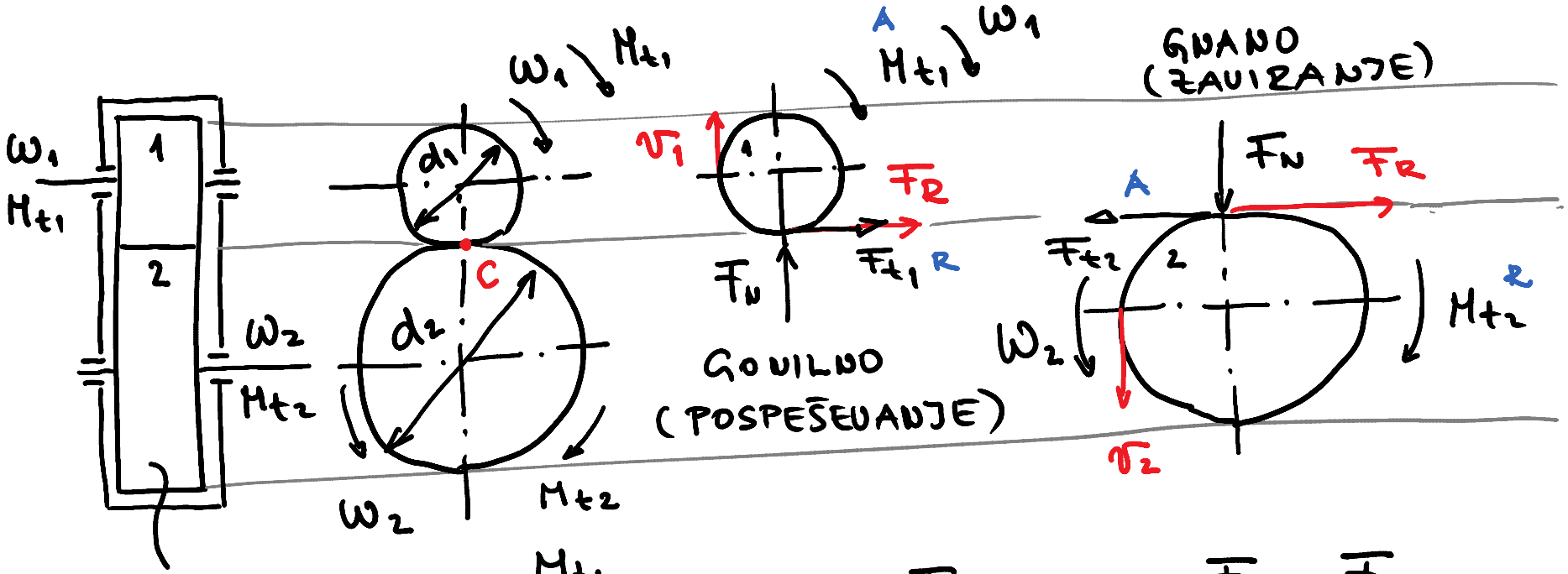
TORNA GONILA



$$F_{t1} = \frac{M_{t1}}{d_1}\,2 \qquad F_R = F_N \cdot \mu \qquad F_W = F_N$$

$$F_{t2} = \frac{M_{t2}}{d_2}\,2 \qquad F_{t1} \leq F_R = F_N \cdot \mu$$

C : KINEMATIČNA TOČKA

F_W : SILA NA GREDI

$$P_2 = M_{t2} \cdot \omega_2$$

$$P_1 = M_{t1} \cdot \omega_1$$

$$\eta = \frac{P_2}{P_1} = \frac{M_{t2} \cdot \omega_2}{M_{t1} \cdot \omega_1} = \frac{F_{t2}}{F_{t1}} \cdot \frac{d_2 \omega_2}{d_1 \omega_1} \cdot \frac{2}{2} = \frac{F_{t2} \cdot v_2}{F_{t1} \cdot v_1}$$

v_2 ... ≤ 1

v_1 ... ≤ 1

IZGUBE SO POSLEDICA ZDRSOVANJA TORNIH KOLES IN KOTALNEGA UPORA!

MAKSIMALNA MOČ, KI JO PRETO TORNEGA GONILA LAHKO PRENAŠAMO

$$P_{max} = F_R v_1 = F_N \cdot \mu \omega_1 \cdot \frac{d_1}{2}$$

$F_N \uparrow$ TRDI TORNI MATERIAL

KALJENO JEKLO - KALJENO JEKLO
JEKLO - SIVA LITINA ✓✓
JEKLO - JEKLO

$\mu \downarrow \quad \eta \uparrow \quad Q \downarrow \quad T \downarrow$

$\mu \uparrow$ MEHKI TORNI MATERIAL

TRDE TKANINE - SIVA LITINA
TRDE TKANINE - JEKLO ✓✓
GUMA - SIVA LITINA
GUMA - JEKLO

$F_N \downarrow \quad \eta \downarrow \quad Q \uparrow \quad T \uparrow$

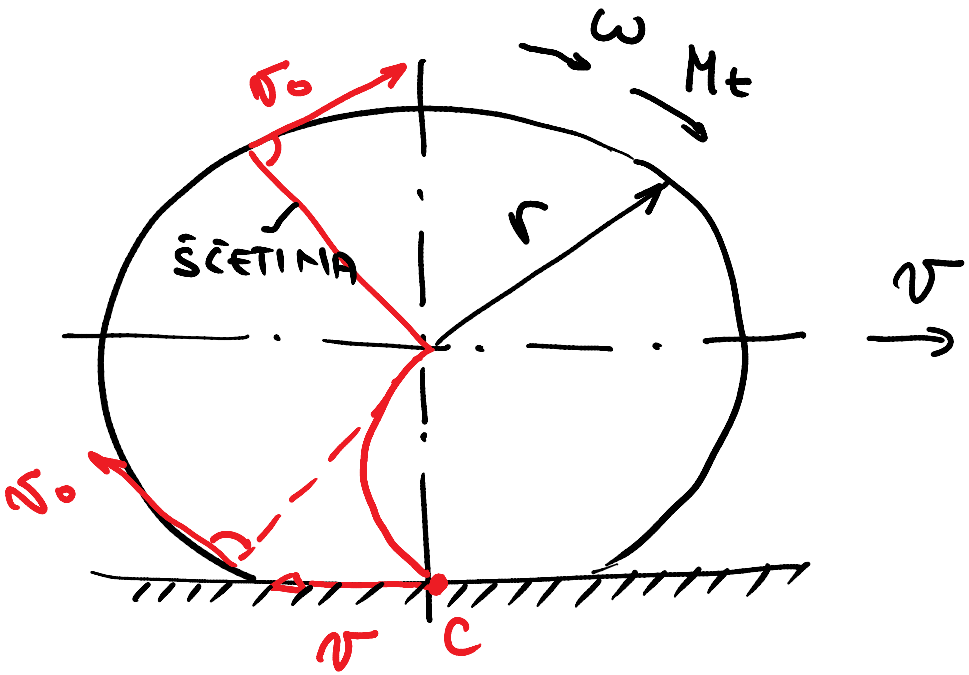
$\omega_1 \uparrow$ ω_1 JE POGOSTO DOLOČENA ✗

$d_1 \uparrow$ POVEČANJE DIMENZIJ GONILA ✓

+ TIH TEŽ V PRIMERJAVI Z GONILI, ZI IZKORIŠČAJO OBLIKOVNO ŽUETO
+ DUŠIJO VIBRACIJE
+ VARUJEJO PRED PREOBREMENITVIJO
+ ENOSTAVNA IZDELAVA
− ZDRS
− NENATANČNO URTENJE GNANE GREDI
− OBRABA TORNIH POVRŠIN
− OBREMENITEV GREDI $F_w \uparrow$

RAZMERE PRI NAKOTALJEVANJU

POSPEŠEVANJE



$$v_0 = \omega r$$

$$v < v_0$$

$$\sigma = \frac{v_0 - v}{v_0}$$

$$\sigma v_0 = v_0 - v$$

$$v = v_0 (1 - \sigma)$$

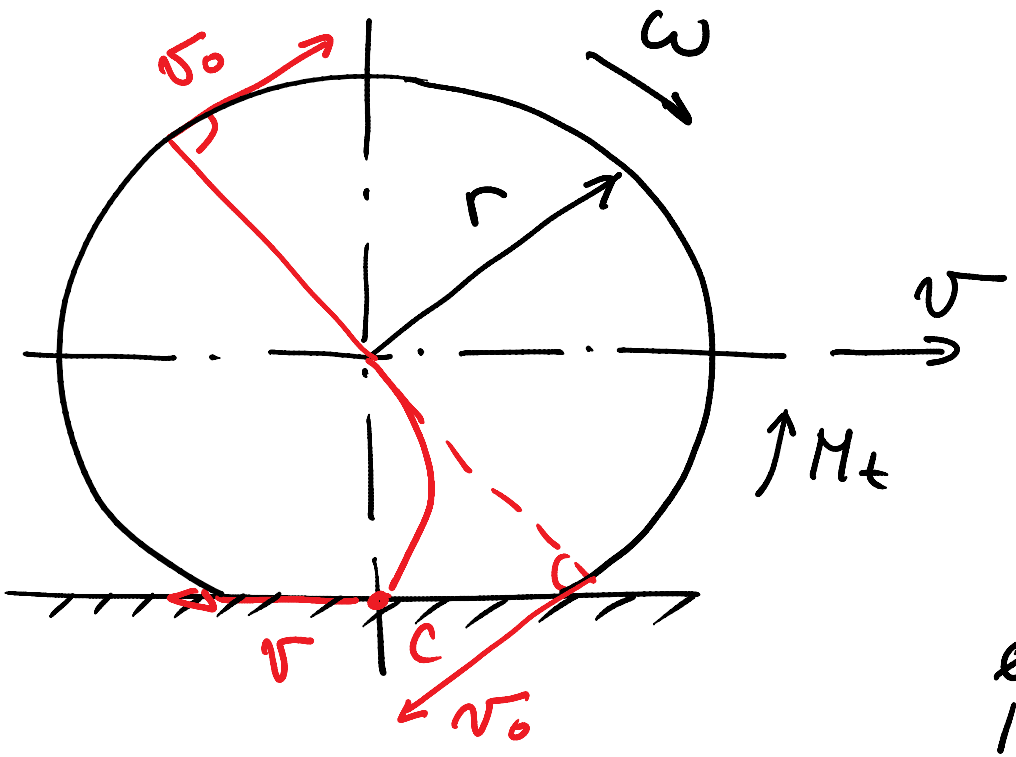
σ ... DRS

$0 \leq \sigma \leq 1$ ČISTI DRS

1

ČISTO NAKOTALJEVANJE

ŽAVIRANJE



$$v > v_0$$

$$\sigma = \frac{v - v_0}{v}$$

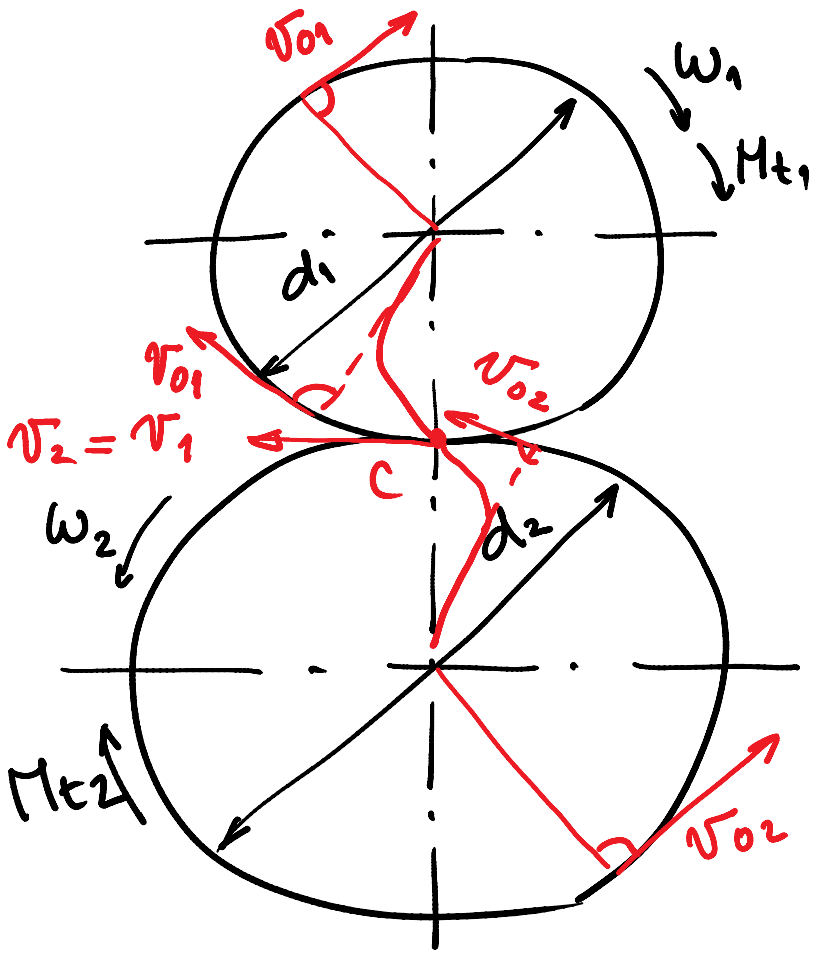
$$v\sigma = v - v_0$$

$$v_0 = v(1 - \sigma)$$

$0 \leq \sigma \leq 1$ - ČISTI ŽDRS

ČISTO VALJANJE

PRESTAVNO RAZMERJE TORNEGA GONILA



$$v_{01} = \omega_1 \cdot \frac{d_1}{2} \; ; \; v_{02} = \omega_2 \cdot \frac{d_2}{2}$$

$$v_{01} \geq v_1$$

$$\sigma_1 = \frac{v_{01} - v_1}{v_{01}}$$

$$v_1 = v_{01}(1 - \sigma_1)$$

$$v_2 \geq v_{02}$$

$$\sigma_2 = \frac{v_2 - v_{02}}{v_2}$$

$$v_{02} = v_2(1 - \sigma_2)$$

$$v_1 = v_2 = v$$

$$i = \frac{\omega_1}{\omega_2} = \frac{z\, v_{01}\, d_2}{d_1\, z\, v_{02}} = \frac{v_1\, d_2}{d_1(1-\sigma_1)v_2(1-\sigma_2)}$$

$$i = \frac{1}{(1-\sigma_1)(1-\sigma_2)} \cdot \frac{d_2}{d_1}$$

KOEFICIENT SOJEMANJA

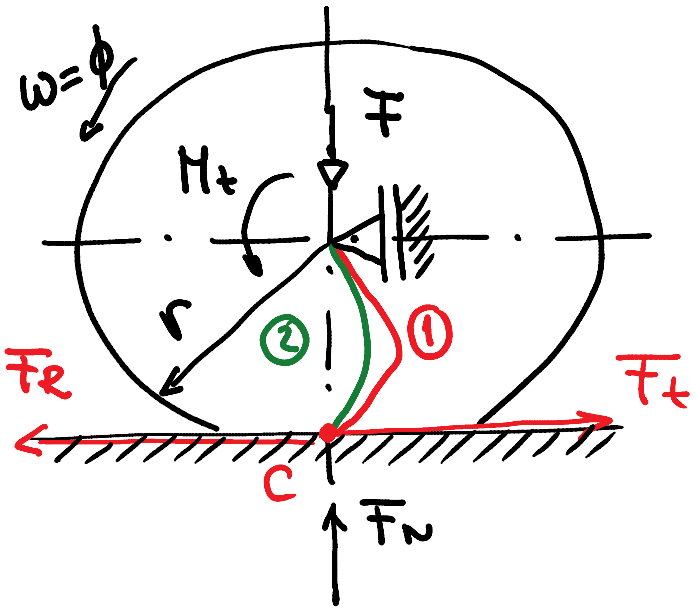
$\mu = \frac{F_R}{F_N}$ KOEFICIENT TRENJA

$\mu_H = \frac{F_t}{F_N}$ KOEFICIENT SOJEMANJA

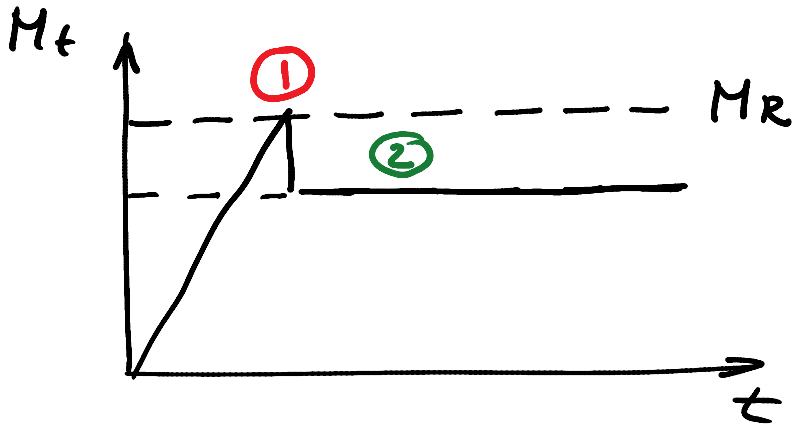
$F_R \leq F_t \rightarrow \mu_H \leq \mu$

F_{Rm} SILA TRENJA PRI MIROVANJU

F_{Rg} SILA TRENJA PRI GIBANJU



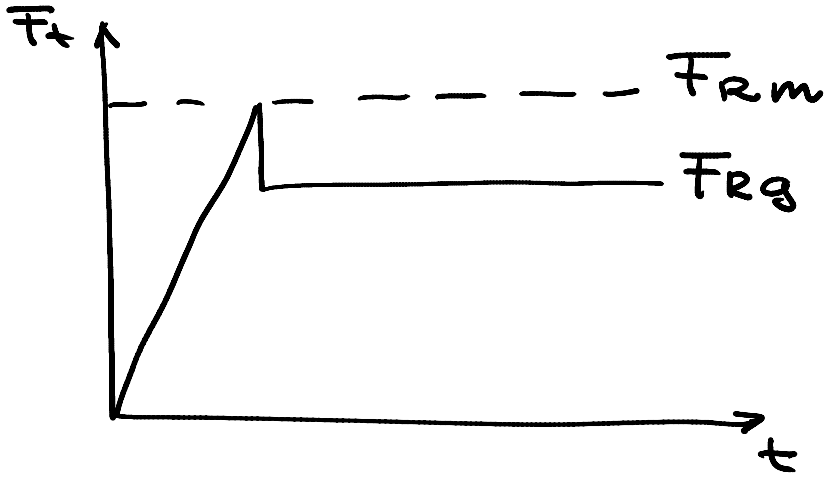
$$F_t = \frac{M_t}{r}$$

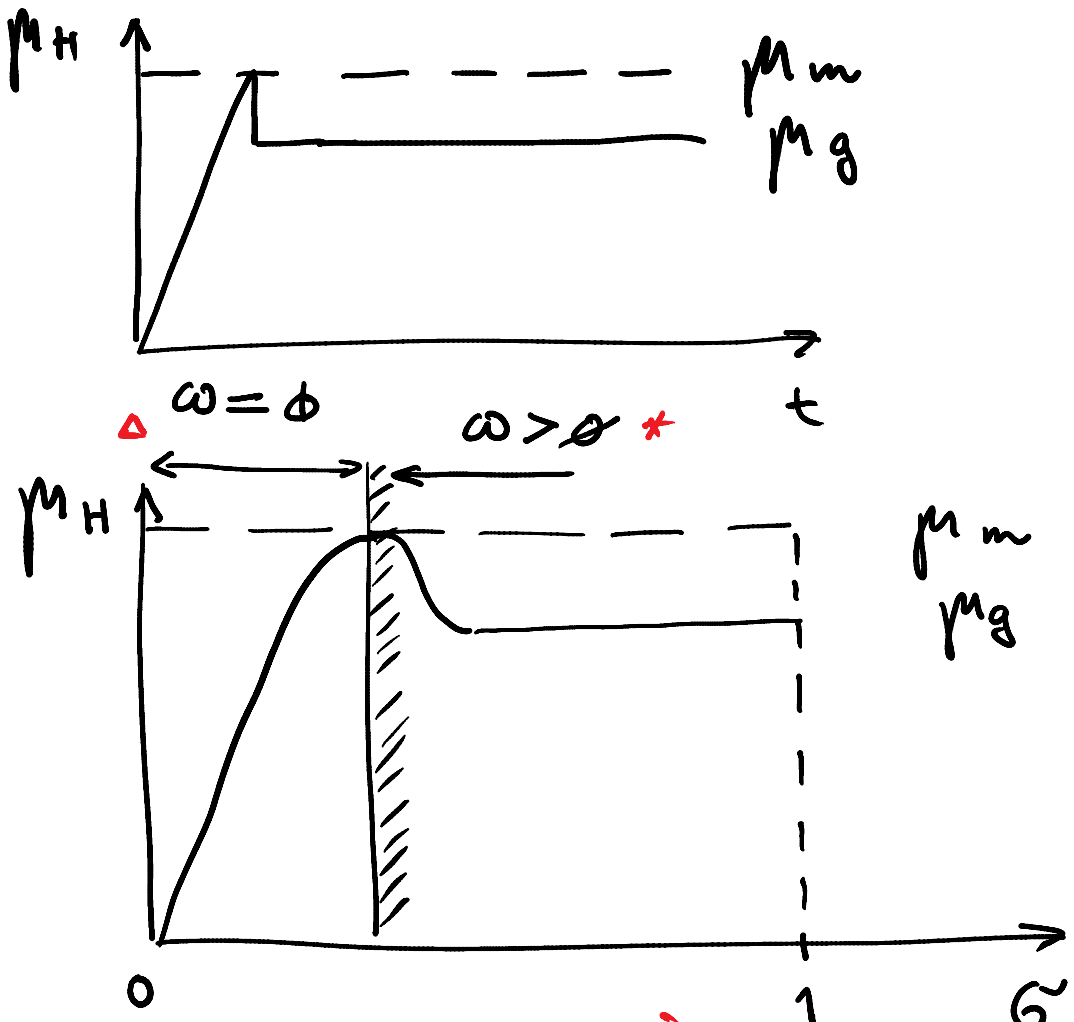


$$M_R = F_R \cdot r$$

$$\mu_m = \frac{F_{Rm}}{F_N}$$

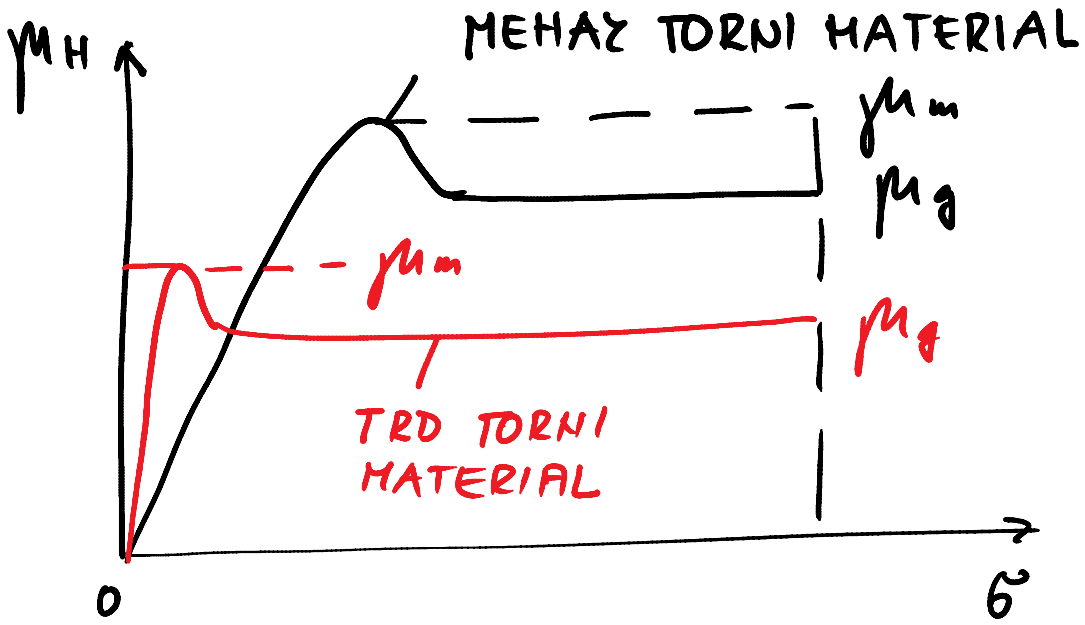
$$\mu_g = \frac{F_{Rg}}{F_N}$$



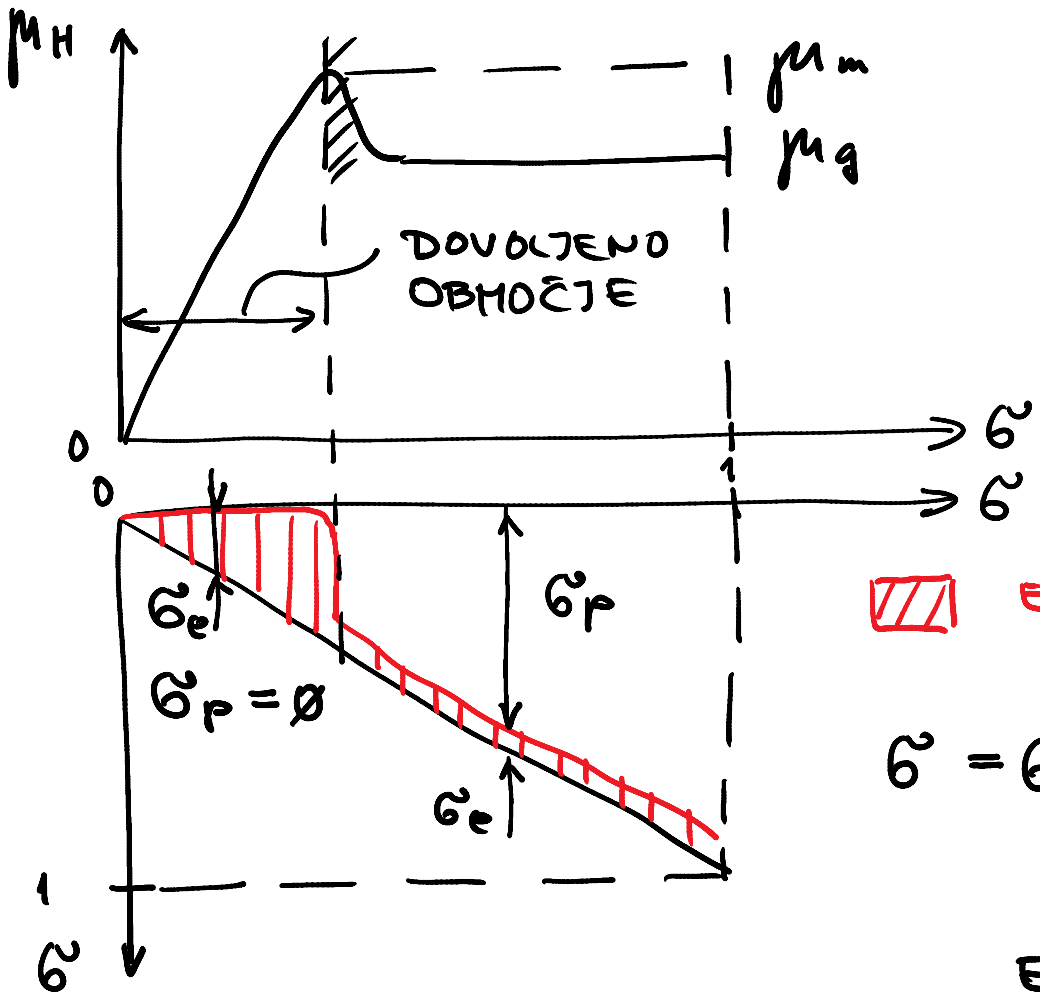


Δ OBMOČJE ELASTIČNEGA ŽDRSA (DOVOLJENO OBMOČJE ZA OBRATOVANJE)

* OBMOČJE PRAVEGA ŽDRSA


μH
MEHAZ TORNI HATERIAL
μm
μg
μm
μg
TRD TORNI
HATERIAL
0
σ

RAZČLENITEV ZDRSA NA ELASTIČNI IN PRAVI ZDRS



ELASTIČNI ZDRS

$$\sigma = \sigma_e + \sigma_p$$

σ_e: ELASTIČNI ZDRS

σ_p: PRAVI ZDRS

VREDNOTENJE TORNIH GONIL

VREDNOTENJE KONTAKTNE OBREMENITVE F_N

KRITERIJ ZA VREDNOTENJE MEHKIH TORNIH MATERIALOV

$$F_N \leq F_{Ndop} = f(d_1, L, n_1)$$

d_1 – PREMER GONILNEGA TORNEGA KOLESA

L – ŠIRINA TORNEGA KOLESA

VREDNOTENJE POVRŠINSKEGA TLAKA p_H

KRITERIJ ZA VREDNOTENJE TRDIH TORNIH MATERIALOV

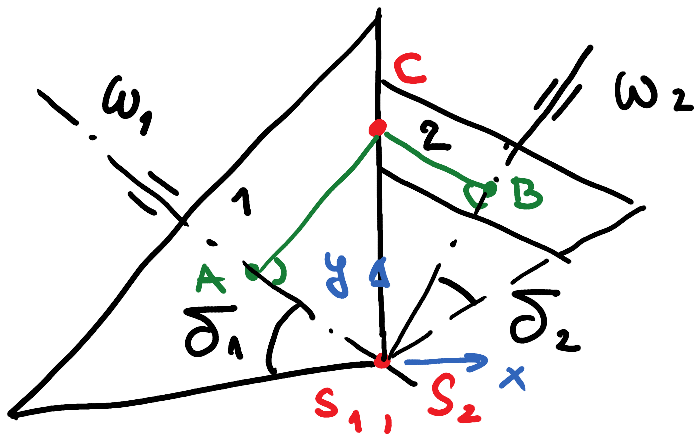
$$p_H \leq p_{Hdop} = f(\text{KOMBINACIJA TORNIH MATERIALOV}, \text{MAZANJE}, \text{DIFERENČNI TORS})$$

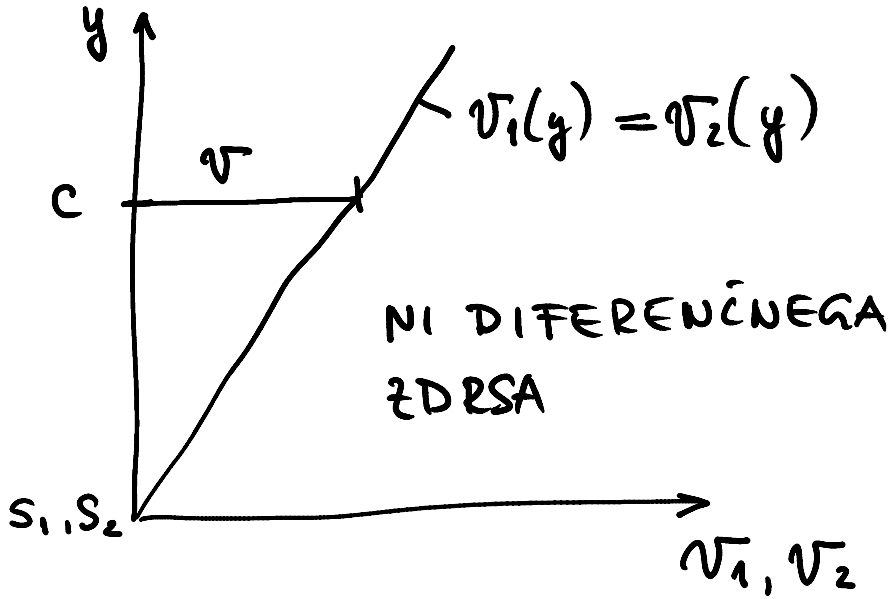
VREDNOTENJE OBRABE

$$\Delta r \leq \Delta r_{dop} \qquad \Delta r = \frac{d_1(t=\phi) - d_1(t>\phi)}{2}$$

VREDNOTENJE SEGREVANJA $T \leq T_{dop}$

DIFERENČNI ZOBNIK





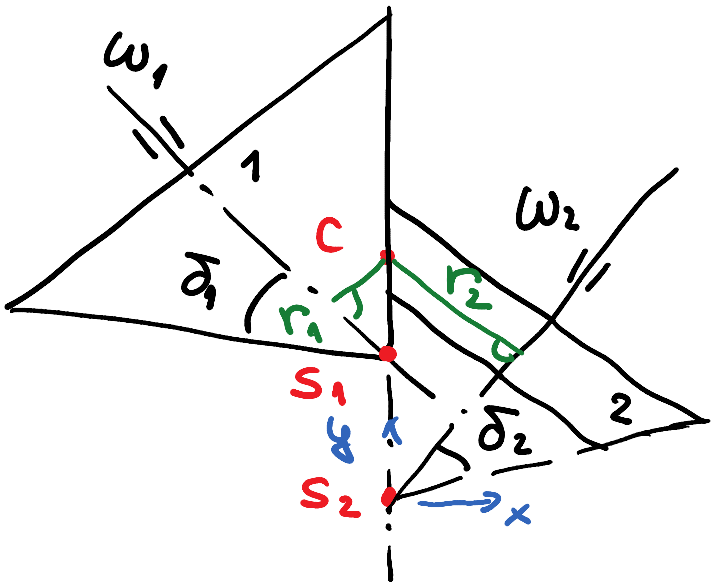
NI DIFERENČNEGA ZOBNIKA

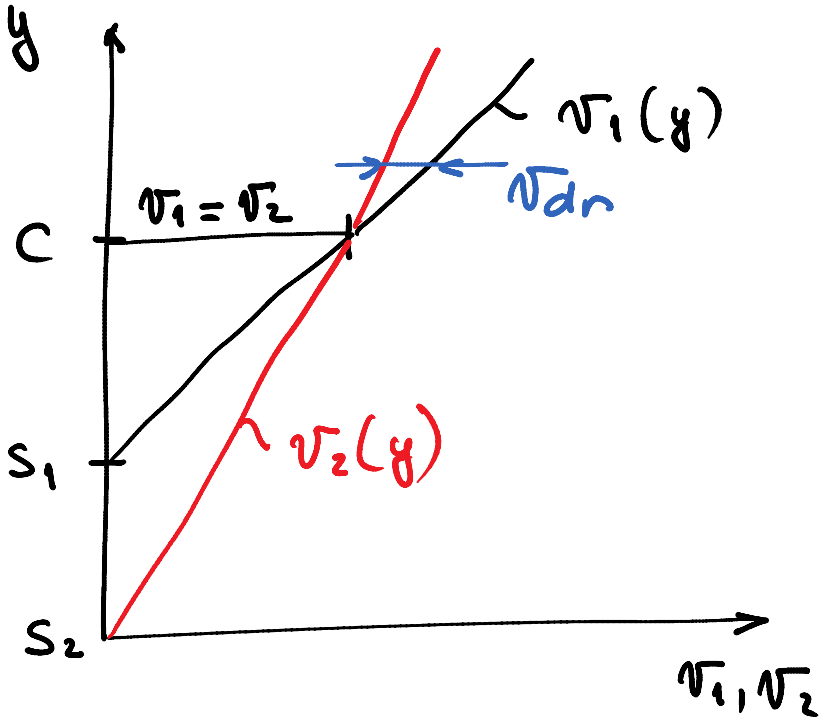
$\overline{AC} = r_1$; $\overline{BC} = r_2$

$v_1 = \omega_1 r_1$; $v_2 = \omega_2 \cdot r_2$ ← VELJA ZA $\sigma_1 = \sigma_2 = \phi$ ČISTO NAKOTALJEVANJE

$v_1 = v_2 = v$

$$i = \frac{\omega_1}{\omega_2} = \frac{v_1 r_2}{r_1 v_2} = \frac{r_2}{r_1} = \frac{\overline{S_2C}\sin\delta_2}{\overline{S_2C}\sin\delta_1} = \frac{\sin\delta_2}{\sin\delta_1}$$





$$v_1 = \omega_1 \cdot r_1 = v_2 = \omega_2 r_2$$

$$v_{dr}(y) = v_1(y) - v_2(y)$$

$$v_{dr}(y = c) = 0$$

DRSNA HITROST v_{dr} POVZROČA DIFERENČNI ŽDRS!