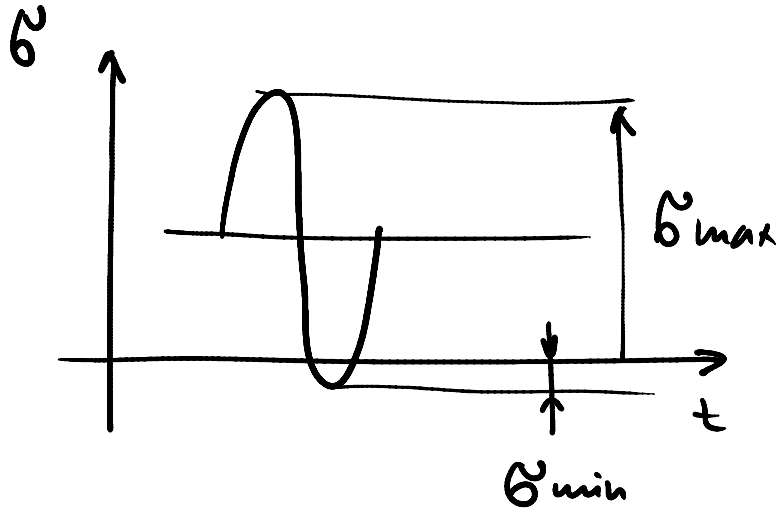
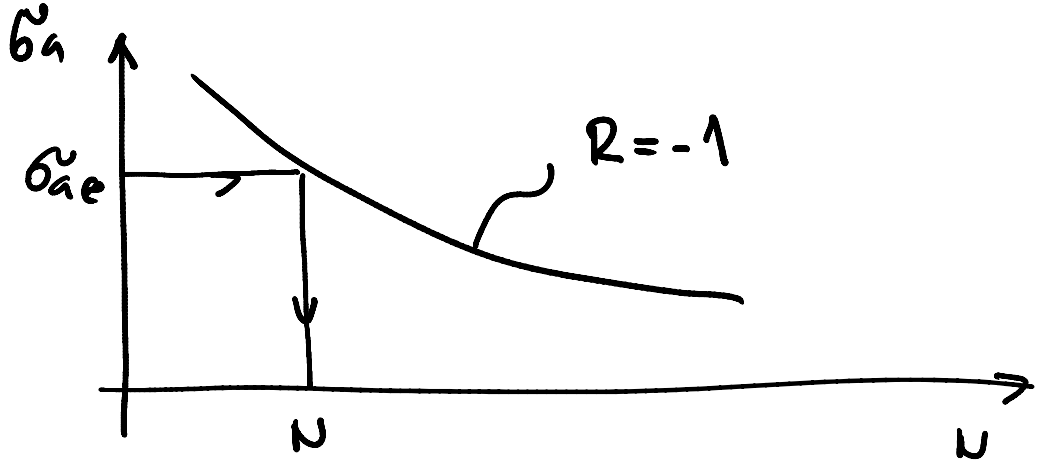
# VPLIV SREDNJEGA NIVOJA OBREMENITVENIH CIKLOV

## GOODMANOVO PRAVILO

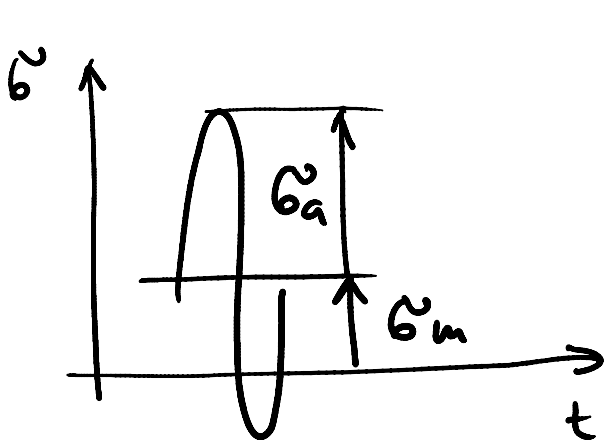



$$\sigma_a = \frac{\sigma_{max} - \sigma_{min}}{2}; \quad \sigma_m = \frac{\sigma_{max} + \sigma_{min}}{2}$$

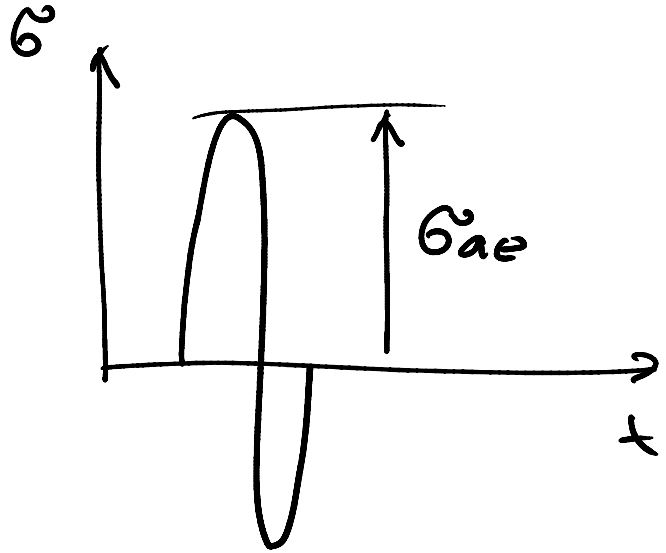



$$D = \frac{1}{N}$$

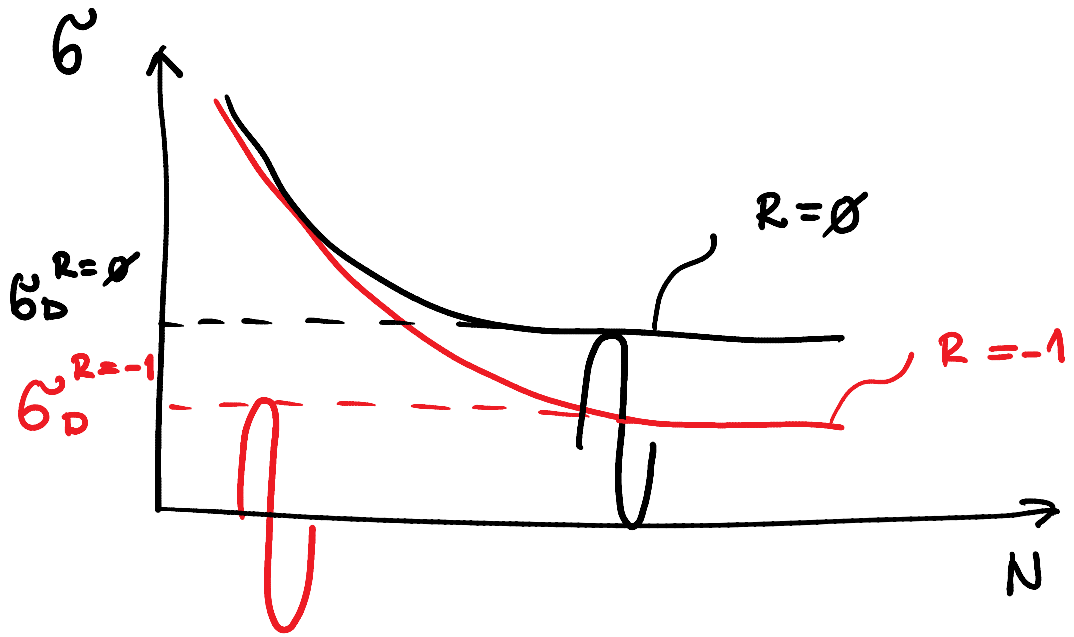
$$R = \frac{\sigma_{min}}{\sigma_{max}}$$ RAZMERJE VAPETOSTI




PRETVORIMO V




$$D(\sigma_a, \sigma_m) = D(\sigma_{ae})$$



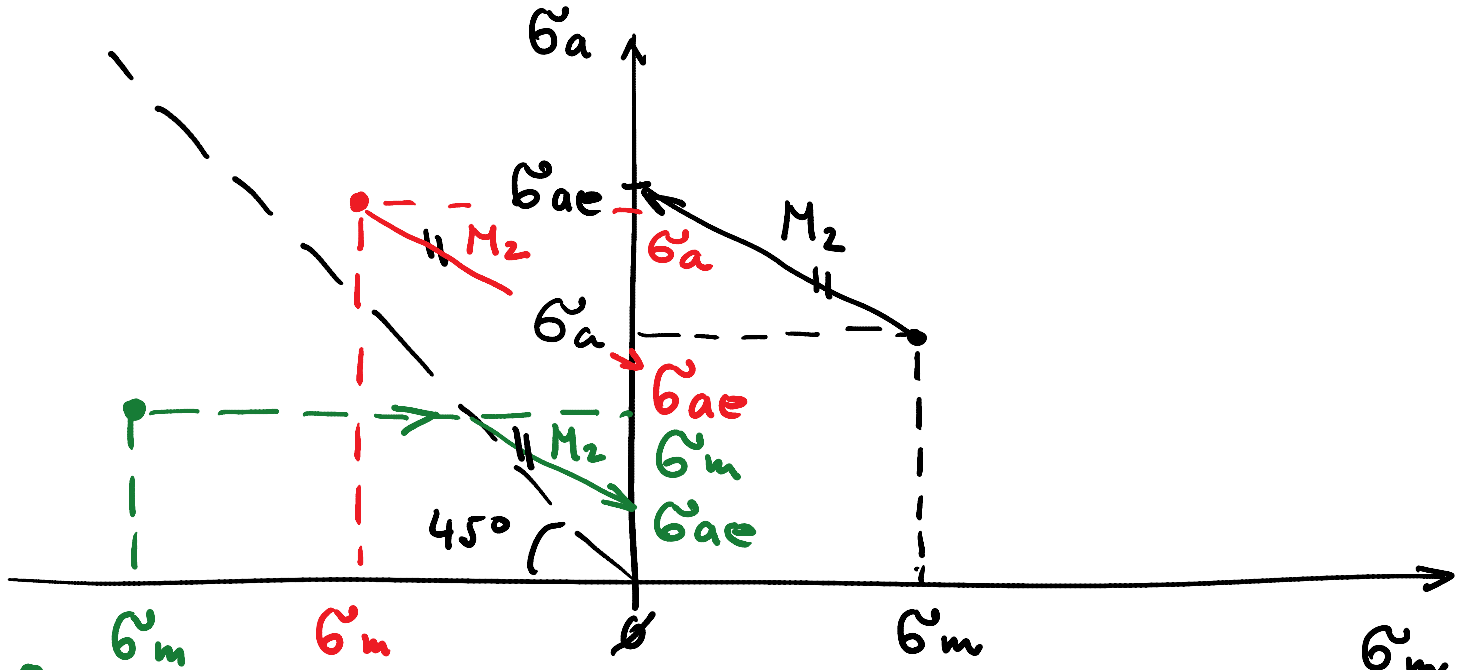

$$\sigma_a = -M_2 \sigma_m + n_1$$

$$\frac{\sigma_D^{R=\phi}}{2} = -M_2 \frac{\sigma_D^{R=\phi}}{2} + n_1$$

$$\sigma_D^{R=-1} = -M_2 \cdot \emptyset + n_1 \rightarrow n_1 = \sigma_D^{R=-1}$$

$$\sigma_D^{R=0} = -M_2 \sigma_D^{R=0} + 2\sigma_D^{R=-1}$$

$$M_2 = \frac{2\sigma_D^{R=-1} - \sigma_D^{R=0}}{\sigma_D^{R=0}} = \frac{2\sigma_D^{R=-1}}{\sigma_D^{R=0}} - 1$$




OBREMENITUENI CIKEL

$$\sigma_a = -M_2 \sigma_m + n_2$$

$$\sigma_{ae} = -M_2 \cdot \varnothing + n_2 \rightarrow n_2 = \sigma_{ae}$$

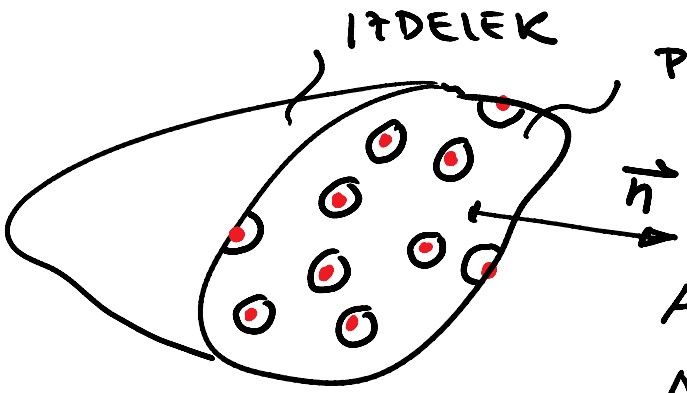
$$\sigma_{ae} = \sigma_a + M_2 \sigma_m$$ VELJA, ČE JE $\sigma_a + \sigma_m \geq \varnothing$

$$\sigma_a = +M_2 \sigma_a + n_3$$ ← V ENAČBO USTAVIMO $\sigma_m = -\sigma_a$

$$\sigma_{ae} = -M_2 \cdot \varnothing + n_3 \rightarrow n_3 = \sigma_{ae}$$

$$\sigma_{ae} = (1 - M_2)\sigma_a$$ VELJA, ČE JE $\sigma_a + \sigma_m < \varnothing$

# OPREDELITEV UTRUJENOSTNE POŠKODBE




$A$ IMENSKI PREREZ

$A_D$ POŠKODOVANI PREREZ

$\tilde{A} = A - A_D$ EFEKTIVNI PREREZ

$$D = \frac{A_D}{A} = \frac{A - \tilde{A}}{A} = 1 - \frac{\tilde{A}}{A}$$

ENAČBA VELJA, ČE JE POŠKODBENI KRITERIJ TRENUTNI LOM

$A_D = \phi \rightarrow D = \phi$

$A_D = A \rightarrow D = 1$

$0 \leq D \leq D_{max}$ LIMIT DAMAGE SUM

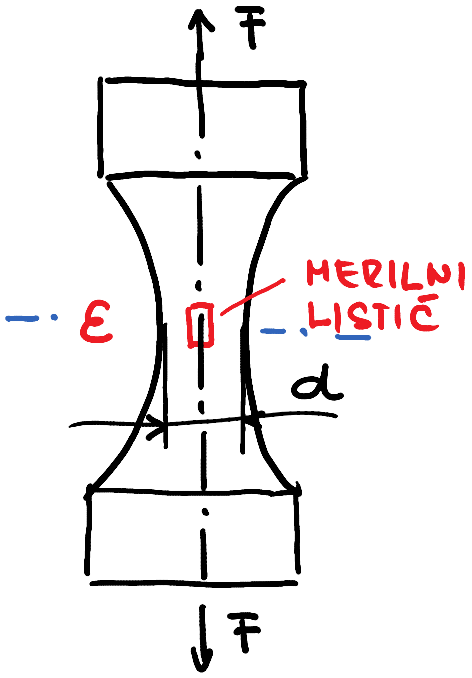
KRITIČNA VREDNOST POŠKODBE $\neq 1$

JEKLO, JEKLENA LITINA, AL DELI BREZ ŽUAROV $D_{max} = 0.3$

DELI Z ŽUARI $D_{max} = 0,5$

SIVA LITINA $D_{max} = 1$

# MERJENJE UTRUJENOSTNE POŠKODBE




$\tilde{\varepsilon} = \varepsilon$

NOV PREZUŠANEC $\sigma = \frac{F}{A}$

A IMENSKI PREREZ $A = \frac{\pi d^2}{4}$

F MERIMO

–·– KRITIČNA RAVNINA

PO DOLOČENEM ČASU OBREMENJEVANJA

$\tilde{\sigma} = \frac{F}{\tilde{A}}$

$\tilde{A}$ EFEKTIVNI PREREZ

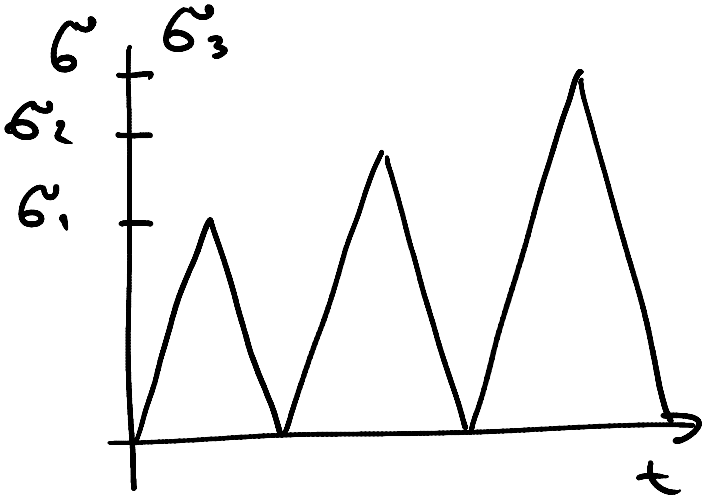
$\tilde{\sigma} \geq \sigma$

$D = \frac{A_D}{A} = \frac{A - \tilde{A}}{A} = 1 - \frac{\tilde{A}}{A}$

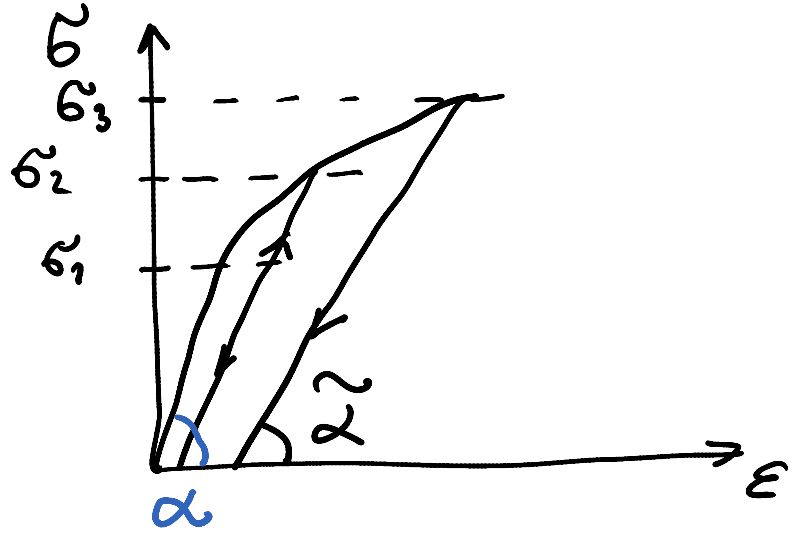
$$D = 1 - \frac{\tilde{\sigma} F}{\tilde{\sigma}_2 F} = 1 - \frac{\tilde{\sigma}}{\tilde{\sigma}_2} = 1 - \frac{\tilde{E}\,\tilde{\varepsilon}}{E\,\tilde{\varepsilon}_2}$$

$$\tilde{\sigma} = \tilde{E}\,\tilde{\varepsilon}$$
$$\tilde{\sigma}_2 = E\,\tilde{\varepsilon}_2$$

$$D = 1 - \frac{\tilde{E}}{E}$$




$\tilde{\alpha} \leq \alpha$




$\varepsilon = tg\alpha \; ; \; \tilde{E} = tg\tilde{\alpha}$

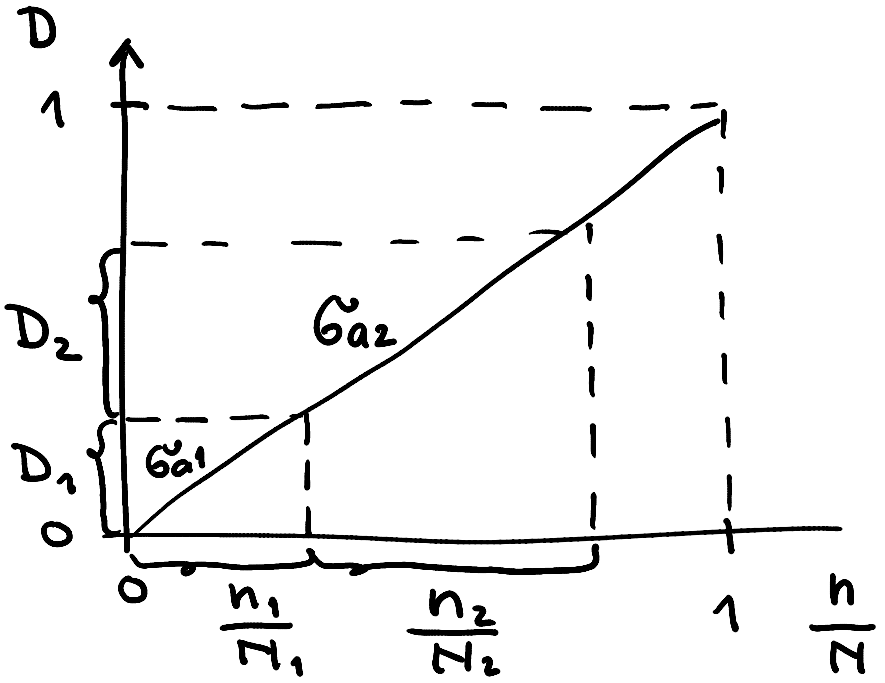
$$\sigma = \tilde{E}\,\varepsilon$$

$$\frac{F}{A} = \tilde{E}\,\varepsilon \;\Rightarrow\; \tilde{E} = \frac{F}{A \cdot \varepsilon}$$

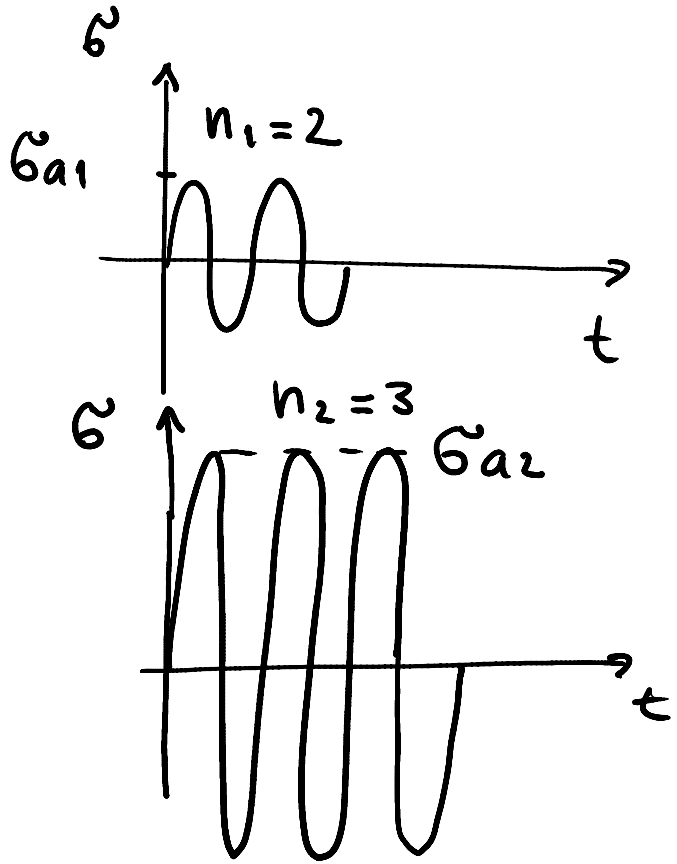
KOLIČINE NA DESNI STRANI ENAČBE LAHKO MERIMO V USTALJENEM TRENUTKU.

# LINEARNA IN NELINEARNA AKUMULACIJA IN RAZVOJ POŠKODBE

## LINEARNA AKUMULACIJA IN LINEARNI RAZVOJ




$$D_1 = \frac{n_1}{N_1} \; ; \; D_2 = \frac{n_2}{N_2}$$

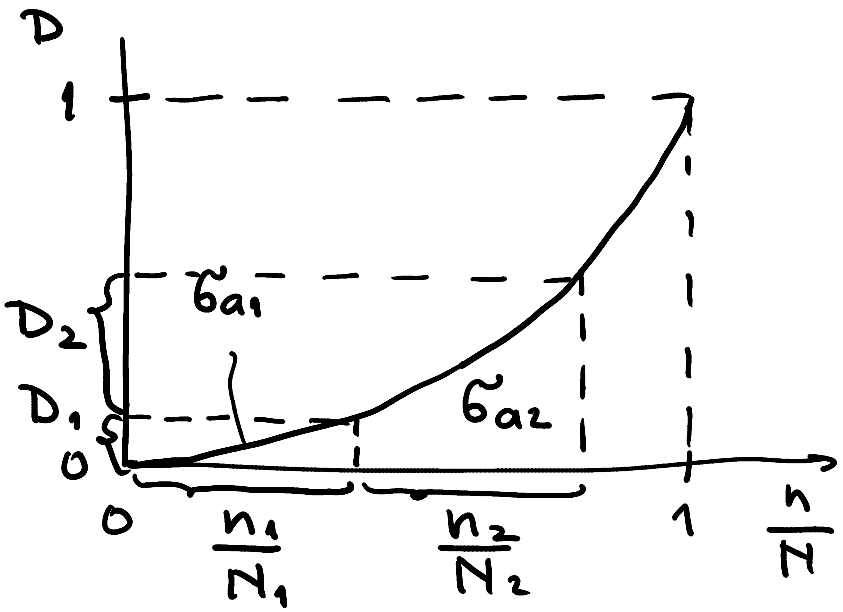


$$D = \sum_i D_i = \sum_i \frac{n_i}{N_i}$$

MINERJEVO PRAVILO O LINEARNI AKUMULACIJI POŠKODB

ČE JE ZVEZA MED D IN n/N LINEARNA GOVORIMO O LINEARNEM RAZVOJU POŠKODBE.

# LINEARNA AKUMULACIJA IN NELINEARNI RAZVOJ

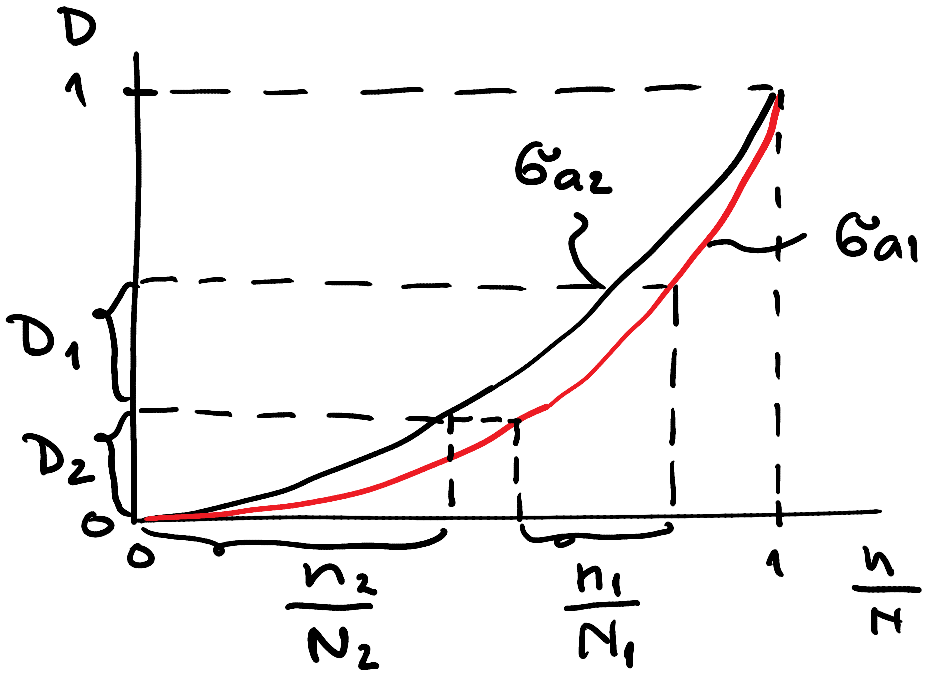



$$D_1 \neq \frac{n_1}{N_1} \; ; \; D_2 \neq \frac{n_2}{N_2}$$

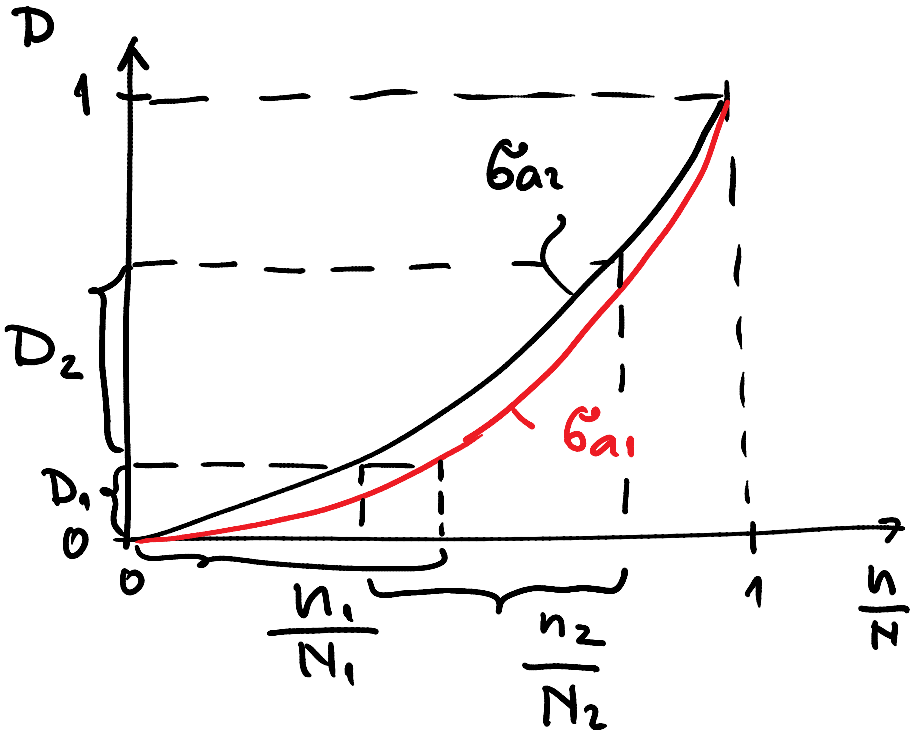
$$D = \sum_i D_i \neq \sum_i \frac{n_i}{N_i}$$

ČE SE MED AKUMULIRANJEM POŠKODBE GIBLJEMO PO ENI KRIVULJI, KI POVEZUJE $D$ IN $\frac{n}{N}$ GOVORIMO O LINEARNI AKUMULACIJI POŠKODBE.

# NELINEARNA AKUMULACIJA IN NELINEARNI RAZVOJ




$$D = \sum_i D_i \neq \sum_i \frac{n_i}{N_i}$$




$$D = \sum_i D_i \neq \sum_i \frac{n_i}{N_i}$$

NA POŠKODBO VPLIVA REDOSLED OBREMENITVENIH CIKLOV

VEDNO GADAR IMAMO NELINEARNI RAČUN POŠKODBE.