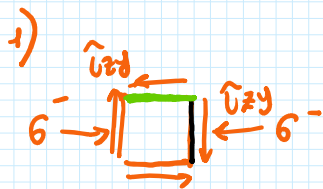
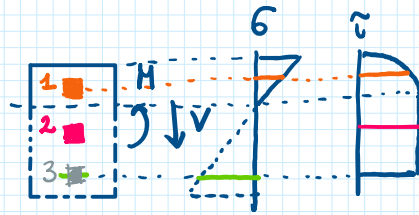
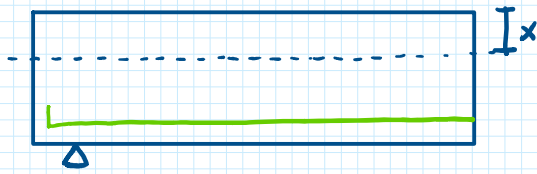
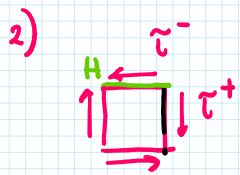
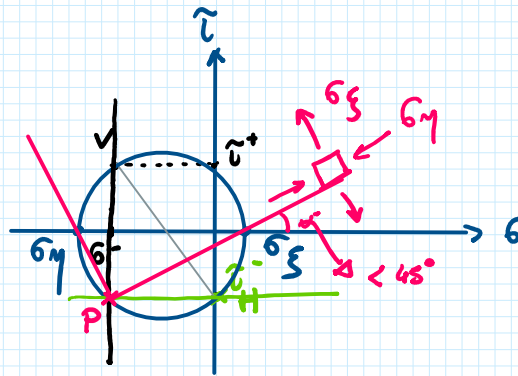


## II STADIO



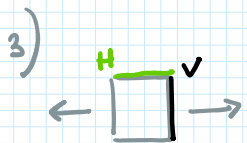
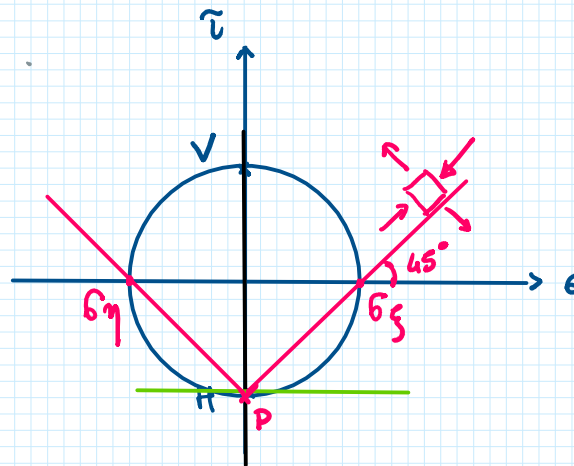
$$v(\sigma^-; \tau^+)$$

$$H(0; \tau^-)$$



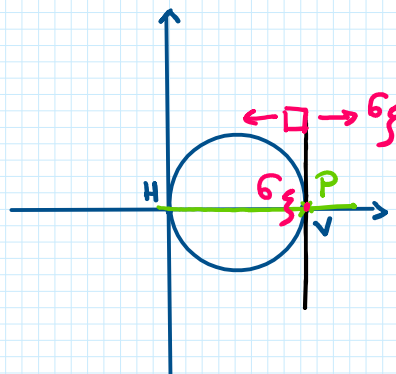
$$v(0; \tau^+)$$

$$H(0; \tau^-)$$

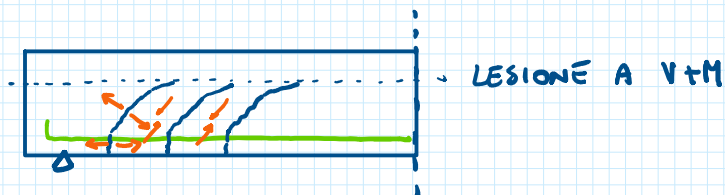


$$v(\sigma^+; 0)$$

$$H(0; 0)$$

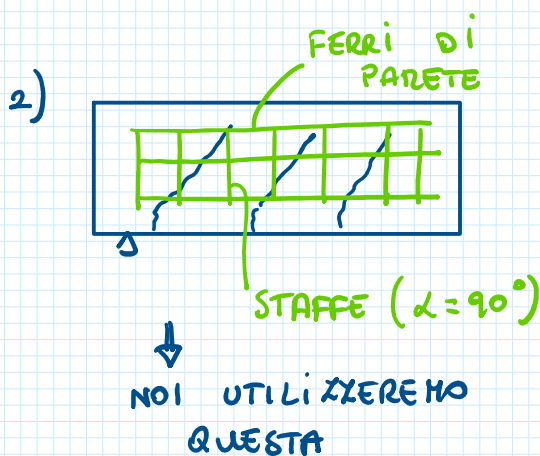
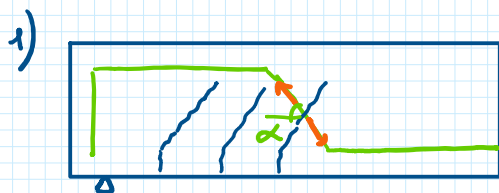


PER EFFETTO DEL  $\Rightarrow \begin{cases} \tau \\ \sigma_M \\ \sigma_F \end{cases}$



DAL V NASCONO TENSIONI DI TRAZIONE  $\Rightarrow$  ARMATURA

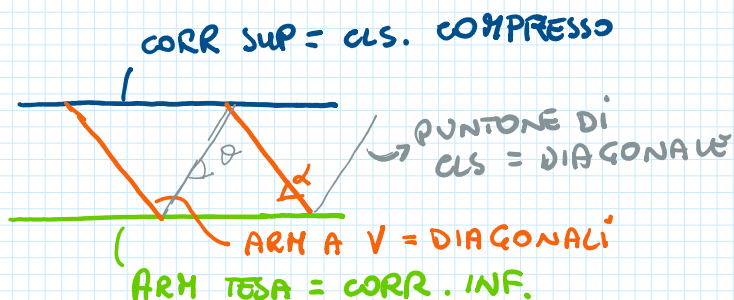
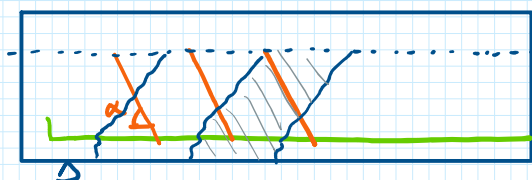
### TIPI DI ARMATURA A V



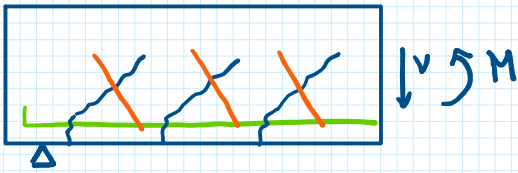
### MODELLI TEORICI

1) TRALICCIO  $\begin{cases} \text{RITTER - MORSH} \\ \text{PUNTONI A INCLINAZIONE VARIABILE (SW)} \end{cases}$

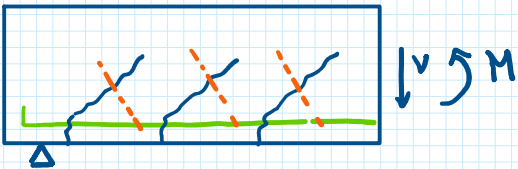
2) CAMPI DI TENSIONE  
 $\hookrightarrow$  NOI USEREMO QUESTO



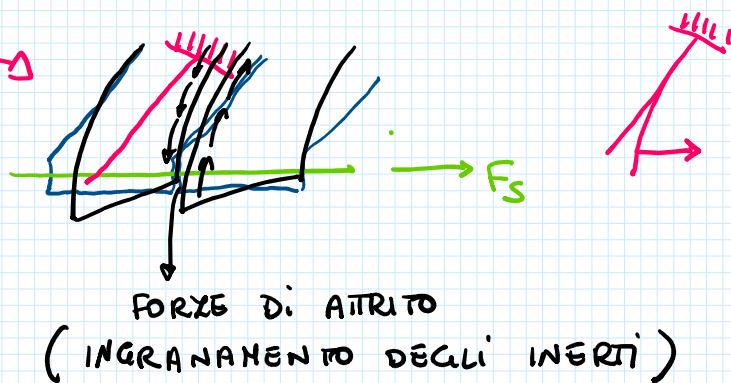
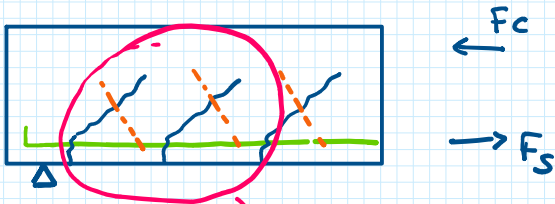
### PASSAGGIO ALLO SW



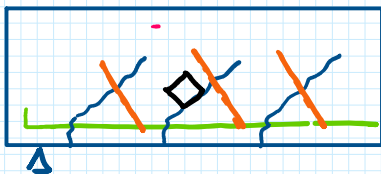
FACCIO CRESCERE  $V$  e  $M \Rightarrow \sigma_{sn} = f_{yd}$  LE ARM. A TAGLIO SI PLASTICIZZANO



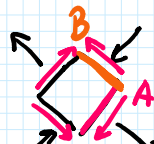
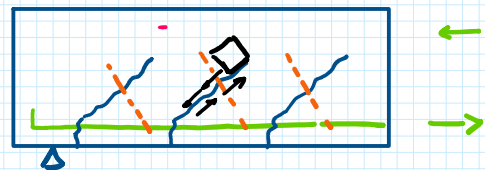
FACCIO CRESCERE ANCORA  $V$  e  $M$ :

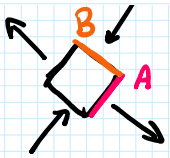


PRIMA DELLA PLASTICIZZ.  
DELL' ARMATURA  
A TAGLIO



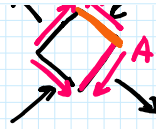
DOPO LA PLASTICIZZ.  
DELL' ARMATURA  
A TAGLIO





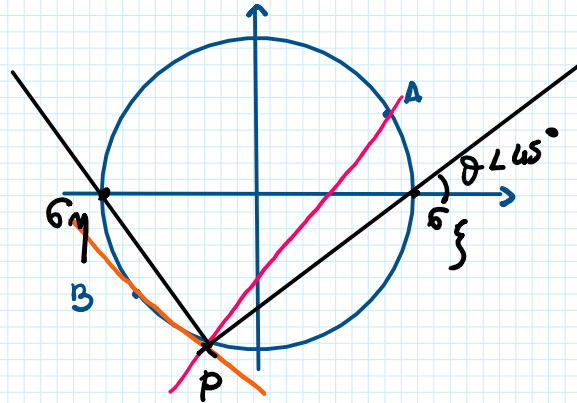
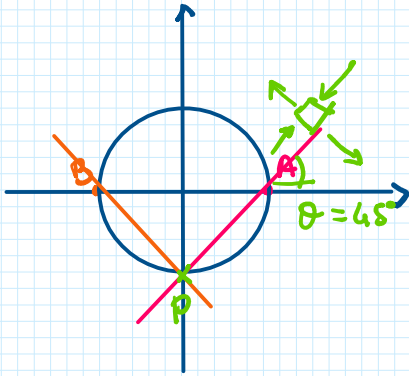
$$A(\sigma^+; 0)$$

$$B(\sigma^-; 0)$$



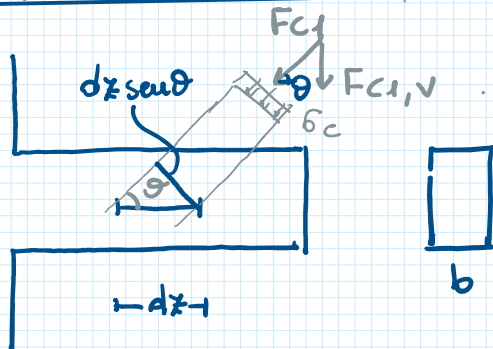
$$A(\sigma^+; \tau^+)$$

$$B(\sigma^-; \tau^-)$$



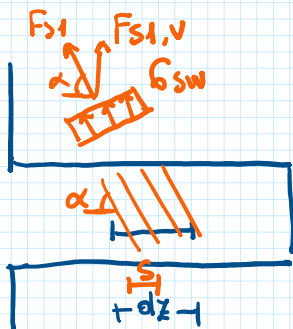
## MODELLO DEI CAMPI DI TENSIONE

### SEZ. ORIZZONTALE



$$F_{c1} = \sigma_c b dz \sin \theta$$

$$F_{c1,v} = F_{c1} \sin \theta = \sigma_c b dz \sin^2 \theta$$



$$F_{s1} = \sigma_{sw} A_{sw} \frac{dz}{s}$$

n. STAFFE CHE  
RICADONO IN  $dz$

$$F_{s1,v} = F_{s1} \cdot \sin \alpha = \sigma_{sw} \frac{A_{sw}}{s} dz \sin \alpha$$

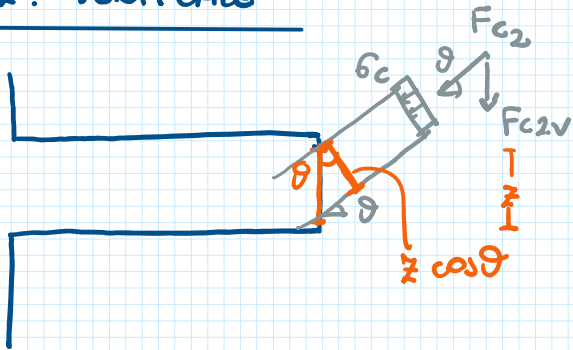
EQ. TRASLAZ. VERTICALE :  $F_{c1,v} = F_{s1,v}$

EQ. TRASL. VERTICALE :  $F_{c1v} = F_{s1v}$

$$G_c b \cancel{\sin^2 \theta} = G_{sw} \frac{A_{sw}}{s} \cancel{\sin \alpha}$$

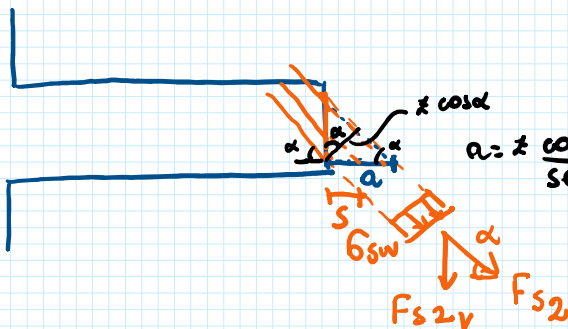
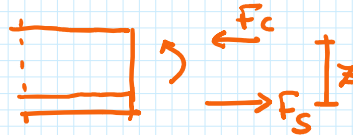
$$G_c b \sin^2 \theta = G_{sw} \frac{A_{sw}}{s} \sin \alpha \quad (1)$$

SEZ. VERTICALE



$$F_{c2} = G_c z \cos \theta b$$

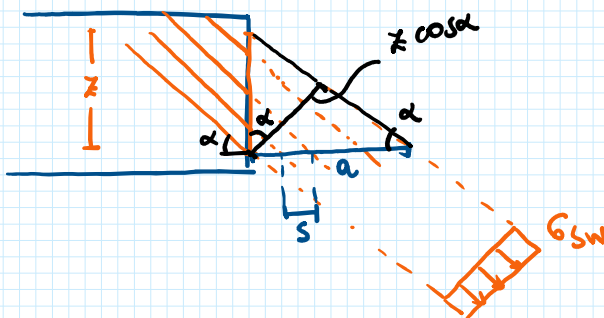
$$F_{c2v} = F_{c2} \sin \theta = G_c b z \cos \theta \sin \theta$$



$$F_{s2} = G_{sw} A_{sw} \cdot \frac{z \cot \alpha}{s}$$

n. STAFFE

$$F_{s2v} = F_{s2} \sin \alpha = G_{sw} \frac{A_{sw}}{s} z \cot \alpha \sin \alpha$$



EQ. TRASL. VERTICALE :  $V = F_{c2v} + F_{s2v}$

$$V = G_c b z \cos \theta \sin \theta + G_{sw} \frac{A_{sw}}{s} z \cot \alpha \sin \alpha \quad (2)$$

DA ① RICEVIO  $\sigma_{sw}$ :

$$\sigma_c b \sin^2 \theta = \sigma_{sw} \frac{A_{sw}}{s} \sin \alpha \quad (1)$$

$$\sigma_{sw} = \frac{\sigma_c b \sin^2 \theta}{\frac{A_{sw}}{s} \sin \alpha} \Rightarrow \text{SOSTITUISCO IN (2)}$$

$$V = \sigma_c b \times \cos \theta \sin \theta + \frac{\sigma_c b \sin^2 \theta}{\cancel{\frac{A_{sw}}{s} \sin \alpha}} \quad \cancel{\frac{A_{sw}}{s} \times \cot \alpha \sin \alpha}$$

$$V = \sigma_c b \times \sin^2 \theta \left( \frac{\cot \theta + \cot \alpha}{\sin^2 \theta + \cos^2 \theta} \right)$$

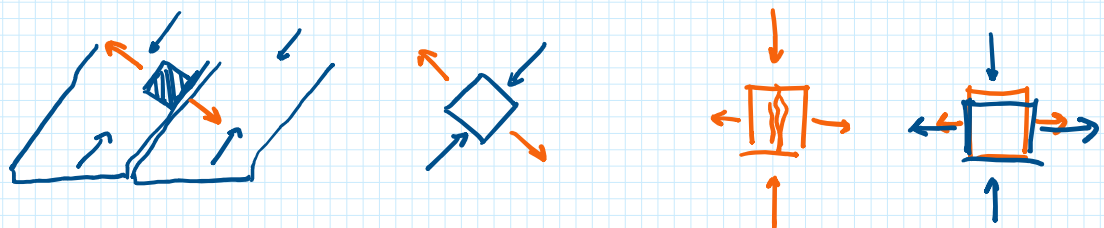
$$V = \sigma_c b \times \cancel{\sin^2 \theta} \left( \frac{\cot \theta + \cot \alpha}{\cancel{\sin^2 \theta} (1 + \cot^2 \theta)} \right)$$

$$V = \sigma_c b \times \frac{\cot \theta + \cot \alpha}{1 + \cot^2 \theta} \quad (3)$$

$$\text{SE } \sigma_c = f'_{cd} \Rightarrow V_{Rd_{max}} = f'_{cd} b \times \frac{\cot \theta + \cot \alpha}{1 + \cot^2 \theta}$$

$$\text{NTC 18: } V_{Rd_{max}} = \underbrace{0.9 d}_b f'_{cd} \alpha_c \frac{\cot \theta + \cot \alpha}{1 + \cot^2 \theta}$$

$$\text{PERCHÉ } \sigma_c = f'_{cd} = \nu_1 f_{cd} = 0.5 f_{cd} ?$$



$\alpha_c$  TIENE CONTO DELLA PRESENZA DI  $N_{ed}$ !

$$\sigma_{cp} = \frac{|N_{Ed}|}{bh}$$

$$\text{SE } \frac{\sigma_{cp}}{f_{cd}} \leq 0.25 \quad \alpha_c = 1 + \frac{\sigma_{cp}}{f_{cd}}$$

$$0.25 \leq \frac{\sigma_{cp}}{f_{cd}} \leq 0.50 \quad \alpha_c = 1.25$$

$$\frac{\sigma_{cp}}{f_{cd}} > 0.50 \quad \alpha_c = 2.5 \left( 1 - \frac{\sigma_{cp}}{f_{cd}} \right)$$

SE  $N_{Ed}$  È DI TRAZIONE  $\Rightarrow \alpha_c = 1$