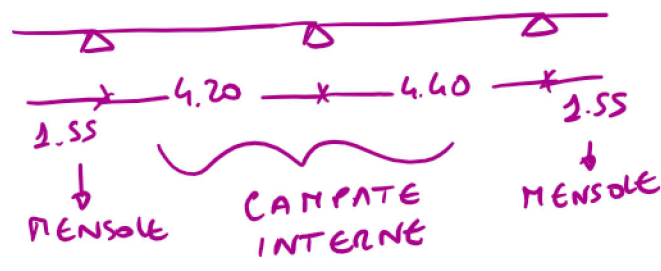
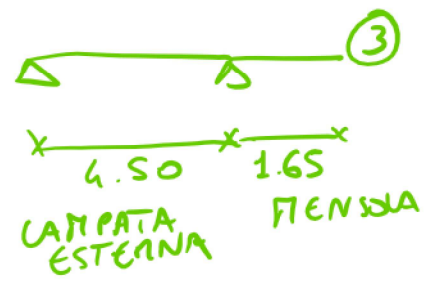
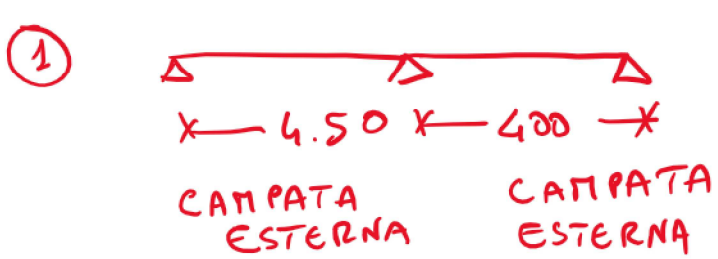
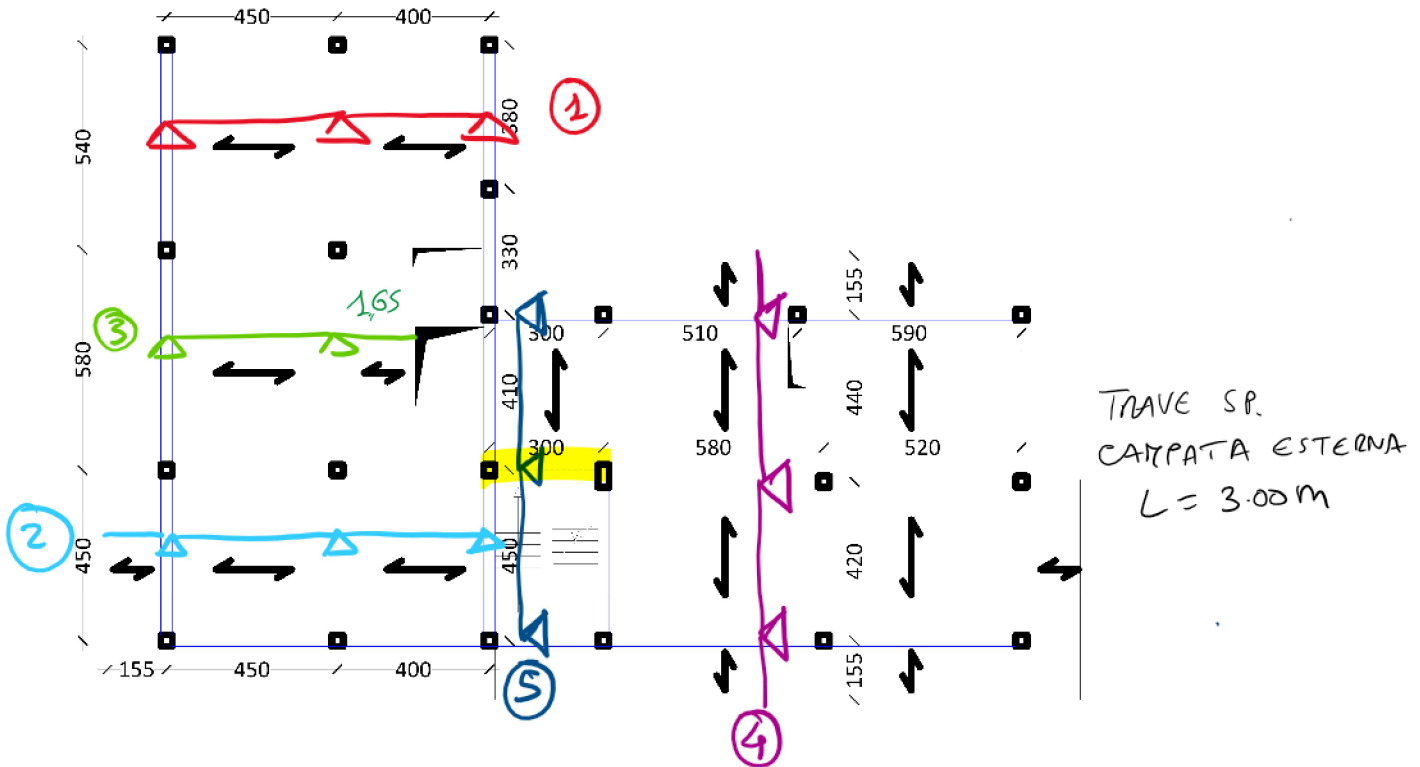


# ALTEZZA SOLAIO

giovedì 26 marzo 2020 14:14



$$\frac{L_{est}}{h} \leq 22 \Rightarrow h_{solaio} \geq \frac{1}{22} 450 \text{ cm} = 20,5 \text{ cm}$$

$$\frac{L_{int}}{h} \leq 25 \rightarrow h_{solaio} \geq \frac{1}{25} 450 \text{ cm} = 18 \text{ cm}$$

$$\frac{L_{sba}}{h} \leq 7 \Rightarrow h_{solaio} \geq \frac{165}{7} \text{ cm} = 23,6 \text{ cm}$$

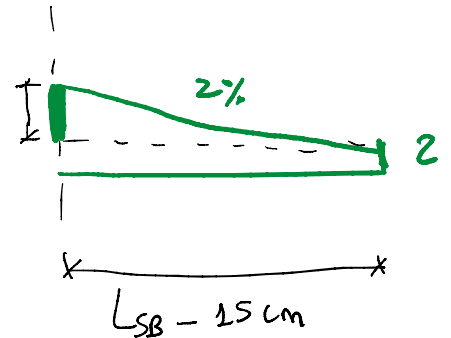
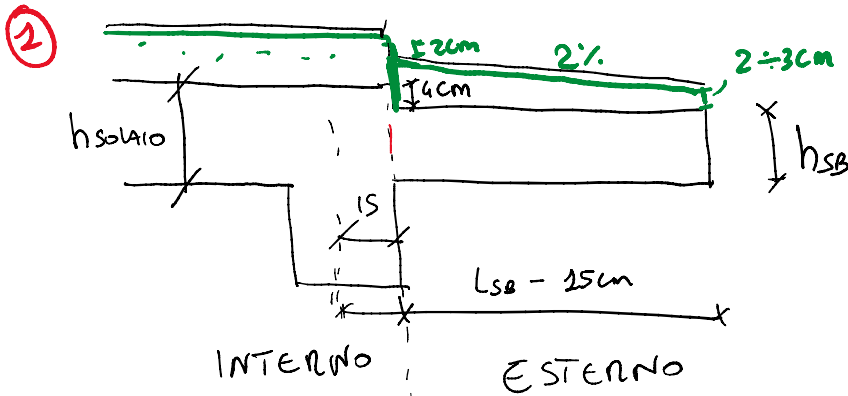
se 165/8 = 20,6 cm

$$\frac{L_{\text{SBALZO, EST}}}{h} \leq 7 \rightarrow h_{\text{SBALZO, EST}} \geq \frac{155}{7} = 22.1 \text{ cm}$$

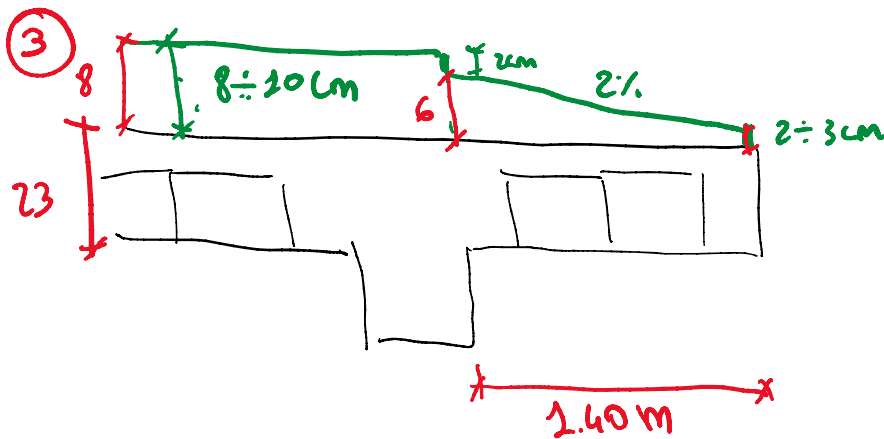
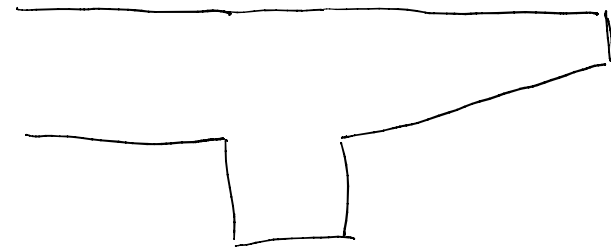
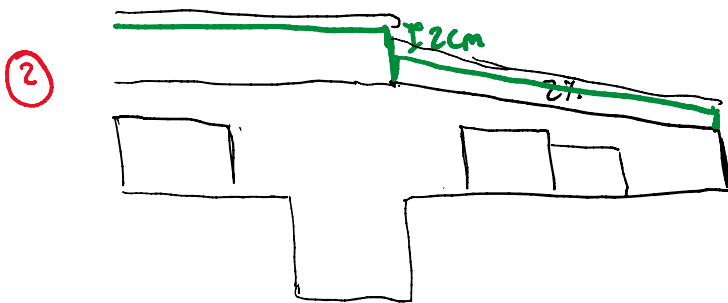
TRAVE SPESSORE

$$\frac{L_{\text{SP}}}{h} \leq 20 \rightarrow h_{\text{TRAVE}} \geq \frac{300}{20} = 15 \text{ cm}$$

### POSSIBILI SOLUZIONI



$$h_{\text{solario}} = 4 \text{ cm} + h_{\text{SBALZO}}$$



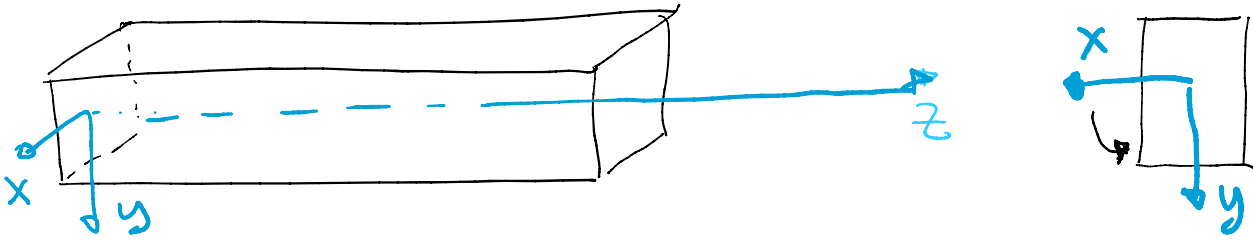
OPZIONE SCELTA

$$h = 23 \text{ cm}$$

5 soletta + 18 pignatie

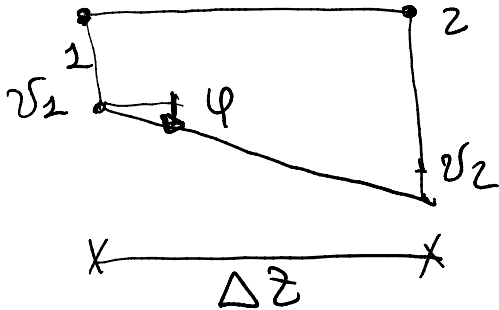
# CONVENZIONI

giovedì 26 marzo 2020 15:01



$$M, \nu, W > 0 \\ x, y, z$$

SE CONCORDI CON ASSI



$$\varphi = - \frac{\Delta V}{\Delta z}$$

## TENSIONI E DEFORMAZIONI

$$\sigma > 0$$

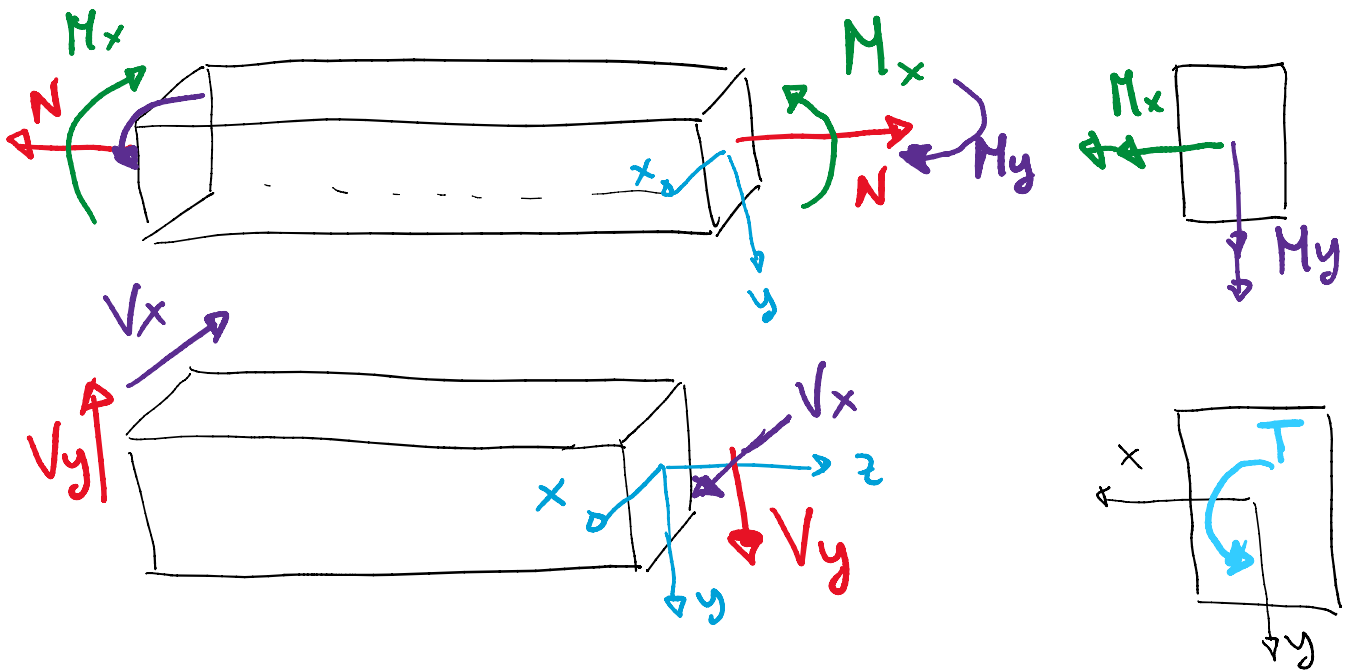
TRAZIONE

$$\epsilon > 0$$

ALLUNGAMENTI

# CARATTERISTICHE DELLA SOLLECITAZIONE

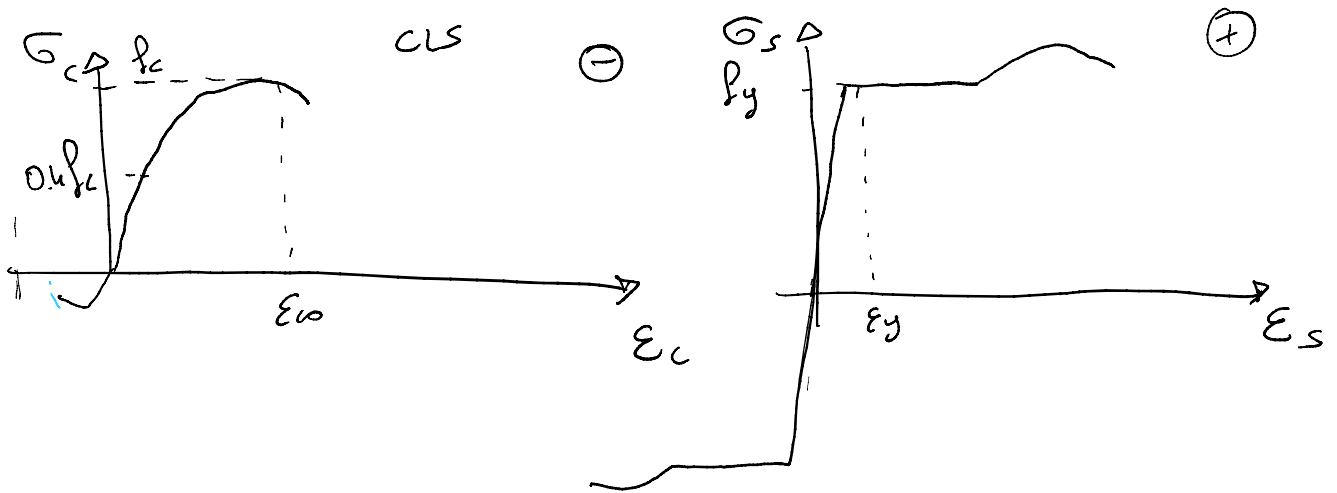
VALORI POSITIVI



# LEGAMI COSTITUTIVI

giovedì 26 marzo 2020 15:09

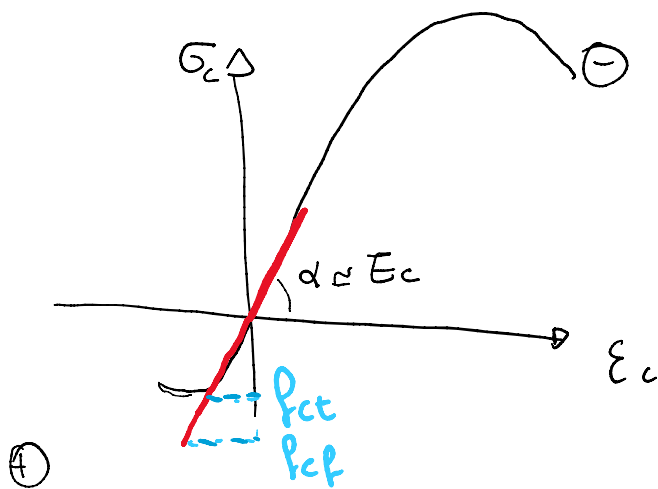
## ANDAMENTO SPERIMENTALE



SONO DEFINITI 3 STADI DI COMPORTAMENTO

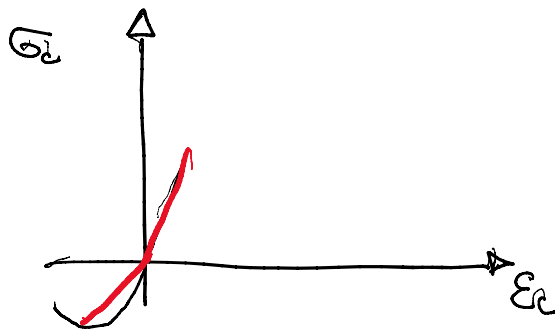
### 1. STADIO DI COMPORTAMENTO

STATO LIMITE DI FESSURAZIONE

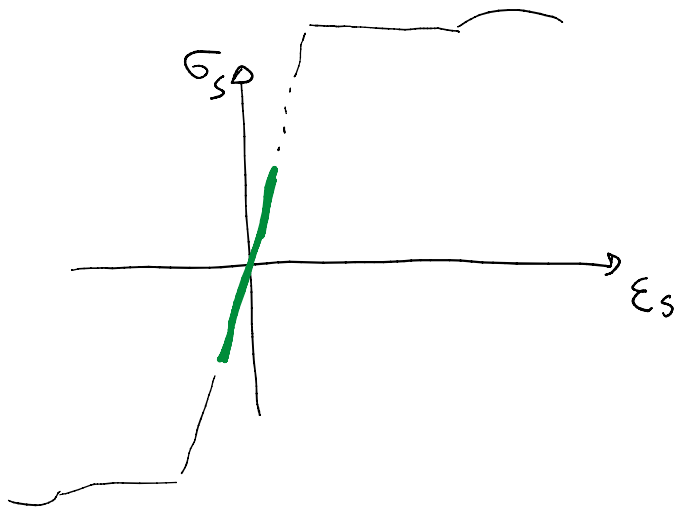


$$\sigma_c = E_c \epsilon_c$$

$$E_c = f_{ct} / \epsilon_{ct}$$



NEL PASSATO  
 $E_c \neq E_c^+$  PER COGLIERE  
 COMPORTAMENTO  
 NON LINEARE

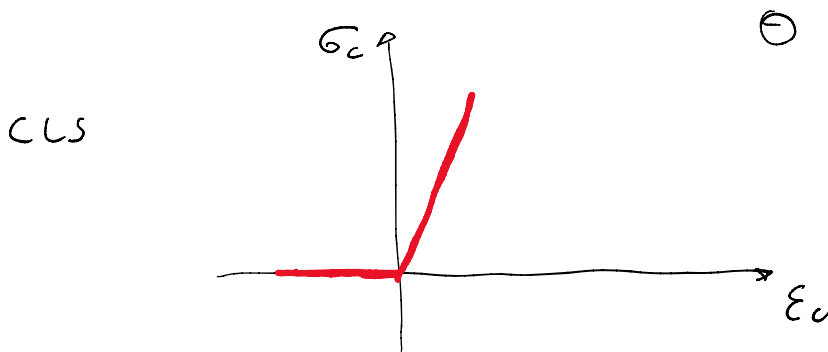


ACCIAIO

$$\sigma_s = E_s \cdot \epsilon_s$$

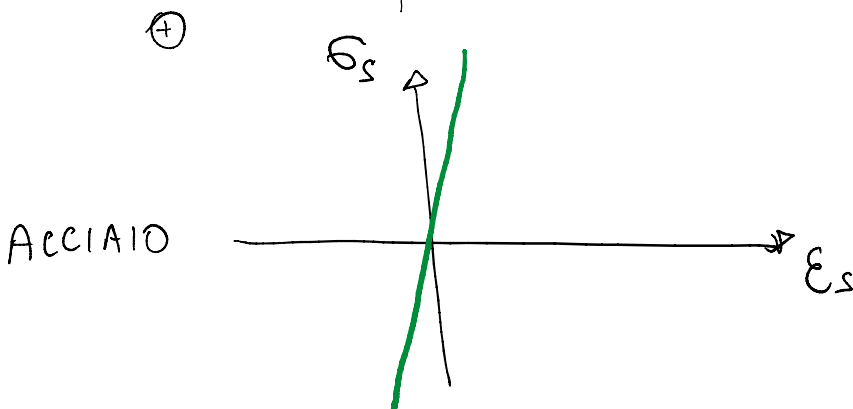
## II STADIO DI COMPORTAMENTO

SLE . STATO LIMITE DI TENSIONI DI ESERCIZIO



$$\sigma_c = E_c \epsilon_c \quad \epsilon < 0$$

$$\sigma_c = 0 \quad \epsilon > 0$$



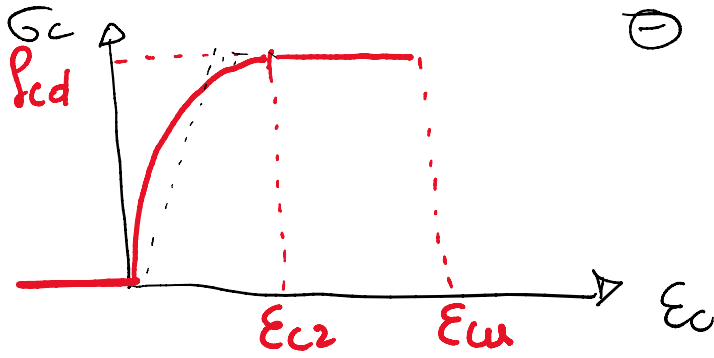
$$\sigma_s = E_s \epsilon_s$$

## III STADIO

VERIFICHE ALLO SLU

1. TENER CONTO DELLA NON LINEARITA' DEL MATERIAL
2. VALORI DI CALCOLO DELLE RESISTENZE

# MODELLI PER CLS.



## PARABOLA RETTANGOLO

$\epsilon_{c2} = 2\text{‰}$  CLASSI FINO A C50/60

$\epsilon_{cu} = 35\text{‰}$

$P_{cd} = \frac{P_{ck}}{\gamma_c} \cdot 0.85_{acc}$

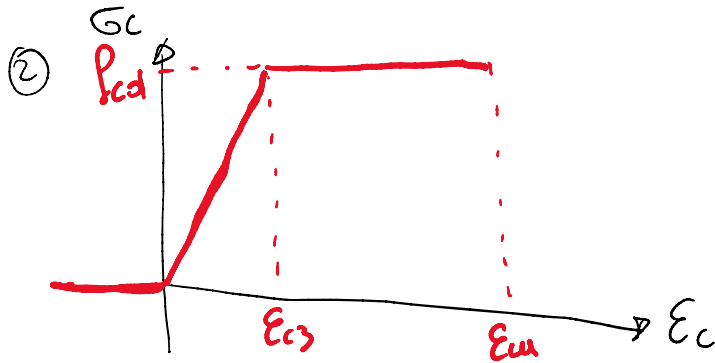
AL CRESCERE DI  $P_{ck}$

$\epsilon_{c2}$  AUMENTA

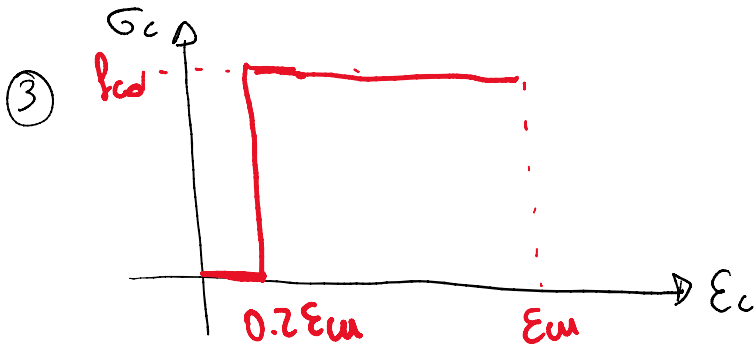
$\epsilon_{cu}$  RIDUCE



COMPORTAMENTO + FRAGILE



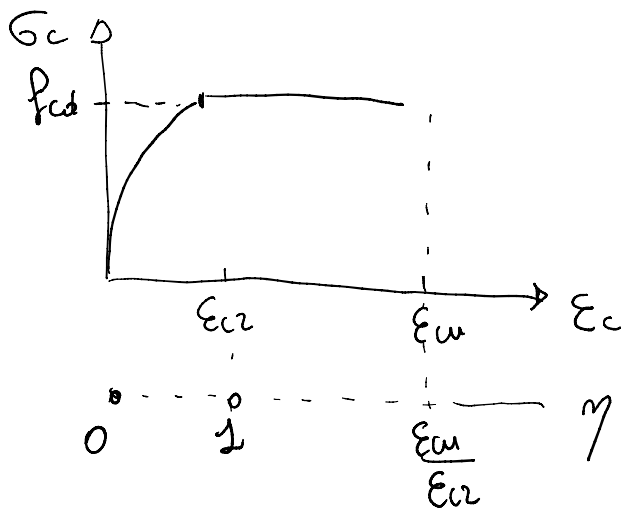
$\epsilon_{c3} = 1.75\text{‰}$



STRESS BLOCK

MODELLO 1	PARABOLA - RETTANGOLO	(RIFERIMENTO)
3	STRESS - BLOCK	(SEZ. ≠ RETTANGOLARE)

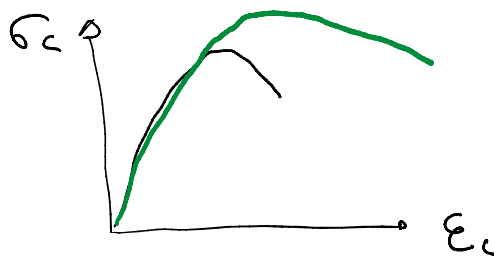
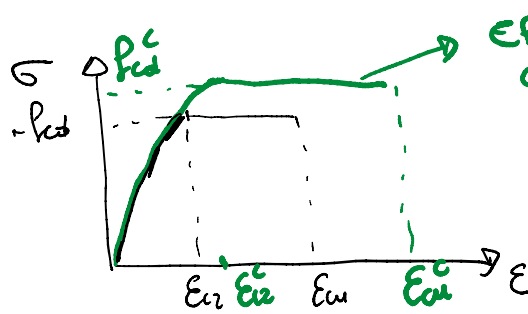
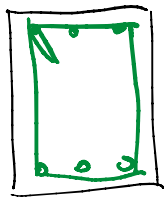
# FORMULAZIONE ANALITICA MODELLO PARABOLA-RETTANGOLO



$$\gamma = - \frac{\epsilon_c}{\epsilon_{cr}}$$

$$\sigma_c = \begin{cases} -f_{cd} \gamma(2-\gamma) & 0 \leq \gamma \leq 1 \\ -f_{cd} & 1 \leq \gamma \leq \frac{\epsilon_u}{\epsilon_{cr}} \end{cases}$$

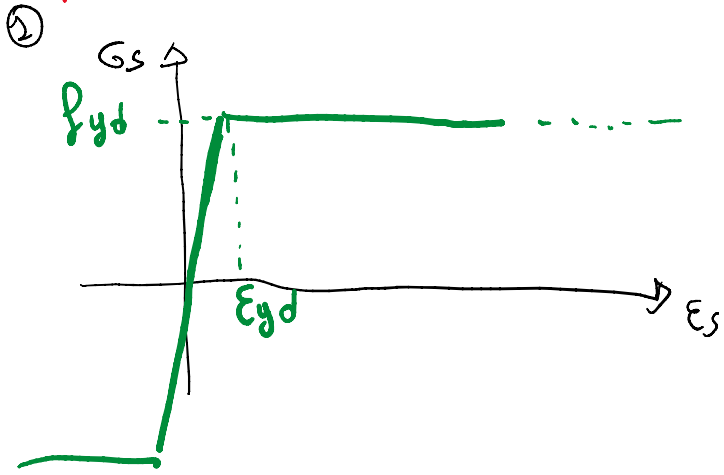
## EFFETTO DEL CONFINAMENTO



COMPORTAMENTO SPERIMENTALE



# ACCIAIO AL III STADIO

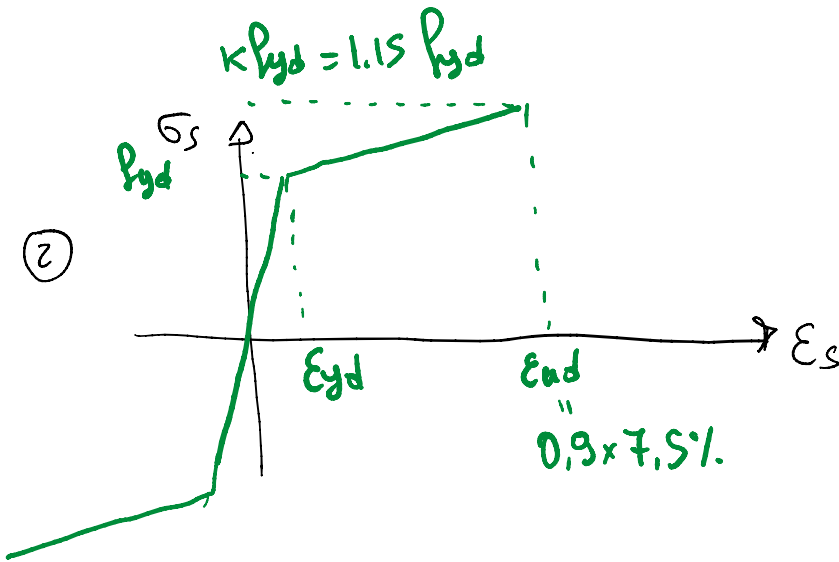


$$\sigma = E \epsilon$$

$$\epsilon_{yd} = \frac{P_{yd}}{E_s} = \frac{391.3 \text{ N/mm}^2}{200'000 \text{ N/mm}^2} = 1.96\%$$

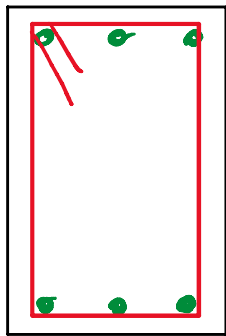
NOTA STORICA  
 $\epsilon_{su} = 1\%$

$$\sigma_s = \begin{cases} E_s \epsilon_s & -\epsilon_{yd} \leq \epsilon_s \leq \epsilon_{yd} \\ P_{yd} & \epsilon_s > \epsilon_{yd} \\ -P_{yd} & \epsilon_s < -\epsilon_{yd} \end{cases}$$



# IPOTESI DI BASE

giovedì 26 marzo 2020 15:55



IPOTESI :

1. CONSERVAZIONE DELLE SEZIONI PIANE

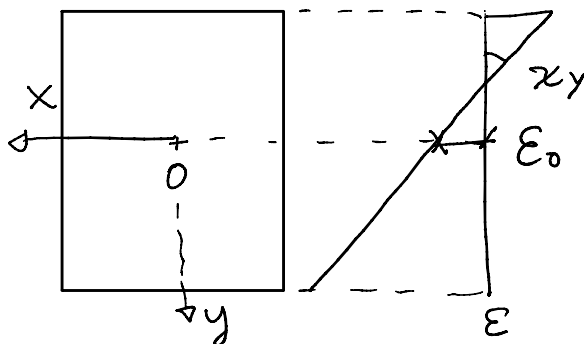
$$\Rightarrow \varepsilon = \varepsilon_0 + \chi_x X + \chi_y Y$$

$$\chi_x = \frac{\partial \varepsilon}{\partial X} \quad \chi_y = \frac{\partial \varepsilon}{\partial Y}$$

2. PERFETTA ADERENZA

$$\varepsilon_c = \varepsilon_s$$

SEZ. DI MATERIALE OMOGENEO



## PROCEDIMENTO

1. DIAGRAMMA  $\varepsilon$

2.  $\sigma = f(\varepsilon)$  LEGAME COSTITUTIVO

$$3. N = \int \sigma dA$$

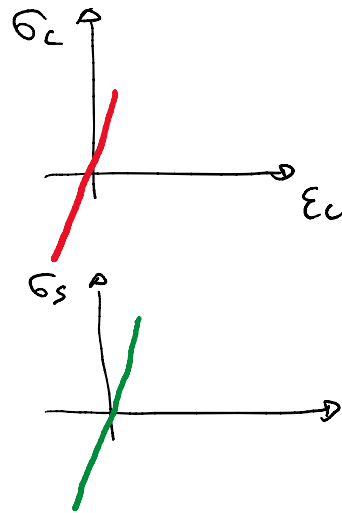
$$M_x = \int \sigma y dA$$

$$M_y = - \int \sigma x dA$$

(- PER LA CONVENZIONE DEL SEGNI ADOTTATA )

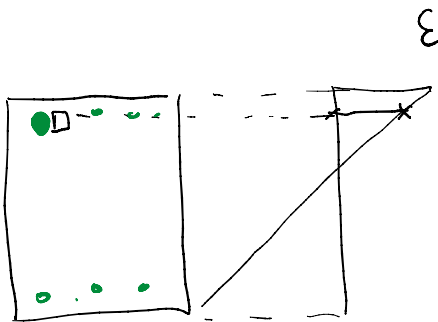
# I STADIO

LEGAMI COSTITUTIVI



$$\sigma_c = E_c \epsilon_c$$

$$\sigma_s = E_s \epsilon_s$$



$dA_c$   $dA_s$   
□ □

PERFETTA ADERENZA  $\rightarrow \epsilon_c = \epsilon_s$

$$\begin{aligned} \sigma_c &= E_c \epsilon_c \\ \sigma_s &= E_s \epsilon_s \end{aligned} \rightarrow \begin{aligned} \epsilon_c &= \sigma_c / E_c \\ \sigma_s &= E_s \cdot \frac{\sigma_c}{E_c} = n \sigma_c \end{aligned}$$

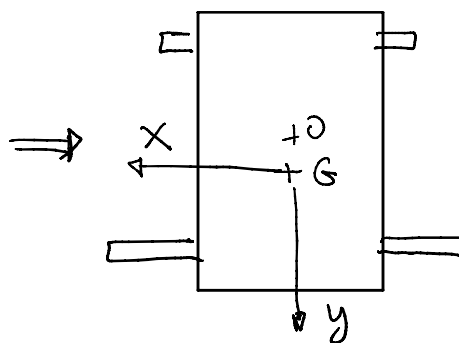
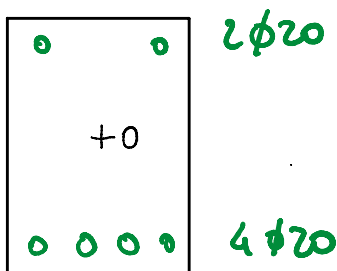
$$\frac{E_s}{E_c} = n$$

**COEFF. DI OMOGENEIZZAZIONE**

C25/30  $\rightarrow E_c = 31500 \text{ MPa} \rightarrow n = \frac{200'000}{31500} = 6,35$

$$\begin{aligned} \sigma_c dA_c \\ \sigma_s dA_s = \sigma_c n dA_s \end{aligned} \quad \sigma_s = n \sigma_c$$

TRASFORMO L'AREA DELLE ARMATURE IN UN'AREA DI CLS EQUIVALENTE  $\Rightarrow$  **SEZIONE OMOGENEIZZATA**



**G BARICENTRO DELLA SEZIONE OMOGENEIZZATA**

DEFINITA LA SEZIONE

$$1) \quad \varepsilon = \varepsilon_G + \chi_x X + \chi_y Y$$

$$2) \quad \sigma = E_c \varepsilon \Rightarrow \sigma = E_c (\varepsilon_G + \chi_x X + \chi_y Y)$$

$$3) \quad N = \int \sigma dA = \int E_c \varepsilon_G dA + \int E_c \chi_x X dA + \int E_c \chi_y Y dA \\ = E_c \varepsilon_G \int dA + E_c \chi_x \int X dA + E_c \chi_y \int Y dA$$

$$\int X dA = 0 ; \int Y dA = 0$$

MOMENTI STATICI RISPETTO  
AD ASSE BARICENTRICO

$$\rightarrow N = E_c \varepsilon_G A \quad A = \text{AREA SEZ. OMOGENEIZZATA}$$