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507 SOBA

TAJNICA: SILVA BRENČIČ 510 SOBA

PIŠEMO 2 KOLOKVIJA K1 K2

KOLOKVIJ OBSEGA 5 UPRAŠANJ

2 TOČKI ZA UPRAŠANJE

TRI URSTE UPRAŠANJ: LAHKA, SREDNJA, TEŽKA

$$5 = 2 \times L + 2 \times S + 1 \times T$$

2 TOČKI = 4 × 0,5 TOČKE

5 × 2 = 10 TOČK (MAKSIMUM)

KAKO OPRAVITI IZPIT?

PIŠE SE 2 KOLOKVIJA

$$\frac{K1 + K2}{2} \geq 5{,}5 \quad \wedge \quad K1 \geq 4{,}5 \quad \wedge \quad K2 \geq 4{,}5 \quad \checkmark$$

IZPIT OPRAVLJEN S KOLOKVIJI

$K1 = \varnothing \quad \wedge \quad K2 \geq 5{,}5$

$K1 \geq 5{,}5 \quad \wedge \quad K2 = \phi$

$\rightarrow$ PRIJAVITE NA IZPIT NA KATEREM PIŠETE LE SNOV SLABŠEGA KOLOKVIJA

↑ POZITIVNA OCENA

$K1 = 4{,}5 \quad \wedge \quad K2 = 5{,}5 \rightarrow \quad K1$

$K1 = 5 \quad \wedge \quad K2 = 5 \rightarrow \quad U = K1 + K2$

$K1 = 7{,}5 \quad \wedge \quad K2 = 4{,}5 \rightarrow \checkmark$

$k1 = 2.0 \quad \wedge \quad k2 = 2{,}5 \rightarrow k1 + k2 < 5{,}5 \rightarrow P + U$

P - IZPIT IZ NALOG (60 MINUT)
U - IZPIT IZ KOMPLETNE TEORIJE $k1 + k2$ (60 MINUT)

$P \geqslant 5{,}5 \quad \wedge \quad U \geqslant 5{,}5 \rightarrow$ ✓

REN, GLODEŽ: STROJNI ELEMENTI 1

REN, GLODEŽ: STROJNI ELEMENTI
UVOD V GONILA, TORNA, JERMENSKA IN VERIŽNA GONILA

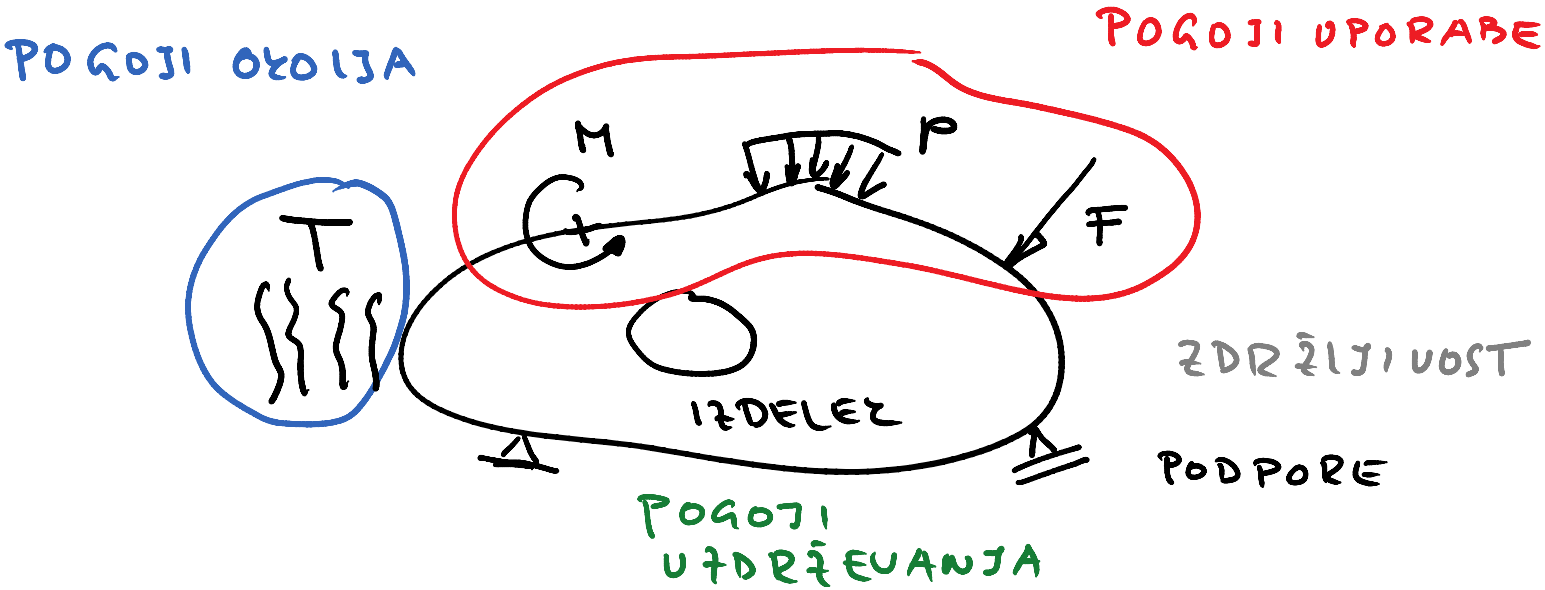
ROLOFF MATEK: MASCHINENELEMENTE

FLAŠKER, GLODEŽ, REN: ZOBNIŠKA GONILA

NA IZPITU MORA BITI DOSEŽENA OCENA $\geq 5{,}5$ V VSAKEM PRIMERU!

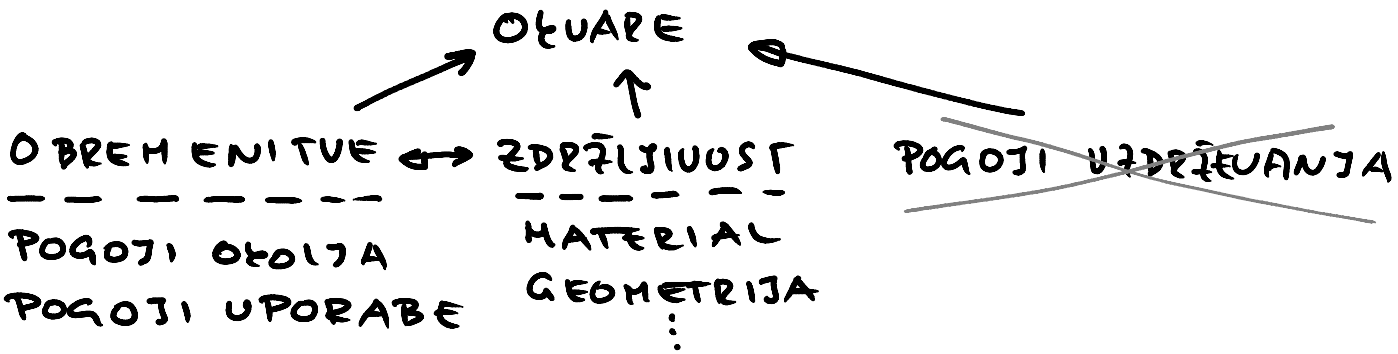
VEDNO SE MORATE PRIJAVITI NA IZPIT! ZA VPIS OCENE, ALI ZA PRISTOP K IZPITU.

UVOD



F, M, p, T, ... OBREMENITVE

FUNKCIONALNOST (1.0 ... 0.0) OKVARA



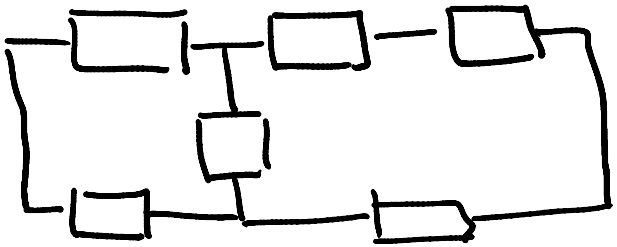
POTREBNO OPREDELITI MOŽNE VRSTE OKVAR.

ZA USAKO VRSTO OKVARE IZBEREMO KRITERIJ POŠKODBE.

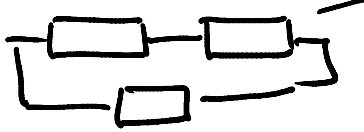
GLEDE NA KRITERIJ POŠKODBE IZBEREMO METODO VREDNOTENJA.

CILJ PREDMETA SE JE NAUČITI VREDNOTITI RAZLIČNE STROJNE ELEMENTE!

IZDELEK



KOMPONENTA



ELEMENT : NAJMANJŠI GRADNIK, KI SE VEČ NE DELI (VIJAK, KOVICA, ŽVAR,..)

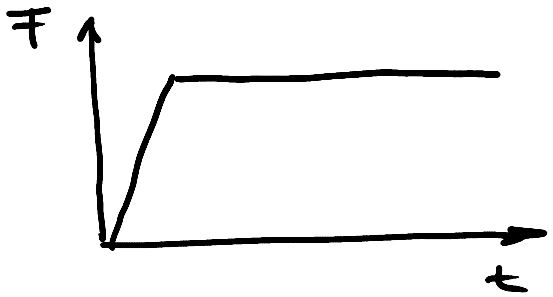
TRENUTNI

LOM - PLASTIČNI (ŽILAV MATERIAL)
- KRHKI (KRHEK MATERIAL)

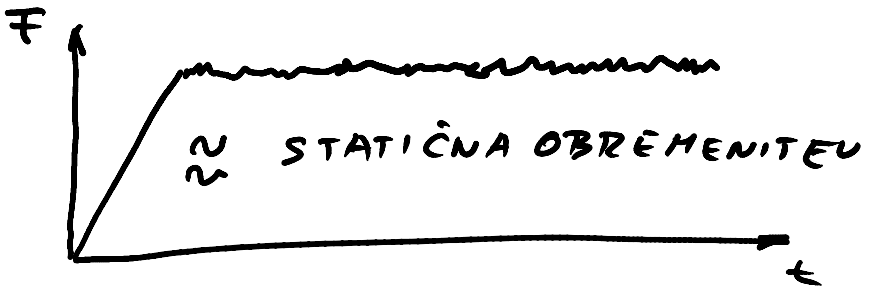
UTRUJENOSTNI LOM

LEZENJE

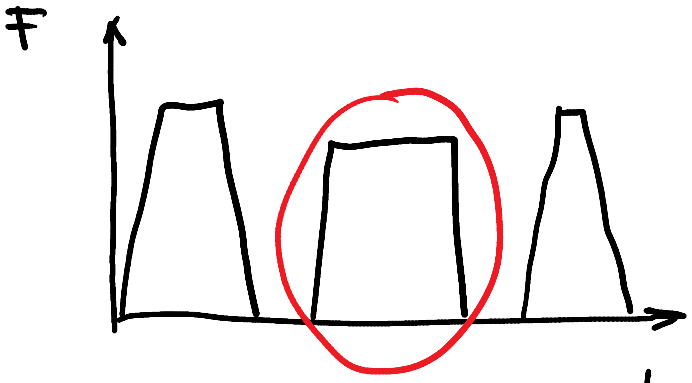
STATIČNE MATERIALNE LASTNOSTI



STATIČNA OBREMENITEV



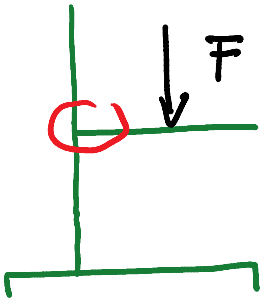
STATIČNA OBREMENITEV



N ↓ LUAŽI STATIČNA

OBREMENITVENI CIKEL

N - ŠTEVILO OBREMENITVENIH CIKLOV



OBREMENITEV F

↓

NAPETOST σ_{max}

ZDRŽLJIVOST

↓

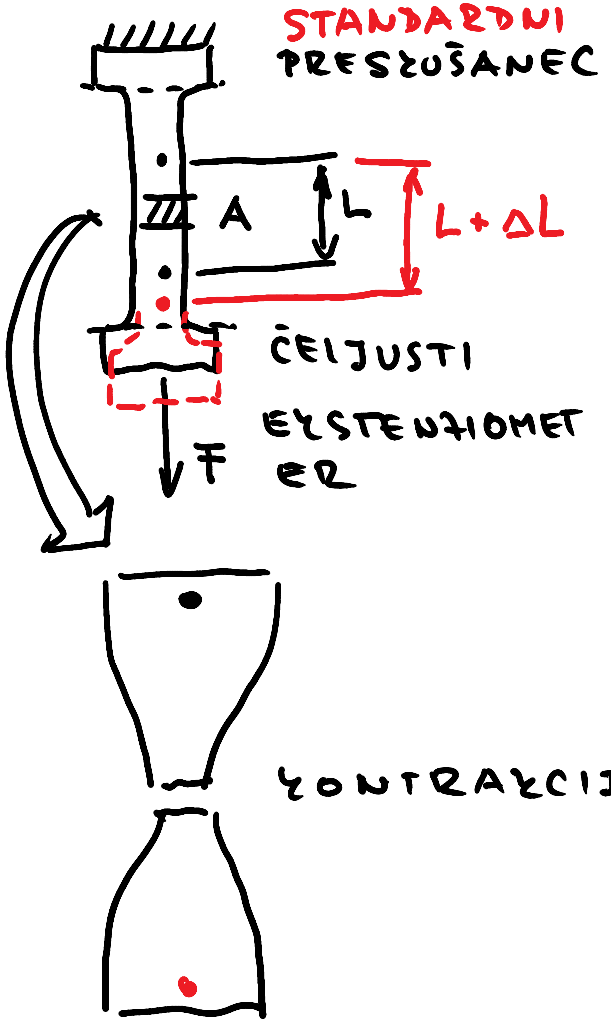
NATEZNA TRDNOST R_m

$\sigma_{max} < R_m$

VREDNOTENJE

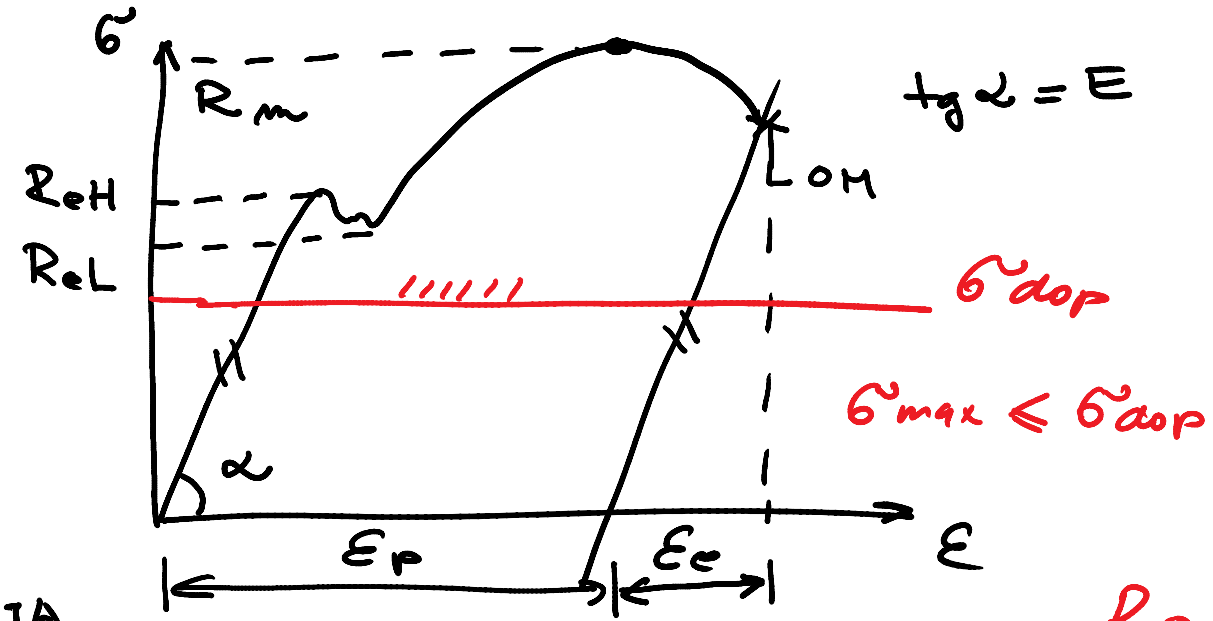
TRGALNI STROJ

STANDARDNI PREIZUŠANEC



NATEZNI PREIZUS

$$\varepsilon = \frac{\Delta L}{L} \qquad \sigma = \frac{F}{A}$$ - IMENSKI PREREZ



$$tg\,\alpha = E$$

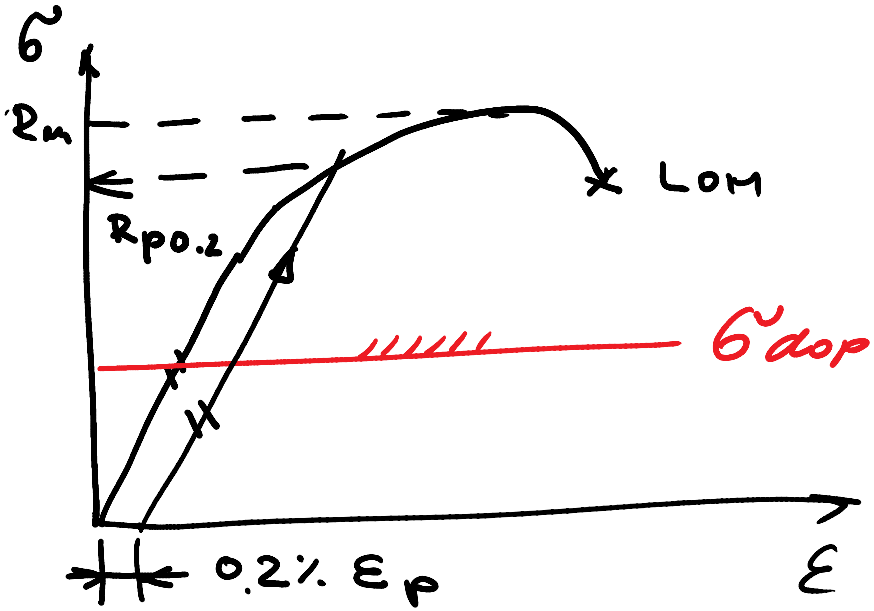
$$\sigma_{max} \leq \sigma_{dop}$$

$$\varepsilon = \varepsilon_p + \varepsilon_e$$

$$\sigma_{dop} = \frac{R_e}{S}$$

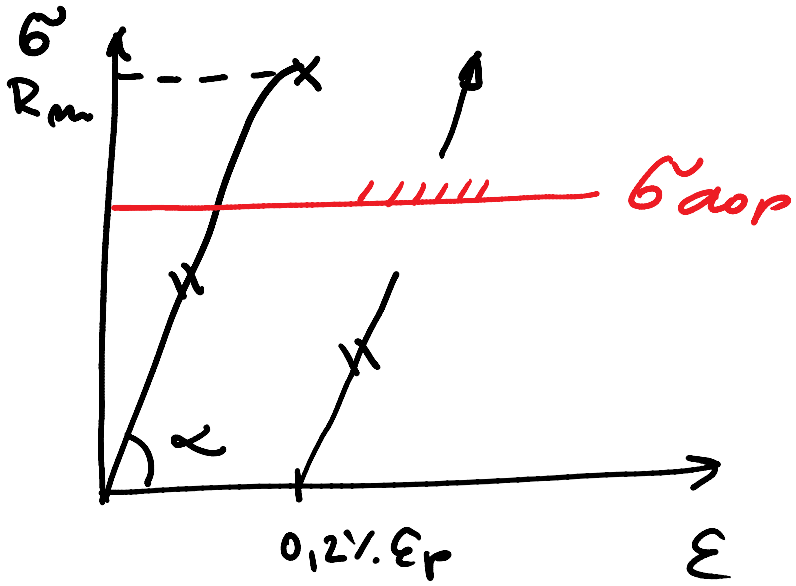
ŽILAV MATERIAL Z IZRAZITO MEJO TEČENJA

ENOOSNI PREIZUS



ŽILAV MATERIAL
Z NEIZRAZITO
MEJO TEČENJA

$$\sigma_{dop} = \frac{R_{p0.2}}{\nu}$$



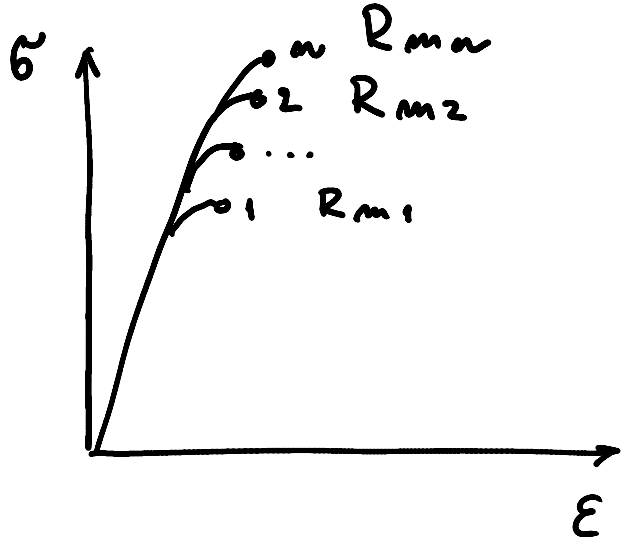
TRHEK MATERIAL

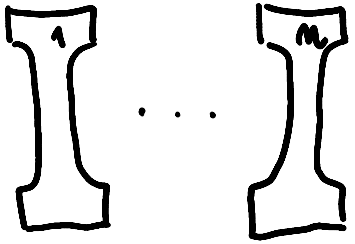
$$\sigma_{dop} = \frac{R_m}{\nu}$$

KRHKI ALI
PLASTIČNI LOM !

$R_{p0.2}$ → 0,2 % PLASTIČNE DEFORMACIJE $\varepsilon_p = 0{,}002$

RAZTROSI STATIČNIH MATERIALNIH LASTNOSTI

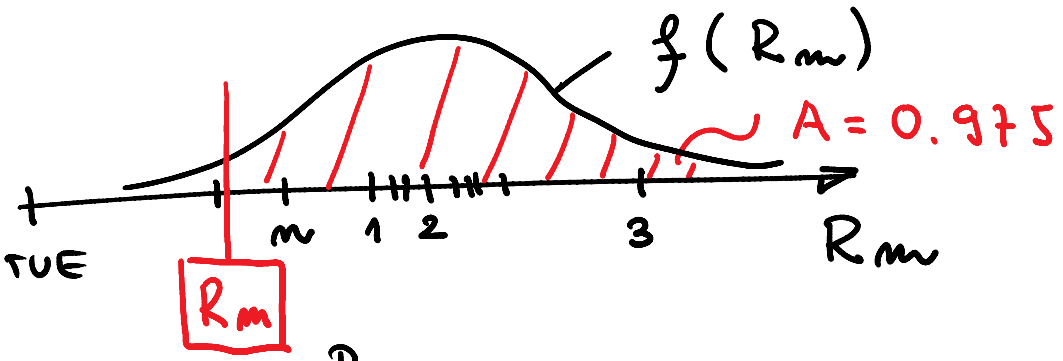




m . ŠT. ELEMENTOV V VZORCU

POPULACIJA

R_m NAKLJUČNA SPREMENLJIVKA

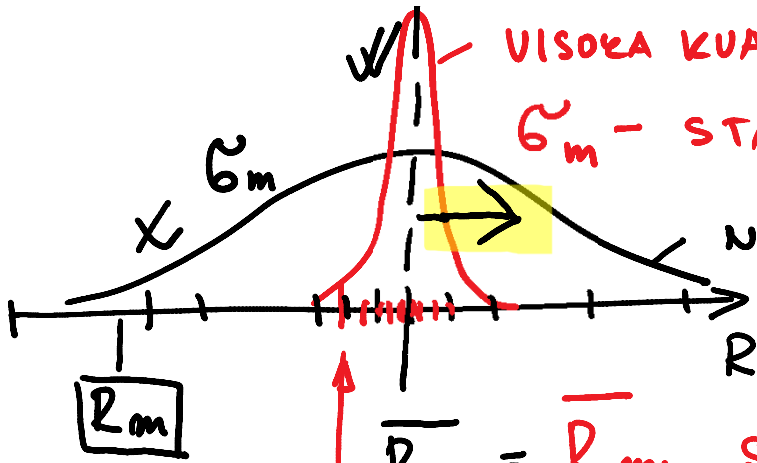


$f(R_m)$ GOSTOTA PORAZDELITVE VERJETNOSTI

$$\int_{-\infty}^{\infty} f(R_m)\, dR_m = 1$$

$$F(R_m) = \int_{0}^{R_m} f(R_m)\, dR_m = 1 - 0{,}975$$

KUMULATIVNA FUNKCIJA VERJETNOSTI



$$\sigma_{dop} = \frac{R_m}{\nu}$$

$$\wedge$$

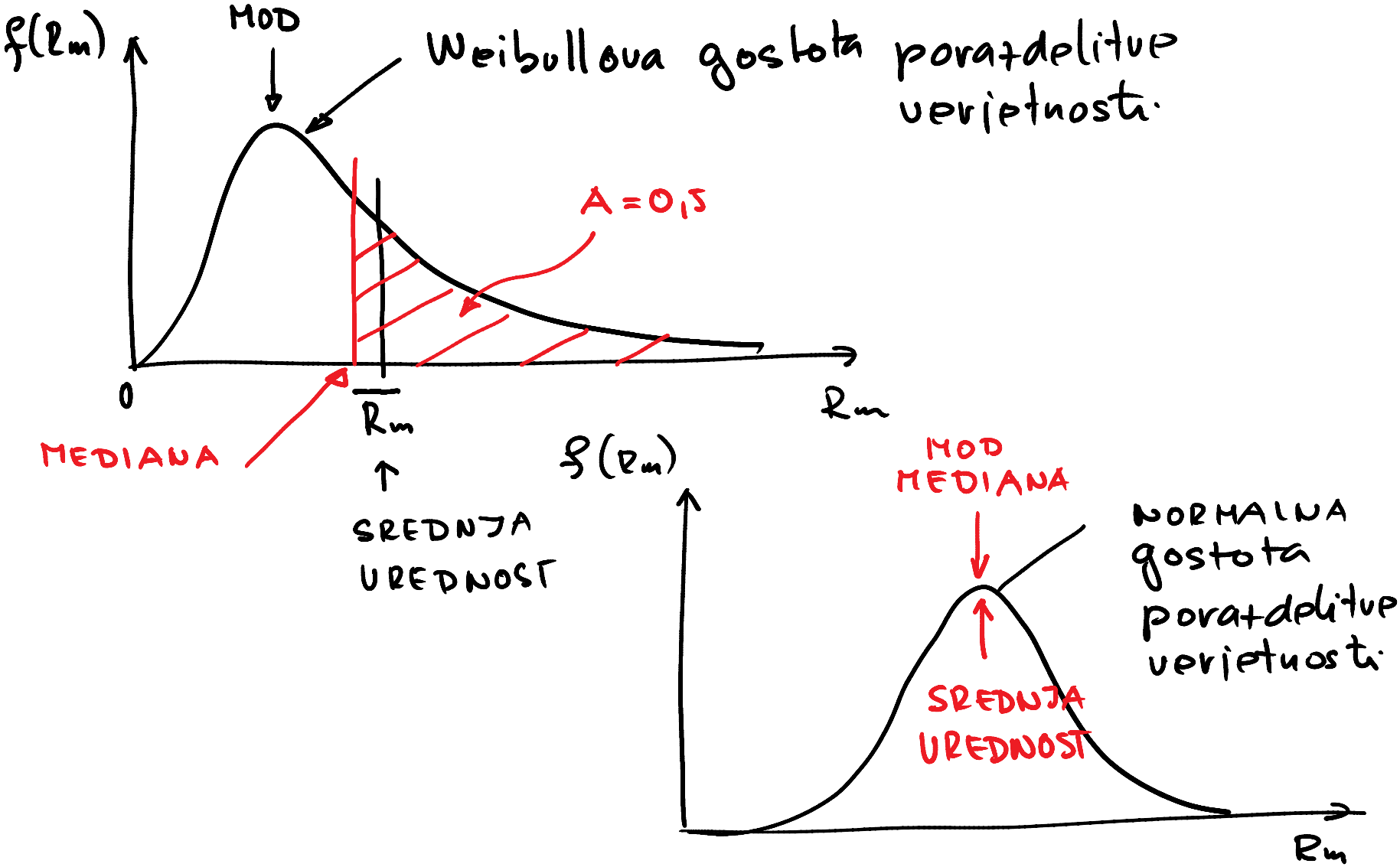
$$\sigma_{dop} = \frac{R_m}{\nu}$$

$\sigma_m > \sigma_m$

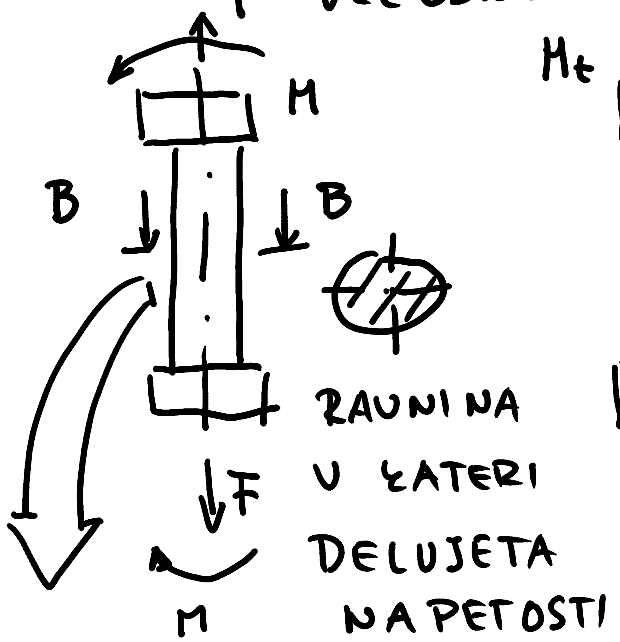
$$\overline{R_m} = \frac{1}{n} \sum_{i=1}^{n} R_{mi}$$

RAZTROS MERIMO S STANDARDNO DEVIACIJO σ_m

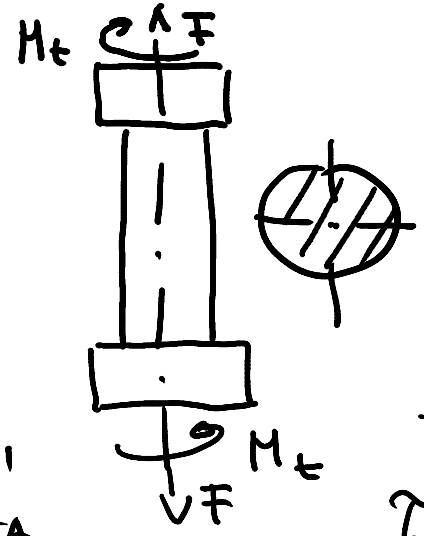
$$\sigma_m = \sqrt{\frac{1}{n} \sum_{i=1}^{n} (R_{mi} - \overline{R_m})^2}$$

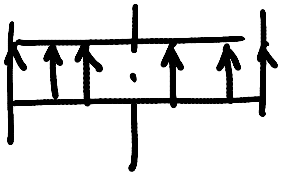

f(Rm)
MOD
Weibullova gostota porazdelitve verjetnosti
A = 0,5
0
Rm
MEDIANA
Rm
SREDNJA VREDNOST
f(Rm)
MOD
MEDIANA
NORMALNA gostota porazdelitve verjetnosti
SREDNJA VREDNOST
Rm

VEČOSNO NAPETOSTNO STANJE

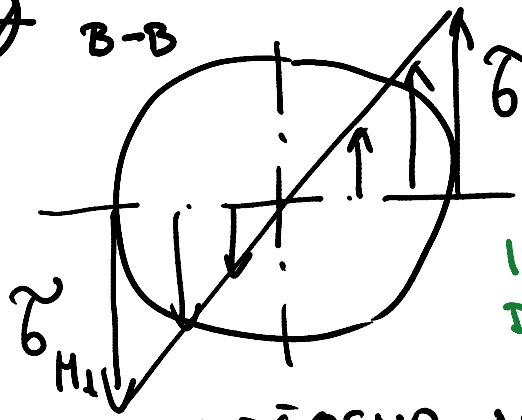


RAVNINA V KATERI DELUJETA NAPETOSTI





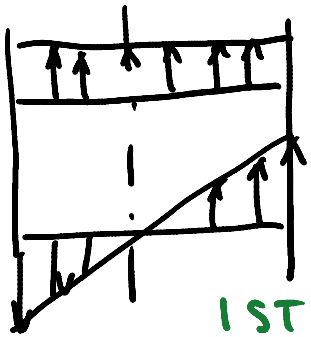
$$\sigma_F = \frac{F}{A}$$



$$\tau_{M_t} = \frac{M_t}{W_{PO}}$$

ISTA RAVNINA DRUGA SMER

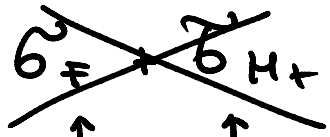
VEČOSNO NAPETOSTNO STANJE



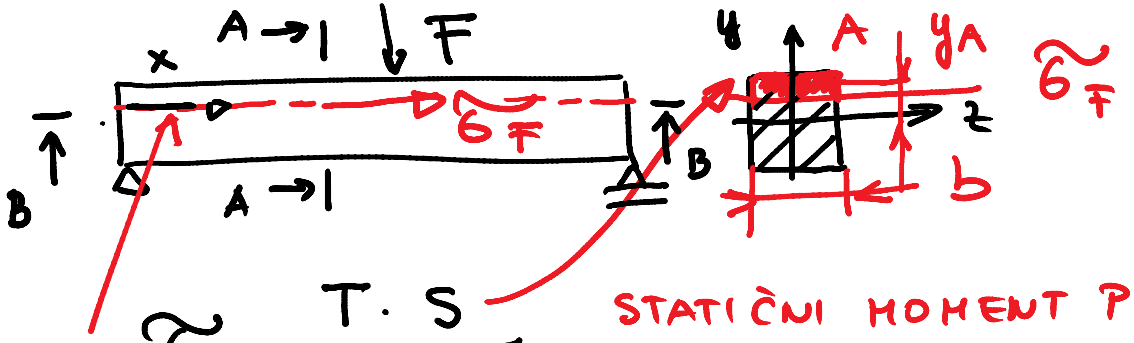
$$\sigma_M = \frac{M}{W_O}$$

ISTA SMER ISTA RAVNINA

$\sigma_F + \sigma_M = \sigma$. ENOOSNO NAP. STANJE



OBE DELUJETA V RAVNINI B-B



τ_F

$T = \frac{F}{2}$

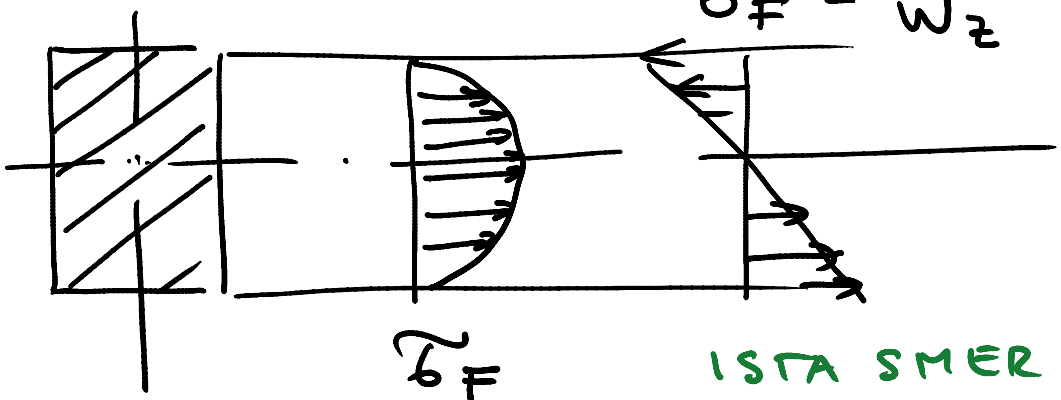
$\tau_F = \frac{T \cdot S}{I_z \cdot b}$

STATIČNI MOMENT PREREZA

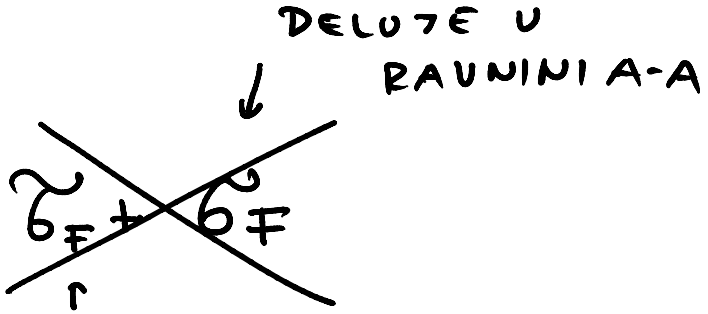
$S = A \cdot y_A$

RAVNINA

$\sigma_F = \frac{M}{W_z}$



τ_F



ISTA SMER DRUGA RAVNINA

$\sigma_x = \sigma$; $\tau_{xy} = \tau$; OSTALO $\not\emptyset$

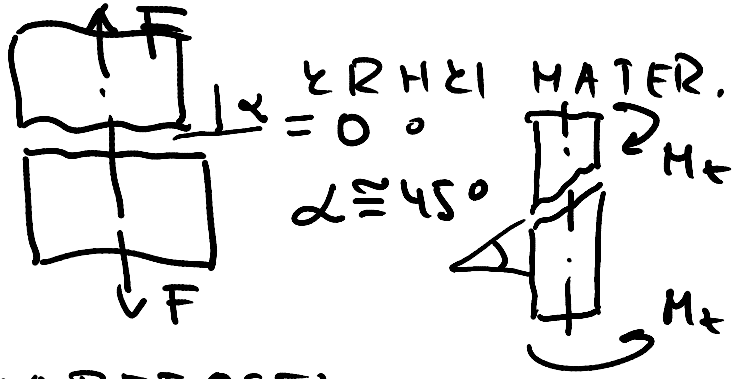
$$\sigma_{ij} = \begin{pmatrix} \sigma_x & \tau_{xy} & \tau_{xz} \\ \tau_{yx} & \sigma_y & \tau_{yz} \\ \tau_{zx} & \tau_{zy} & \sigma_z \end{pmatrix}$$

HIPOTEZA NAJVEČJIH NORMALNIH NAPETOSTI

$$\sigma_v = \frac{1}{2}\left(\sigma + \sqrt{\sigma^2 + 4\tau^2}\right)$$

$\sigma = \phi \Rightarrow \sigma_v = \tau$

$\tau = \phi \Rightarrow \sigma_v = \sigma$



KRHKI MATER.

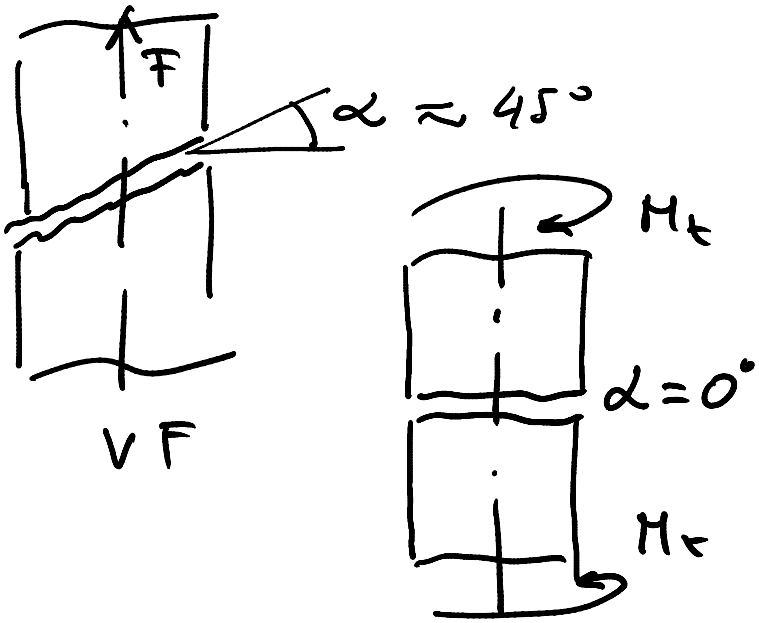
HIPOTEZA NAJVEČJIH STRIŽNIH NAPETOSTI

TRESCA

$$\sigma_v = \sqrt{\sigma^2 + 4\tau^2}$$

$\sigma = \phi \Rightarrow \sigma_v = 2\tau$

$\tau = \phi \Rightarrow \sigma_v = \sigma$



ŽILAV MATERIAL

↑ IZRAZITO MEJO TEČENJA

HIPOTEZA NAJVEČJEGA PREOBRAZNEGA DELA

$$\sigma_v = \sqrt{\sigma^2 + 3\tau^2}$$

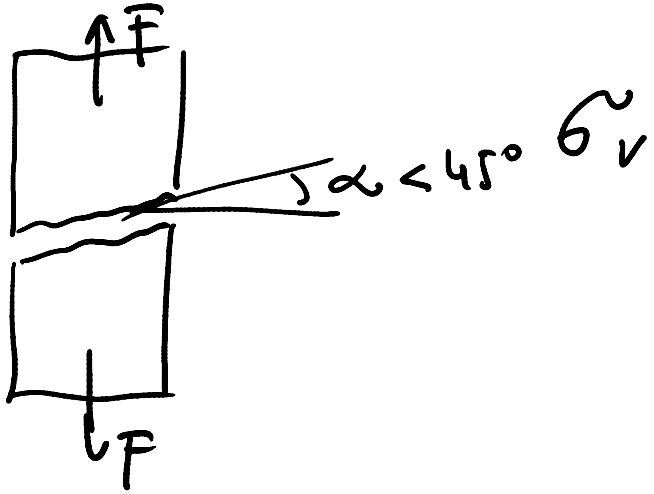
$\sigma = 0 \Rightarrow \sigma_v = \sqrt{3}\,\tau$

$\tau = 0 \Rightarrow \sigma_v = \sigma$

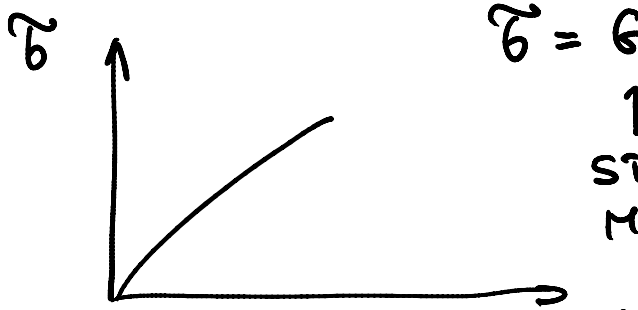
ŽILAU MAT.

Z NEIZRAZITO MEJO TEČENJA

VON MISES-OVA HIPOTEZA



$\sigma_v \leq \sigma_{dop}$



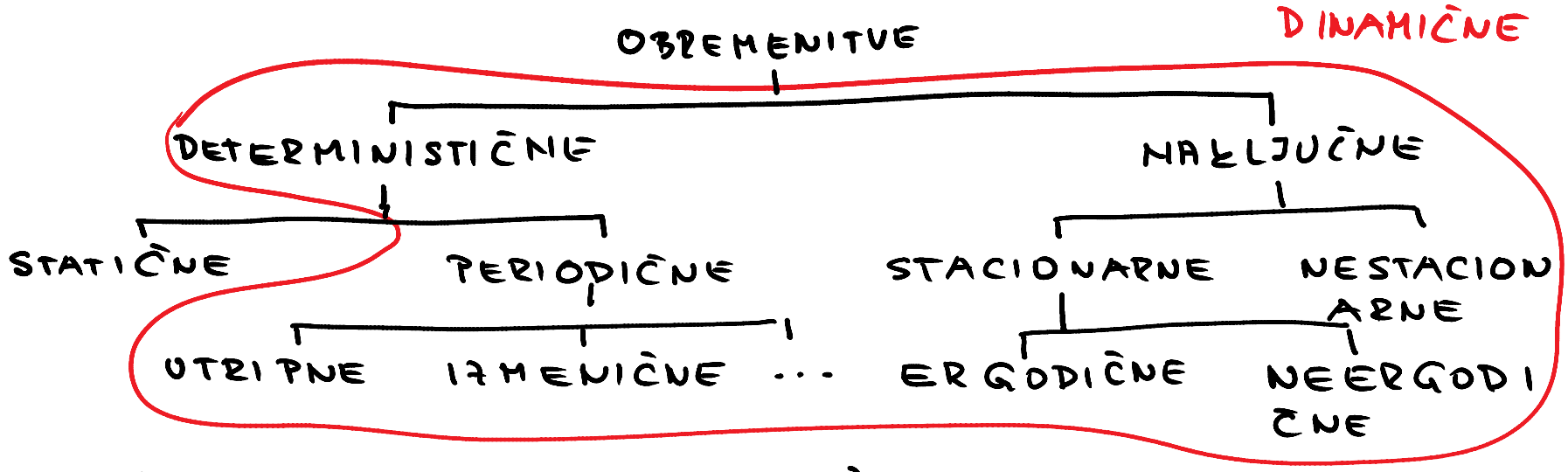
$\tau = G \cdot \gamma$

STRIŽNA SPECIFIČNA DEFORMACIJA

STRIŽNI MODUL

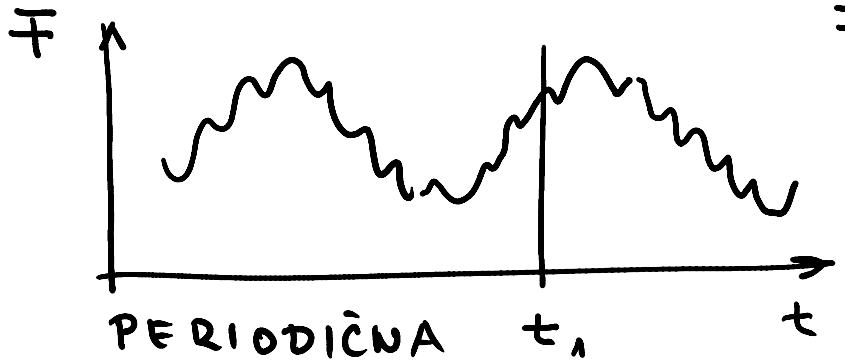
HOOKOV ZAKON ZA STRIŽNE NAPETOSTI

VRSTE OBREMENITEV



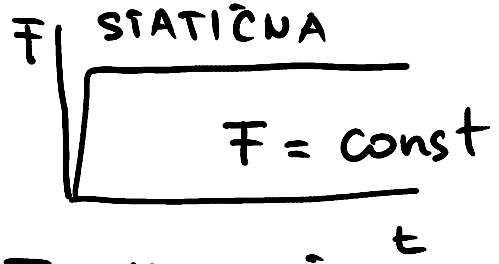
STATIČNE → KRHKI ALI PLASTIČNI LOM

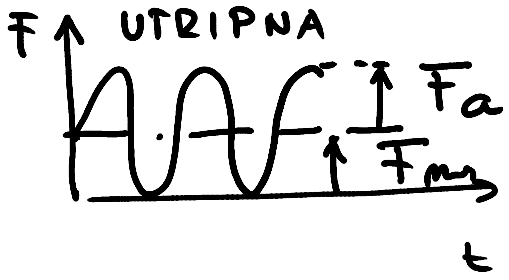
DINAMIČNE → UTRUJENOSTNI LOM



$F(t_1)$ ✓✓

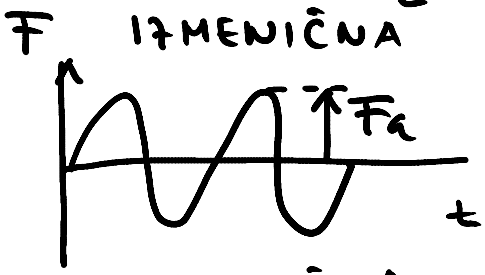
$F(t) = A_1 \sin(\omega_1 t) + A_2 \cos\omega_2 t$



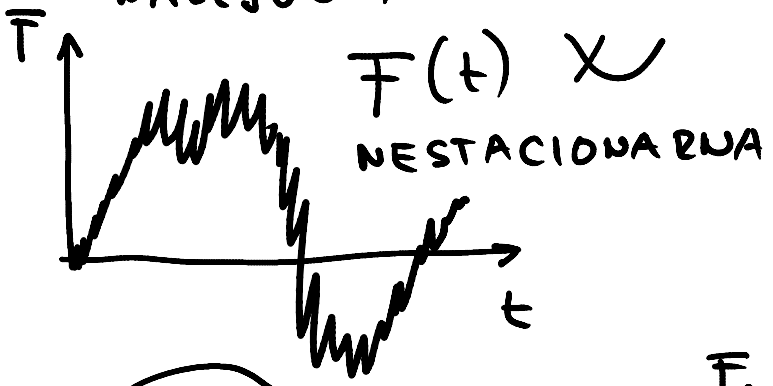


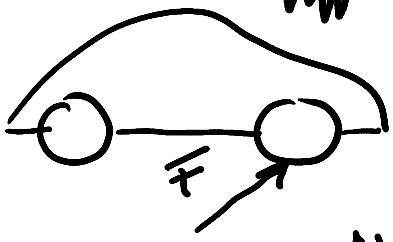
$$F(t) = F_m + F_a \sin \omega t$$

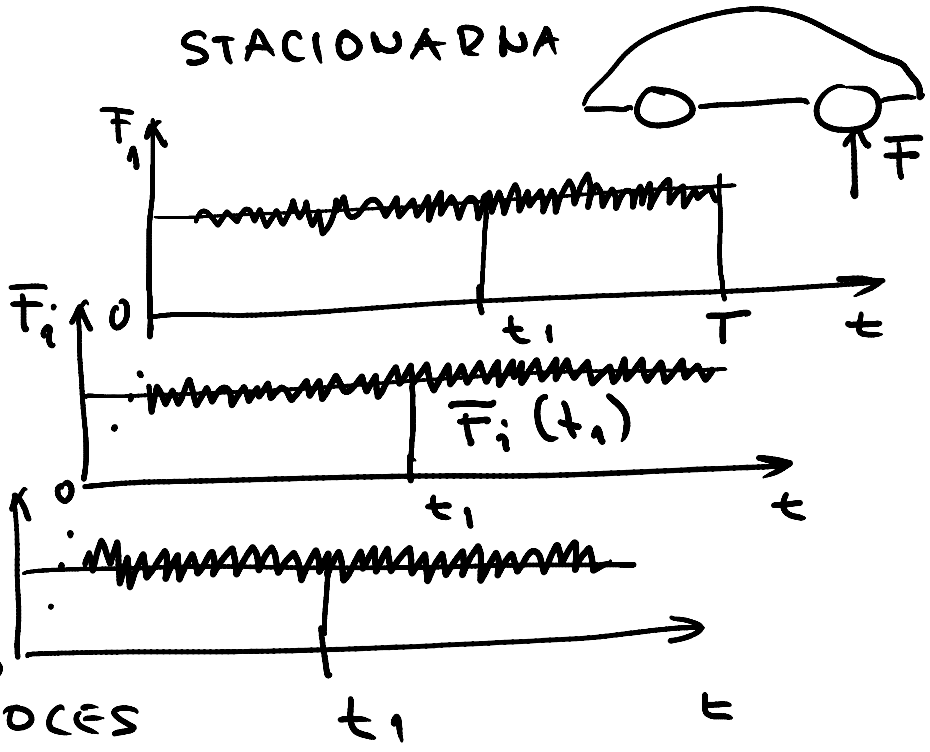
$$F_m = F_a$$



$$F(t) = F_a \sin \omega t$$







$$\overline{F(t_1)} = \lim_{n\to\infty} \frac{1}{n} \sum_{i=1}^{n} F_i(t_1) = M_1(t_1)$$

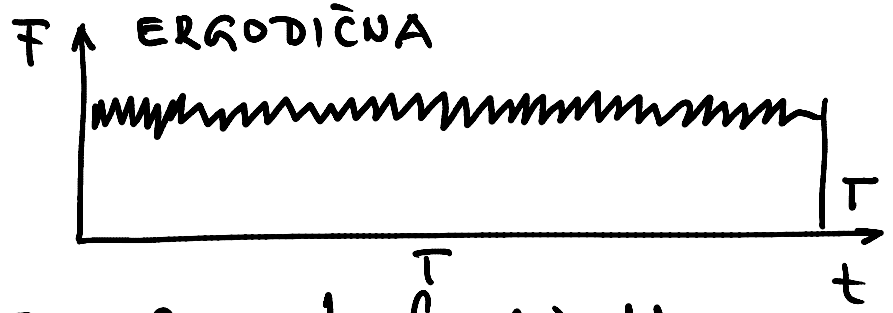
SREDNJA VREDNOST

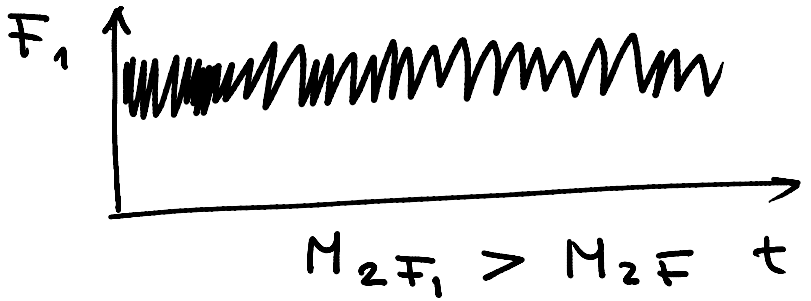
PRVI MOMENT

$$M_2(t_1) = \lim_{n\to\infty} \frac{1}{n} \sum_{i=1}^{n} F_i^2(t_1)$$

DRUGI MOMENT

DAJE INFORMACIJO O RAZTROSU OBREMENITVE





$$M_{2F_1} > M_{2F}$$

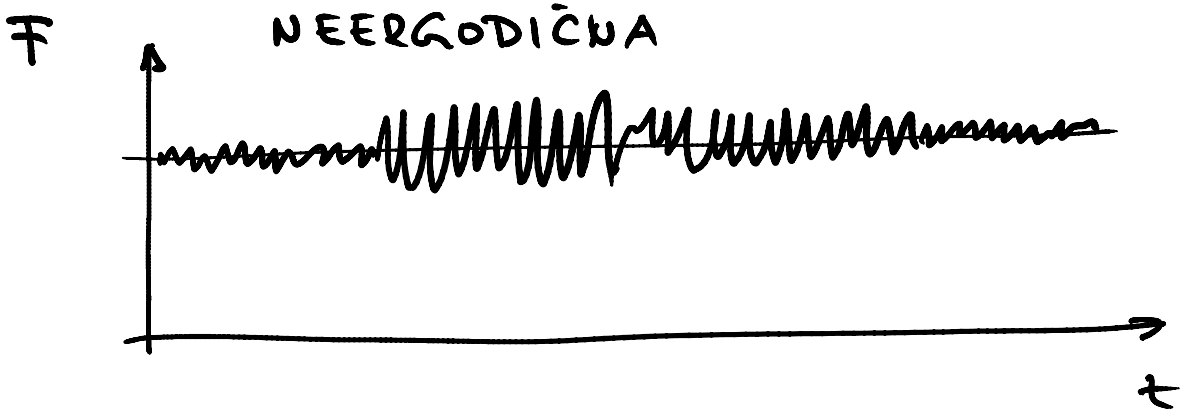
$$\overline{F} = \lim_{T\to\infty} \frac{1}{T} \int_0^T F(t)\,dt = M_1$$

$$\overline{F(t_1)} = \overline{F(t_2)} = \cdots$$

ERGODIČNA OBREMENITEV

$$M_2(t_1) = M_2(t_2) = \cdots$$

$$M_2 = \lim_{T\to\infty} \frac{1}{T} \int_0^T F^2(t)\,dt$$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