se dogoditi ako se struja drugog motora podesi na 10A

$$I_{2B} := 10A \quad \frac{I_{2B}}{I_n} = 0.357 \quad m_{e2B} := \psi_{fn} \cdot I_{2B}$$

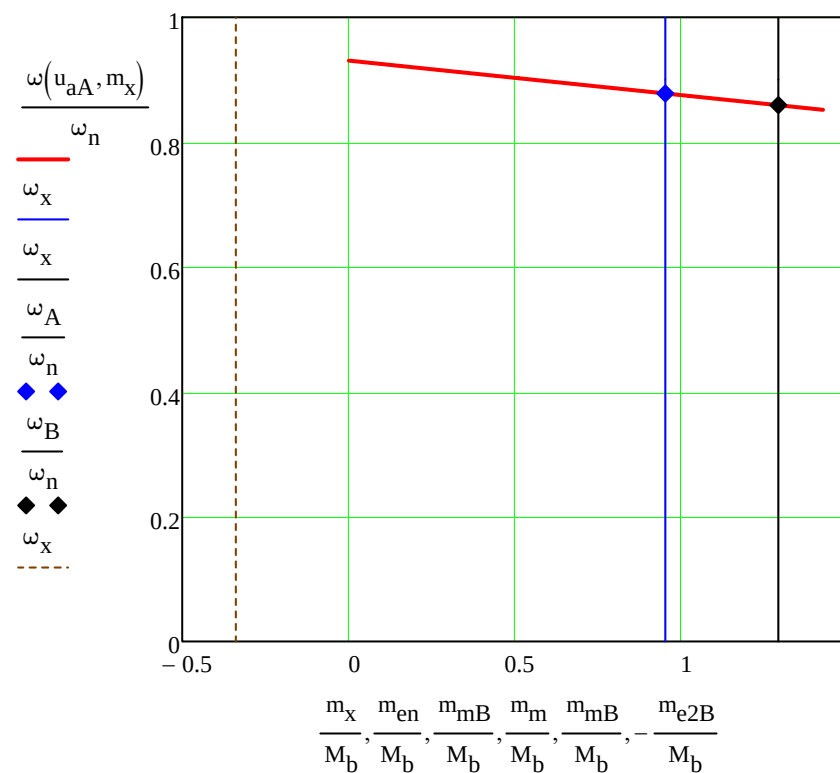
$$m_{mB} := m_m + \psi_{fn} \cdot I_{2B} = 50.56 \cdot N \cdot m \quad \frac{m_{mB}}{M_b} = 1.289$$

$$I_{1B} := \frac{m_{mB}}{\psi_{fn}} = 38A \quad \frac{I_{1B}}{I_n} = 1.357$$

$$\omega_B := \frac{u_{aA}}{\psi_{fn}} - R_a \cdot \frac{m_{mB}}{\psi_{fn}^2} = 134.955 \cdot \frac{\text{rad}}{\text{s}} \quad \frac{\omega_B}{\omega_n} = 0.85915 \quad \omega_B = 1288.721 \cdot \frac{\text{o}}{\text{min}}$$

$$m_x := 0 \cdot Nm, 0.1Nm \dots 1.5 \cdot m_{en} \quad \omega_x := 0, 0.1 \dots 1$$

$$\omega(u_a, m_e) := \frac{u_a}{\psi_{fn}} - R_a \cdot \frac{m_e}{\psi_{fn}^2}$$



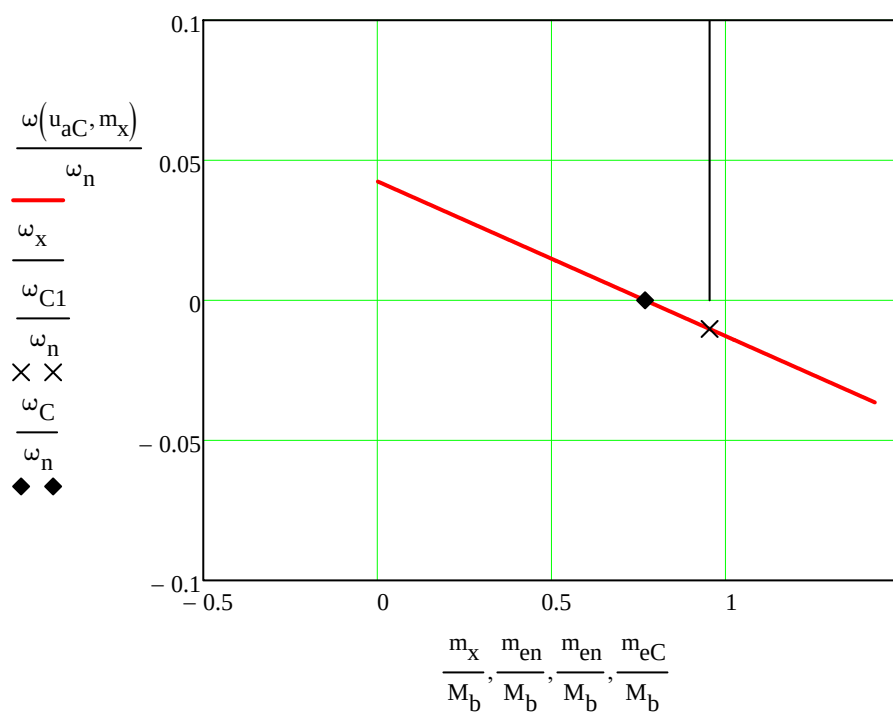
C) Odrediti brzinu obrtanja ako se ugao paljenja prvog ispravljača podesi na 88, a struja drugog ispravljača na nulu.

$$u_{aC} := u_d(88\text{deg}) = 8.861 \text{ V} \quad \frac{u_{aC}}{U_n} = 0.04$$

$$\omega_{C1} := \frac{u_{aC}}{\psi_{fn}} - R_a \cdot \frac{m_m}{\psi_{fn}^2} = -1.608 \cdot \frac{\text{rad}}{\text{s}} \quad \frac{\omega_{C1}}{\omega_n} = -0.01 \quad \text{Ovo ne odgovara za reaktivno opterećenje!}$$

$$\omega_C := 0 \quad i_{aC} := \frac{u_{aC}}{R_a} = 22.554 \text{ A} \quad \frac{i_{aC}}{I_n} = 0.806$$

$$m_{eC} := i_{aC} \cdot \psi_{fn} = 30.009 \cdot \text{Nm} \quad \frac{m_{eC}}{M_b} = 0.765$$



D) Kako se može obezbediti **stabilan (!)** rad sa brzinom -750o/min?

$$n_D := -750 \cdot \frac{\text{o}}{\text{min}} \quad \omega_D := n_D = -78.54 \cdot \frac{\text{rad}}{\text{s}} \quad \frac{\omega_D}{\omega_n} = -0.5$$

$$m_{mD} := -m_{en} = -37.255 \cdot \text{N} \cdot \text{m}$$

Izabrali smo struju prvog motora

$$i_{a1D} := 0.3 \cdot I_n = 8.4 \text{ A} \quad m_{e1D} := \psi_{fn} \cdot i_{a1D} = 11.176 \cdot \text{N} \cdot \text{m} \quad \frac{m_{e1D}}{M_b} = 0.285$$

$$m_{e2D} := m_{e1D} - m_{mD} = 48.431 \cdot \text{Nm} \quad \frac{m_{e2D}}{M_b} = 1.235$$

$$i_{a2D} := \frac{m_{e2D}}{\psi_{fn}} = 36.4 \text{ A} \quad \frac{i_{a2D}}{I_n} = 1.3$$

$$u_{aD} := \omega_D \cdot \psi_{fn} + R_a \cdot i_{a1D} = -101.2 \text{ V} \quad \frac{u_{aD}}{U_n} = -0.46$$

$$\alpha_D := \arccos\left(\frac{u_{aD}}{U_{d0}}\right) = 113.491 \cdot \text{deg}$$

