OSI IN GREDI

OSI SO ELEMENTI ZA PRENOS AKSIALNIH, PREČNIH IN UPOGIBNIH OBREMENITEV TER POVRŠINSKIH PRITISKOV.
GREDI POLEG NAŠTETEGA PREVZEMAJO ŠE VZVOJNE OBREMENITVE.

OSI

- MIRUJOČE
- ROTIRAJOČE

MIRUJOČE OSI

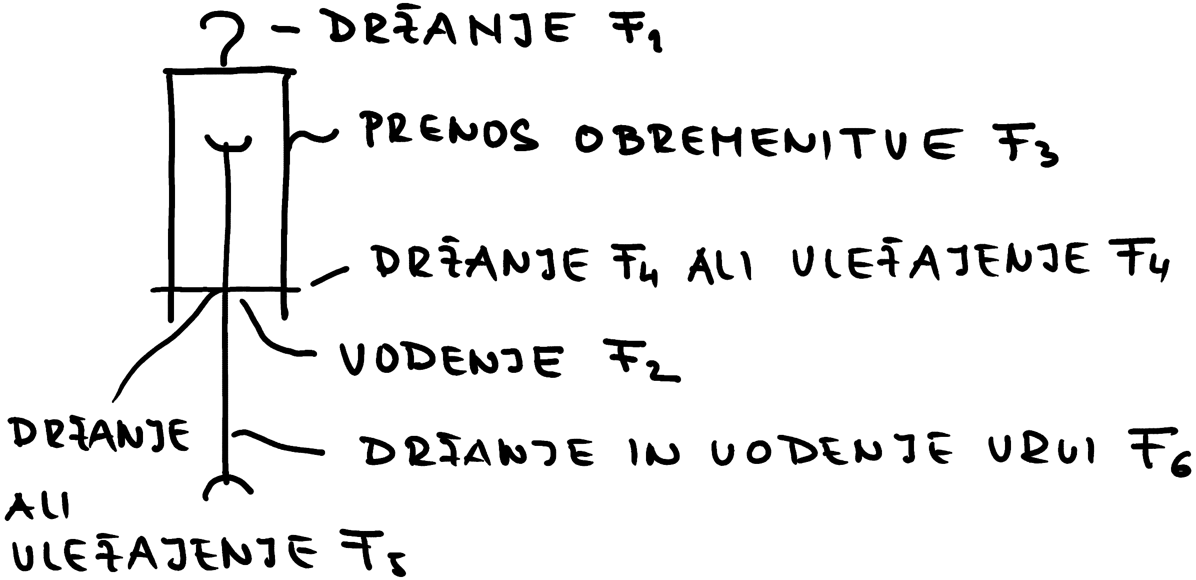
1. PROJEKTNE ZAHTEVE

   RAZVOJ ŠKRIPCA, F_{max} DOLOČIMO MAKSIMALNO OBREMENITEV

2. OPREDELITEV FUNKCIJE

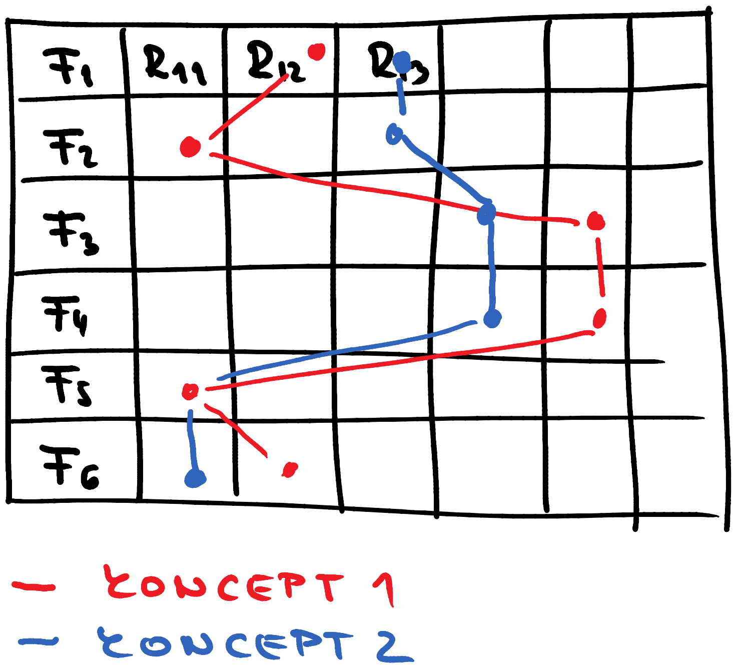
   DVIGANJE BREMEN DO F_{max}

3. RAZČLENITEV FUNKCIJE V DELNE FUNKCIJE



PROCES RAZVOJA IZDELKA SE IZVAJA V SKUPINI!

4 MORFOLOŠKA MATRIKA



DELNIM FUNKCIJAM POIŠČEMO REŠITVE R_{ij}

R_{11} KLJUKA
R_{12} KARABIN
R_{13} VRV
⋮

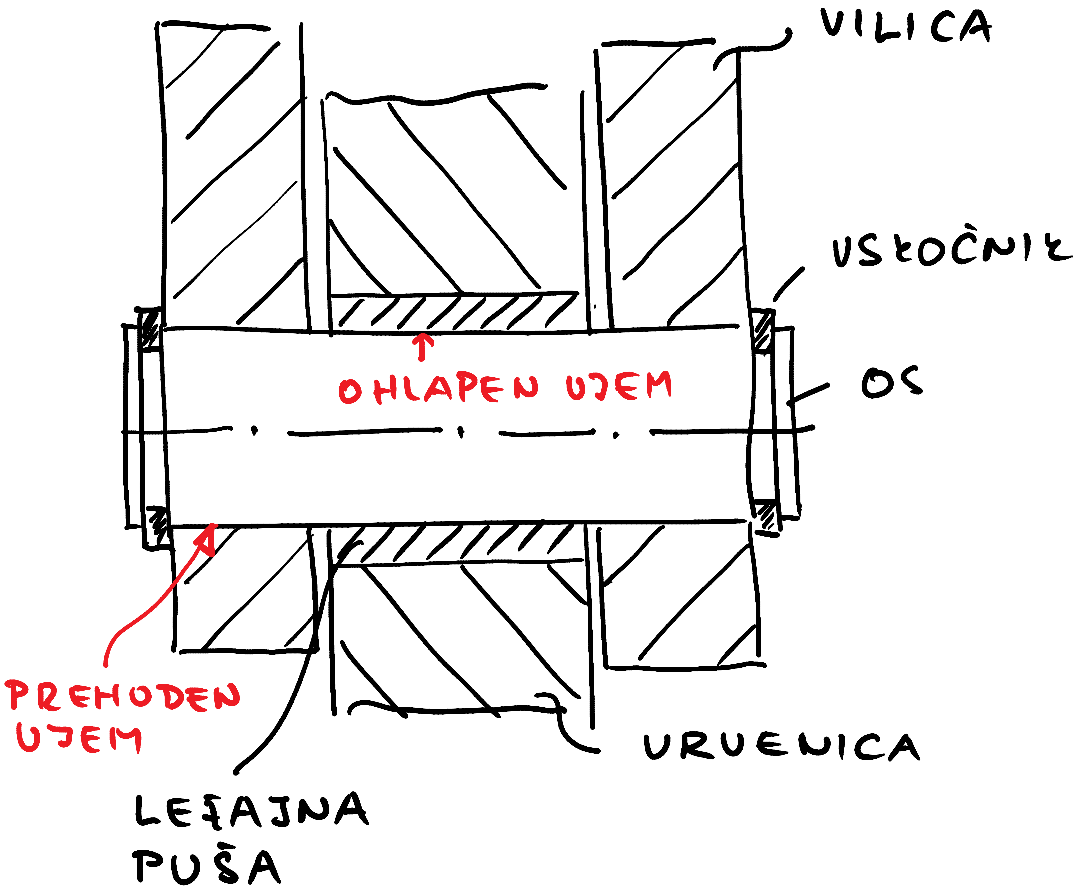
5 ISKANJE KONCEPTOV REŠITEV

KONCEPT 1, 2, 3, ...

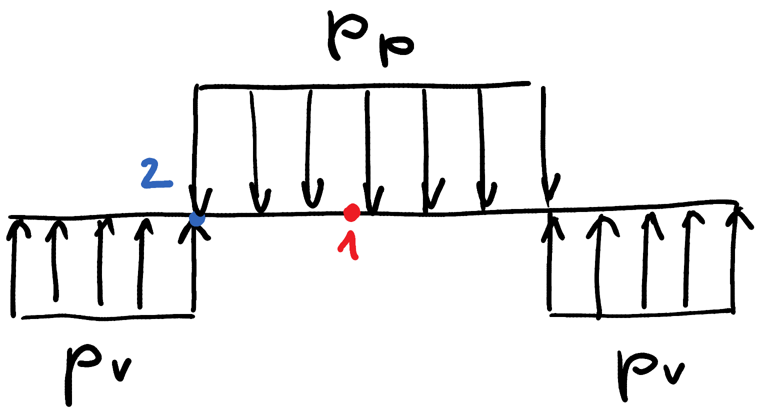
KONCEPTE PROSTOROČNO SKICIRAMO

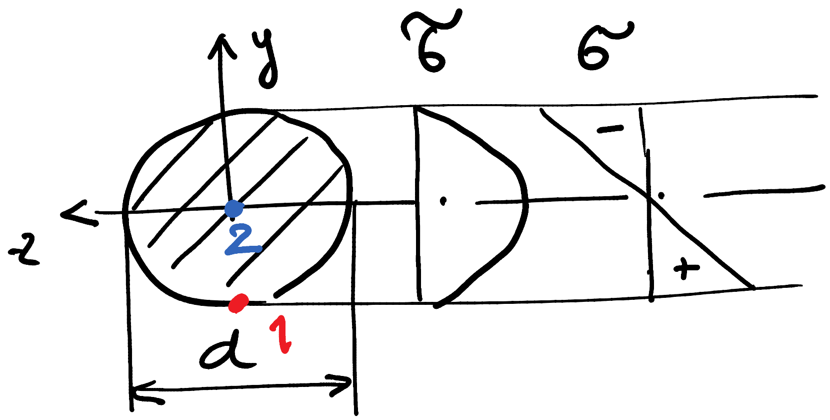
6 VREDNOTENJE KONCEPTOV REŠITEV PO TEHNIČNIH IN EKONOMSKIH KRITERIJIH

7 IZBOR KONCEPTOV ZA ZASNOVO



VREDNOTENJE MIRUJOČE OSI





1: MAKSIMALNA UPOGIBNA NAPETOST

2: MAKSIMALNA STRIŽNA NAPETOST

$\tau \leq \tau_{dop}$

$\sigma \leq \sigma_{dop}$

$p_v \leq p_{v\,dop}$

$p_p \leq p_{p\,dop}$

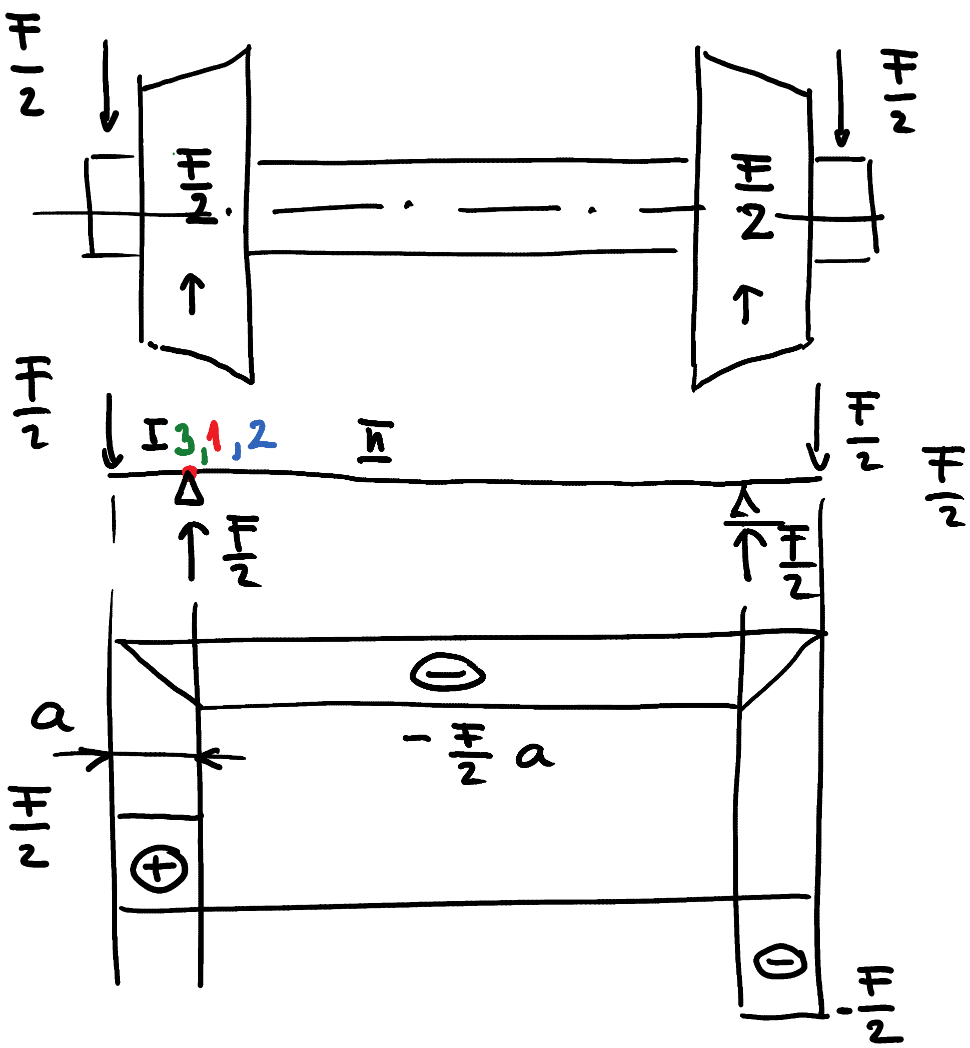
PRI KRATKIH OSEH JE DOMINANTEN τ

PRI DOLGIH PA σ.

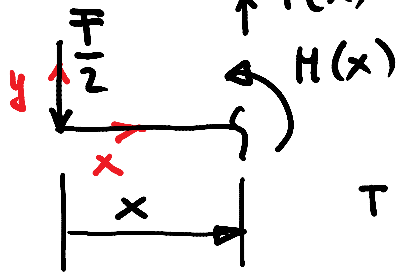
VREDNOTIMO NA TRENUTNI LOM.

REDKEJE NA UTRUJENOSTNI LOM.

ROTIRAJOČE OSI



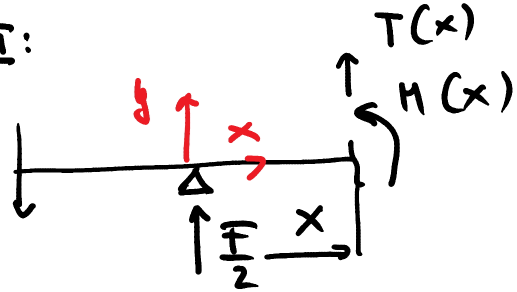
I:



$$T(x) = \frac{F}{2}$$

$$M(x) = -\frac{F}{2}x$$

II:



$$T(x) = 0$$

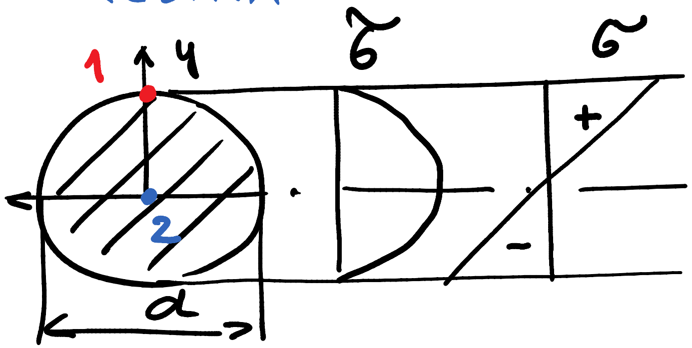
$$M(x) = \frac{F}{2}x - \frac{F}{2}(a+x)$$

$$= -\frac{F}{2}a$$

$$T_{max} = \frac{F}{2}\ ; \quad M_{max} = -\frac{Fa}{2}$$

1: MAKSIMALNA UPOGIBNA NAPETOST

2: MAKSIMALNA STRIŽNA NAPETOST

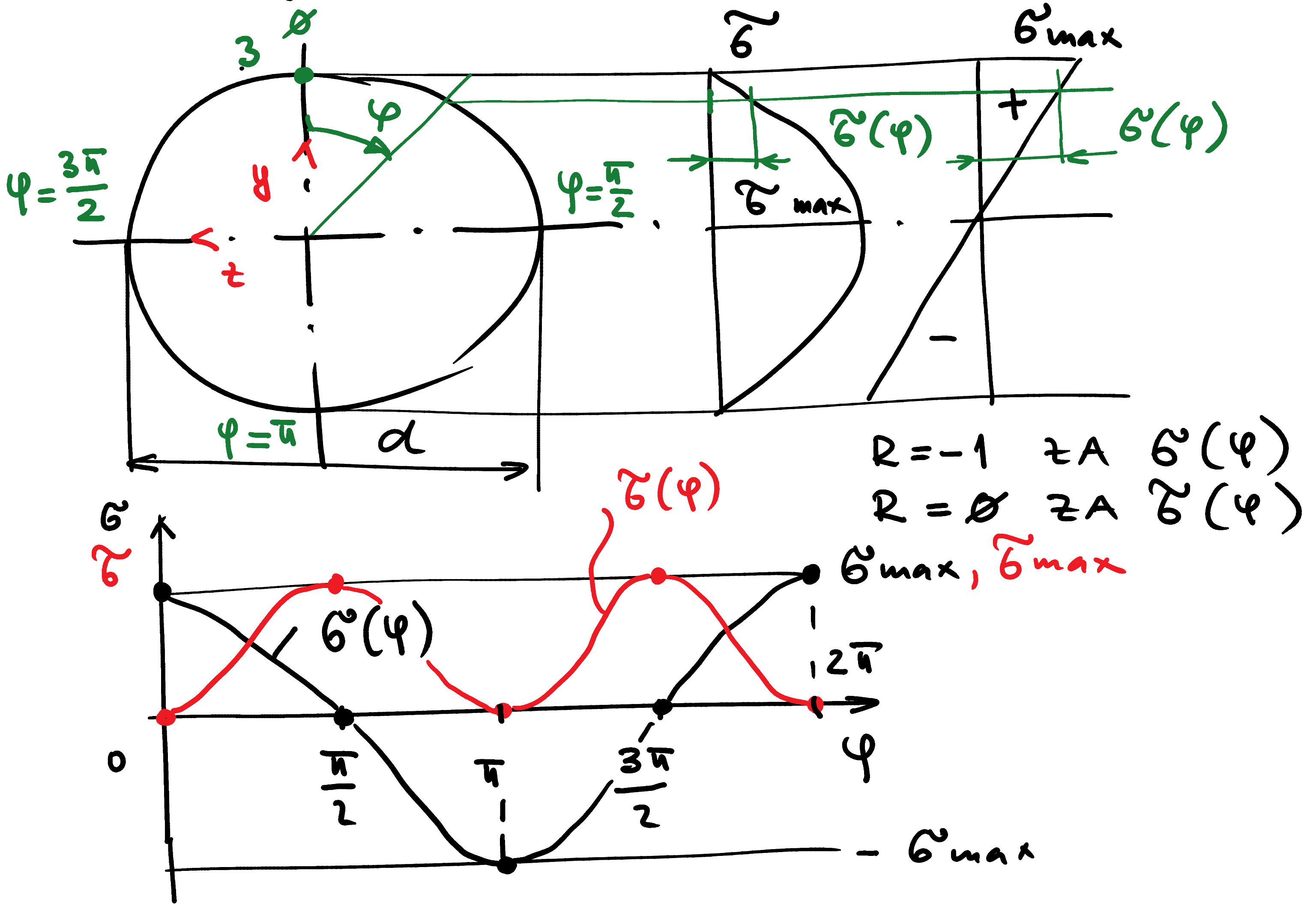


$\tau \leq \tau^{R}_{dop}$

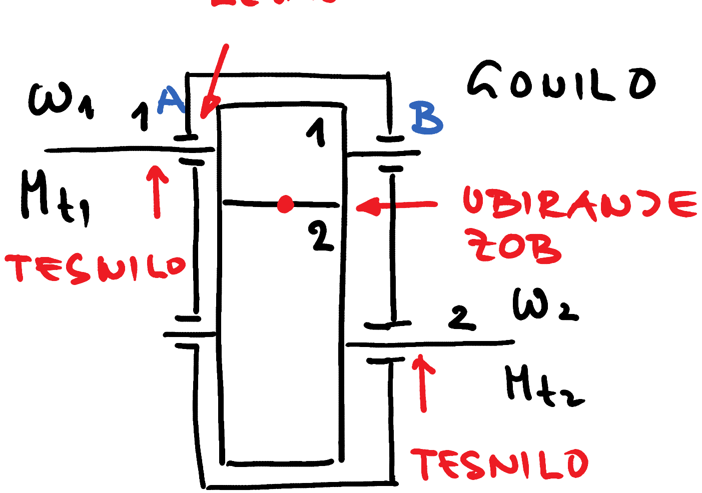
$\sigma \leq \sigma^{R}_{dop}$

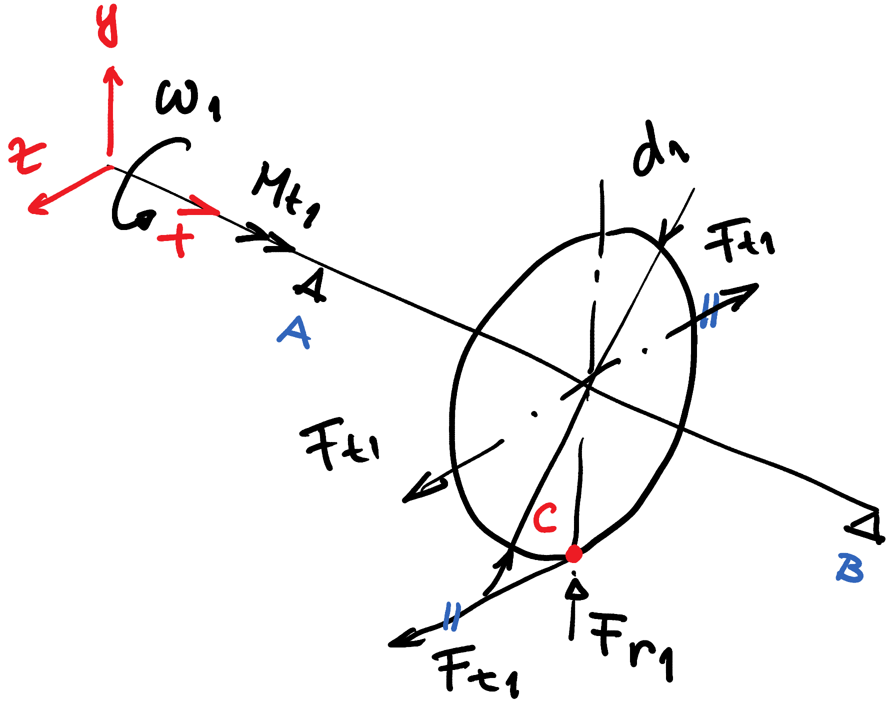
VREDNOTIMO NA UTRUJENOSTNI LOM!

VZROK ZA UTRUJENOSTNI LOM ROTIRAJOČIH OSI



GREDI

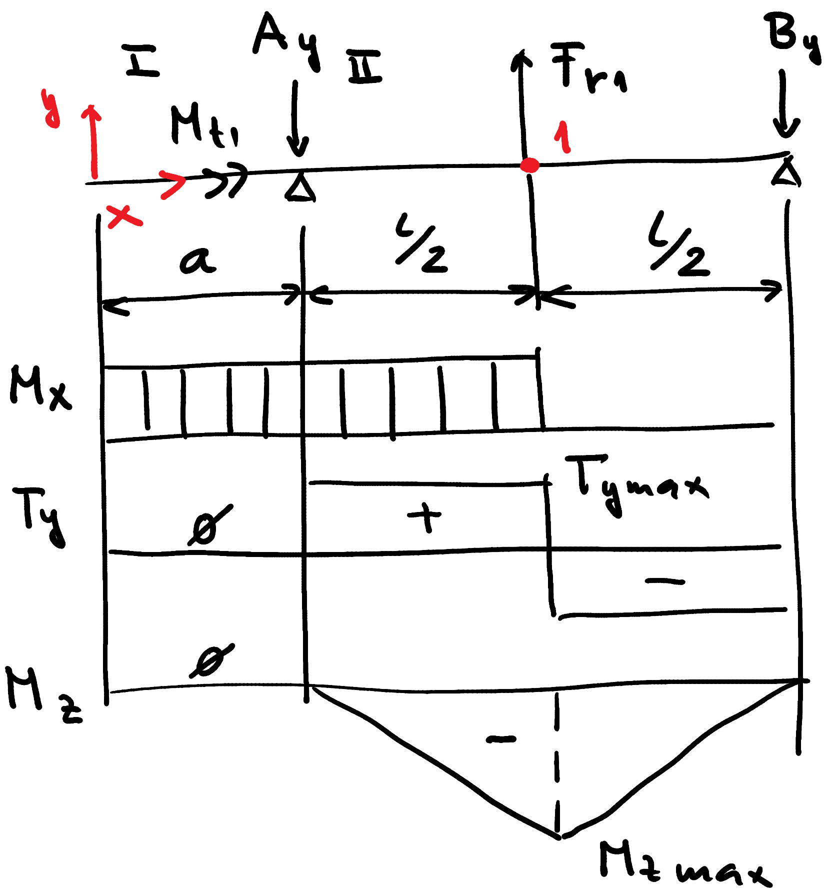




C : KINEMATIČNA TOČKA

d_1 : PREMER RAZDELNEGA KROGA

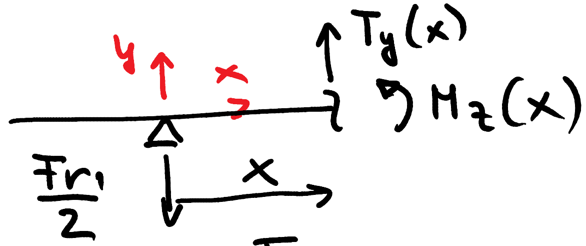
$$M_{t1} = F_{t1} \frac{d_1}{2} \rightarrow F_{t1} = \frac{2 M_{t1}}{d_1}$$



$$A_y = B_y = \frac{F_{r1}}{2}$$

$$M_x = M_{t1} = M_{x\,max}$$

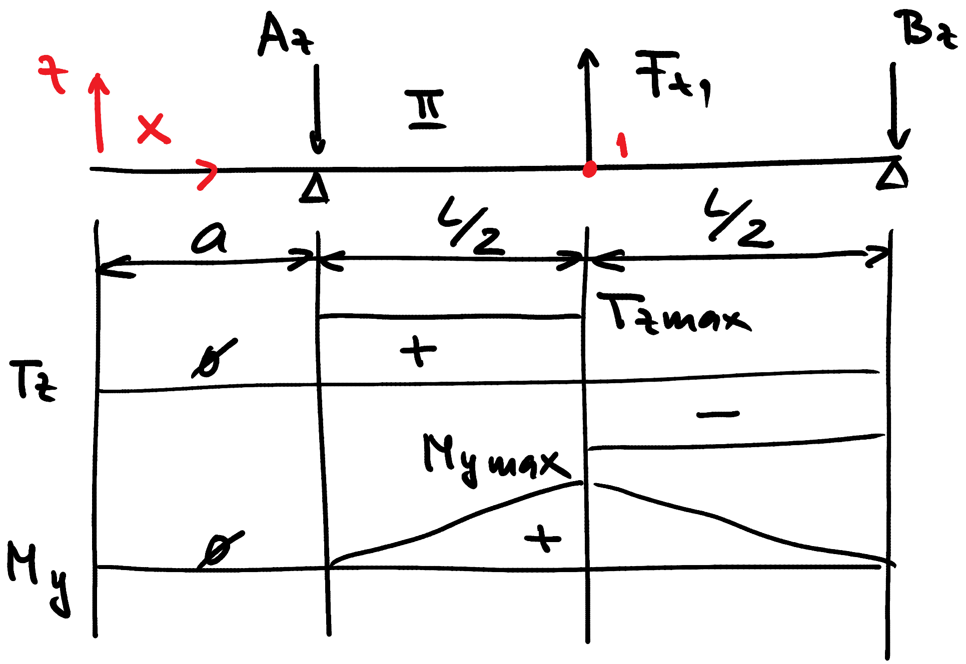
II:



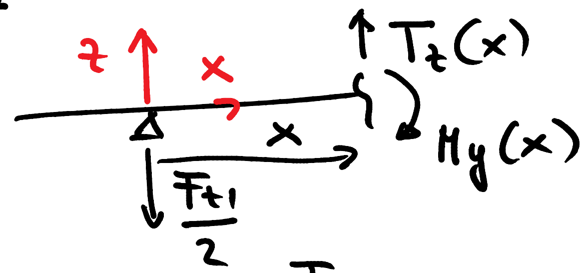
$$T_y(x) = \frac{F_{r1}}{2} = T_{y\,max}$$

$$M_z(x) = -\frac{F_{r1}}{2}\,x$$

$$M_{z\,max} = -\frac{F_{r1}\cdot l}{4}$$



II: $A_z = B_z = \frac{F_{t1}}{2}$



$$T_z(x) = \frac{F_{t1}}{2} = T_{z\,max}$$

$$M_y(x) = +\frac{F_{t1}}{2}\, x$$

$$M_{y\,max} = \frac{F_{t1} \cdot l}{4}$$

1: KRITIČNO MESTO Z VIDIKA OBREMENITEV

$$A = \sqrt{A_y^2 + A_z^2}$$

$$B = \sqrt{B_y^2 + B_z^2}$$

SILI POTREBUJEMO ZA VREDNOTENJE LEŽAJEV

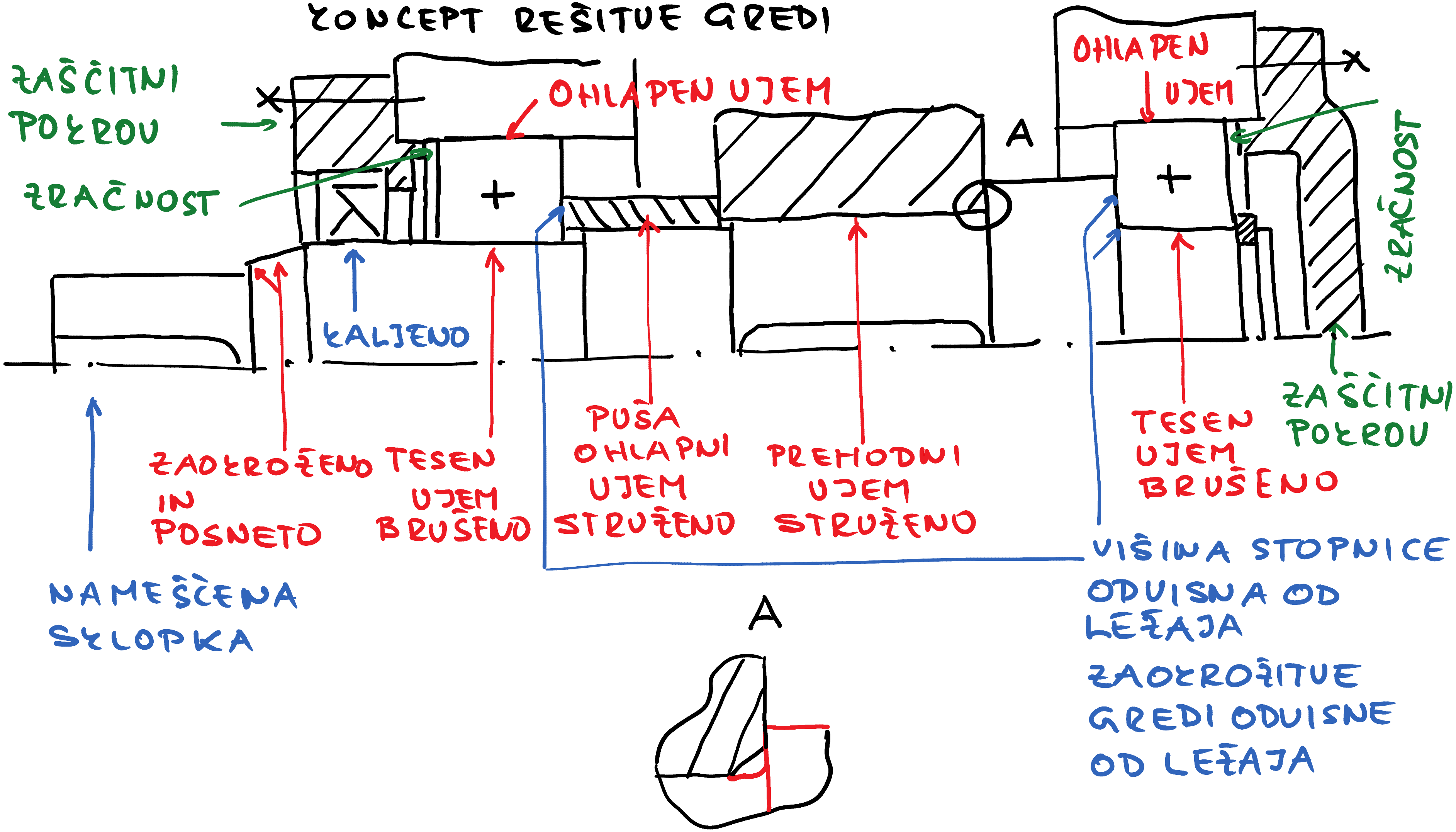
$T_{z\,max}$ IN $T_{y\,max}$ POVZROČATA STRIŽNE NAPETOSTI, KI JIH PRI UREDNOTENJU GREDI VEDNO ZANEMARIMO

$$M_{max} = \sqrt{M_{y\,max}^2 + M_{z\,max}^2}$$

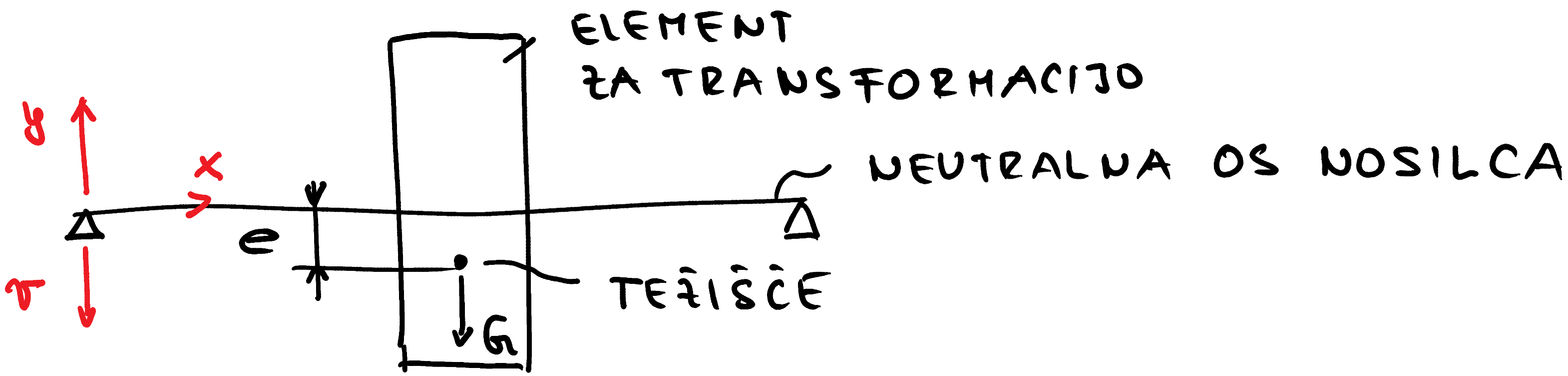
MOMENT POVZROČA UPOGIBNE NAPETOSTI IN GA POTREBUJEMO ZA UREDNOTENJE GREDI.

$M_{x\,max}$ MOMENT POVZROČA UZVOJNE NAPETOSTI IN GA POTREBUJEMO ZA UREDNOTENJE GREDI.

KONCEPT REŠITVE GREDI



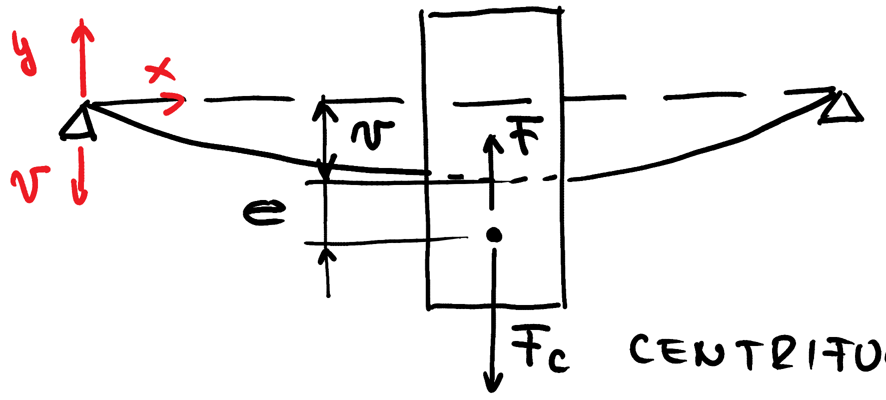
VREDNOTENJE OSI IN GREDI NA LASTNE FREKVENCE



$\omega = \emptyset$ STANJE MIROVANJA

G LASTNA TEŽA VSEH MAS NA GREDI

$\omega > 0$ STANJE GIBANJA



$F_c \gg G$

LASTNO TEŽO ZANEMARIMO

F_c CENTRIFUGALNA SILA

$$F_c = m(v+e)\omega^2 = F = c\,v$$

c – UPOGIBNA TOGOST GREDI

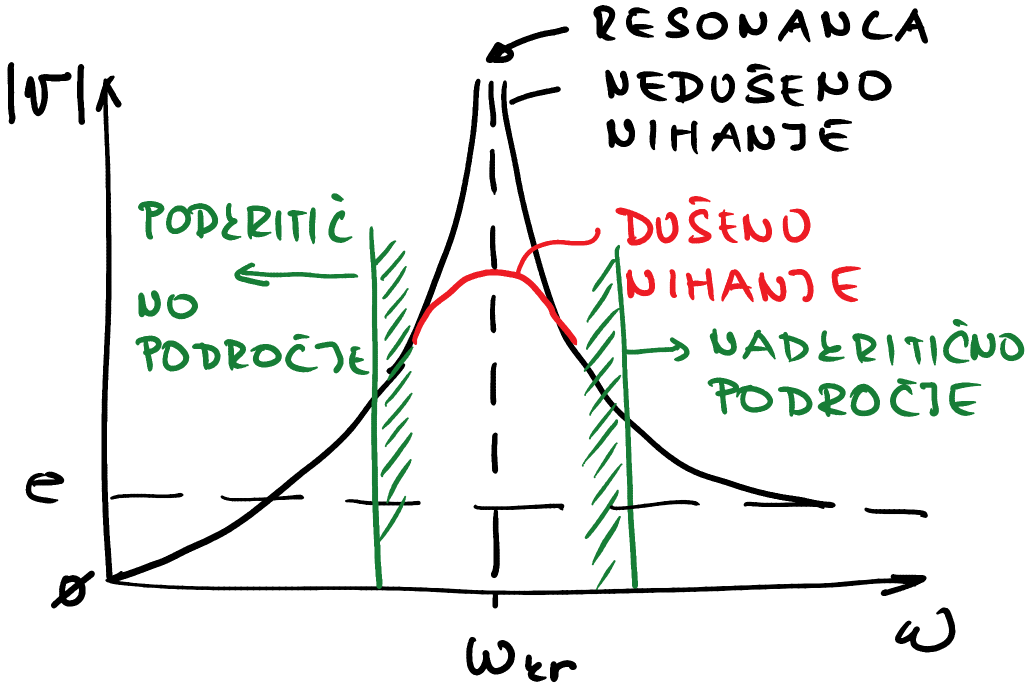
$$(v+e)\omega^2 = \frac{c}{m} v$$

$$v\omega^2 + e\omega^2 = \frac{c}{m} v$$

$$e\omega^2 = \frac{c}{m} v - \omega^2 v$$

$$\vartheta = \frac{e\,\omega^2}{\frac{c}{m} - \omega^2}$$

$$\omega_{kr} = \sqrt{\frac{c}{m}}$$



$$\vartheta = \frac{e}{\frac{c}{m\omega^2} - 1}$$

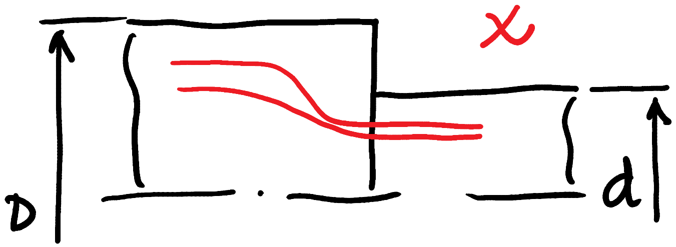
$$\omega = \infty$$

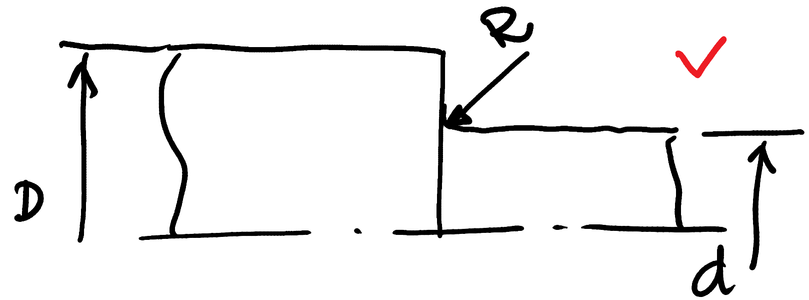
$$\vartheta = -e$$

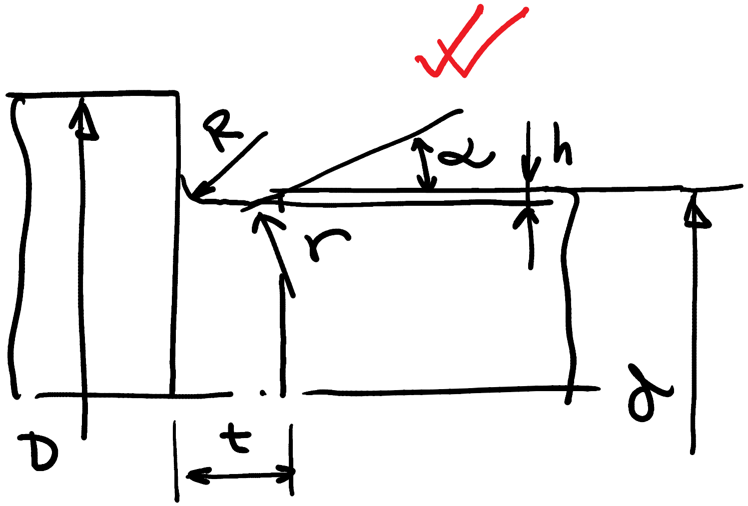
ω_{kr} LASTNA FREKVENCA GREDI

NIKOLI NE OBRATUJEMO V PODROČJU RESONANCE

OBLIKOVANJE GREDNIH PREHODOV



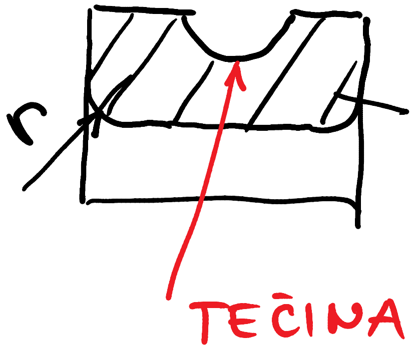


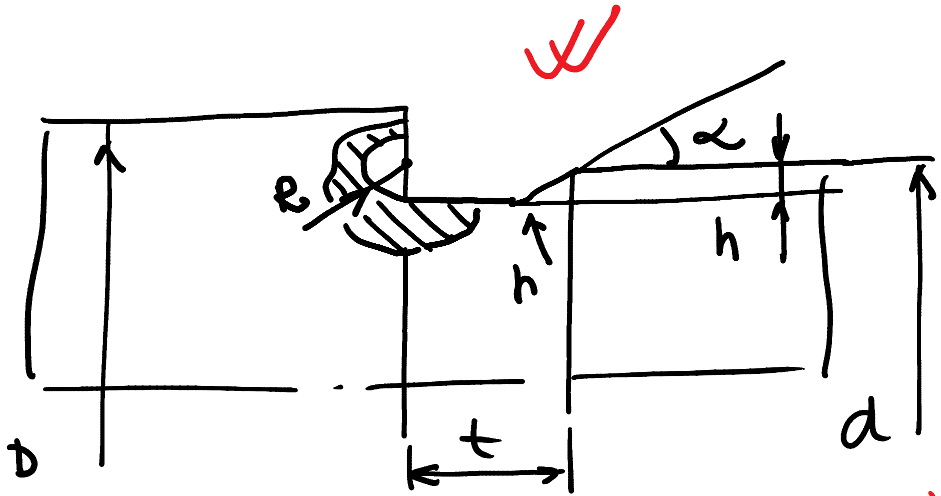


SEDEŽ ZA LEŽAJ

R, (D-d)/2 PREDPISUJE LEŽAJ

$r > R$




R
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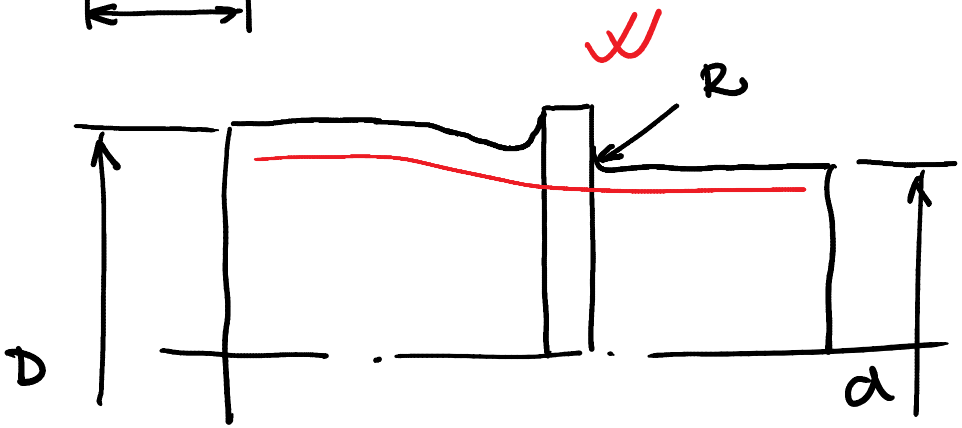
d


R
D
d