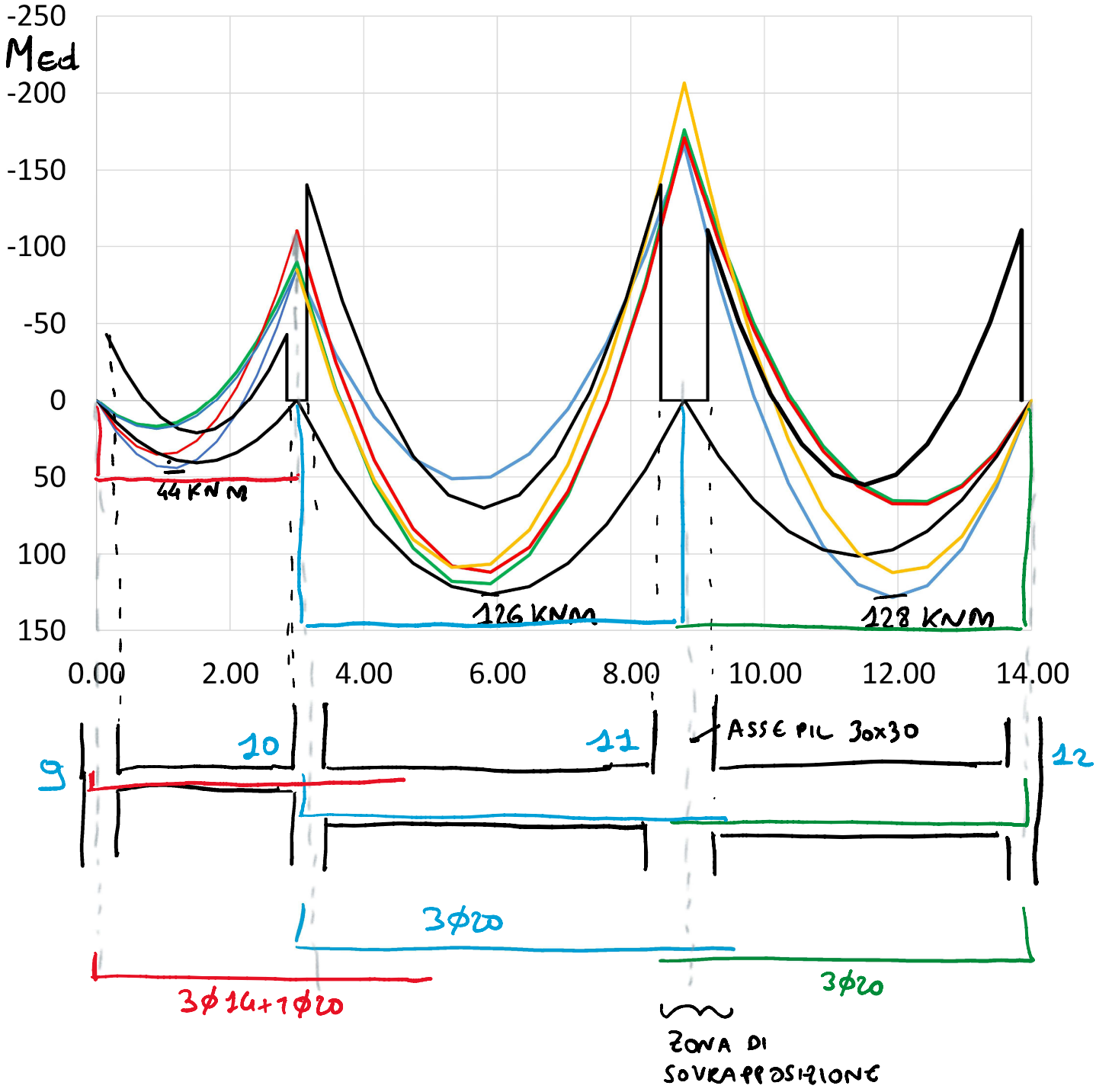
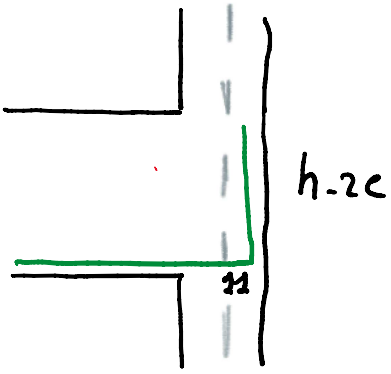
DISPOSIZIONE ARMATURE INFERIORI

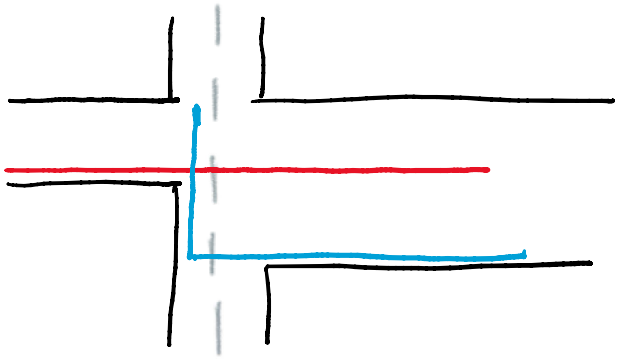
mercoledì 27 maggio 2020 16:28



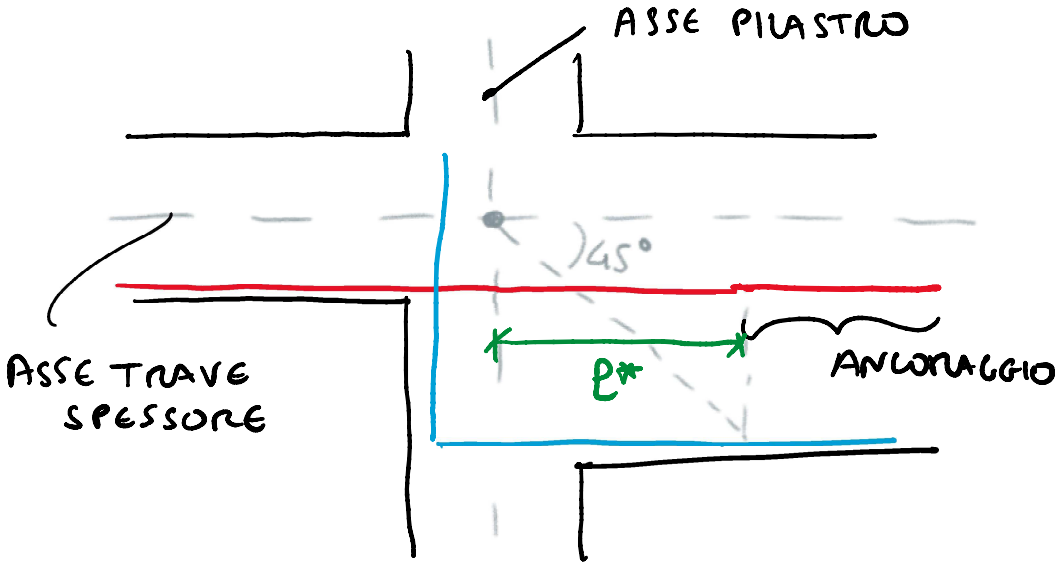
DETTAGLIO NODO PILASTRO 12



DETTAGLIO NODO PILASTRO 10



ZONA DI PERTINENZA TRAVE A SPESSORE



DIFFUSIONE GRADUALE TENSIONI

MOMENTO RESISTENTE

$$M_{Rd} = A_s f_{yd} \cdot 0{,}9d$$

$$A_s = 3 \times 3{,}14\ cm^2 = 9{,}42\ cm^2$$

$$M_{Rd} = 9{,}42\ cm^2 \times 391{,}3\ N/mm^2 \times 0{,}9 \times 0{,}45\ m \times \frac{1}{10}$$

$$= 149{,}28\ KNm$$

TRAVE A SPESSORE $5\phi14$, o $3\phi14 + 1\phi20$

$$A_s = 5 \times 1{,}54\ cm^2 = 7{,}70\ cm^2$$

$$A_s = 5 \times 1{,}54\,cm^2 = 7{,}70\,cm^2$$

$$M_{Rd} = 7{,}7\,cm^2 \times 391{,}3\,\frac{N}{mm^2} \times 0{,}9 \times 0{,}18\,m = \frac{1}{10}$$

$c = 5\,cm$
$h = 23\,cm$

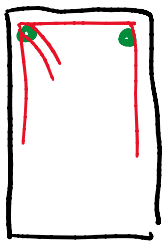
$$= 48{,}81\ KNm$$

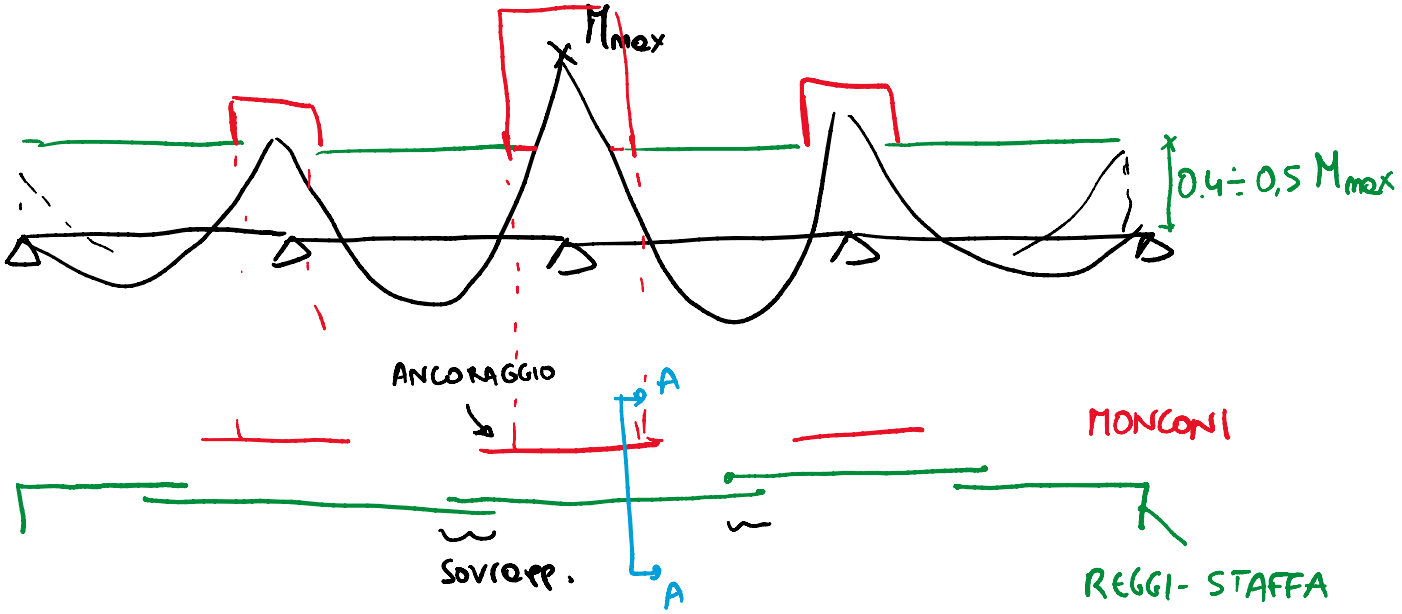
PROGETTO ARMATURE SUPERIORI

giovedì 28 maggio 2020 14:11

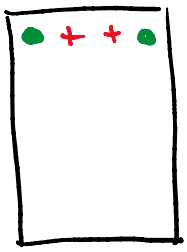
METODO 1

1. VALUTO $0,4 \div 0,5\ M_{max} \Rightarrow$ REGGISTAFFA
2. DISPONGO $A_{s,minima}$ DA CAMPATA A CAMPATA
3. AGGIUNGO MONCONI DOVE NECESSARIO



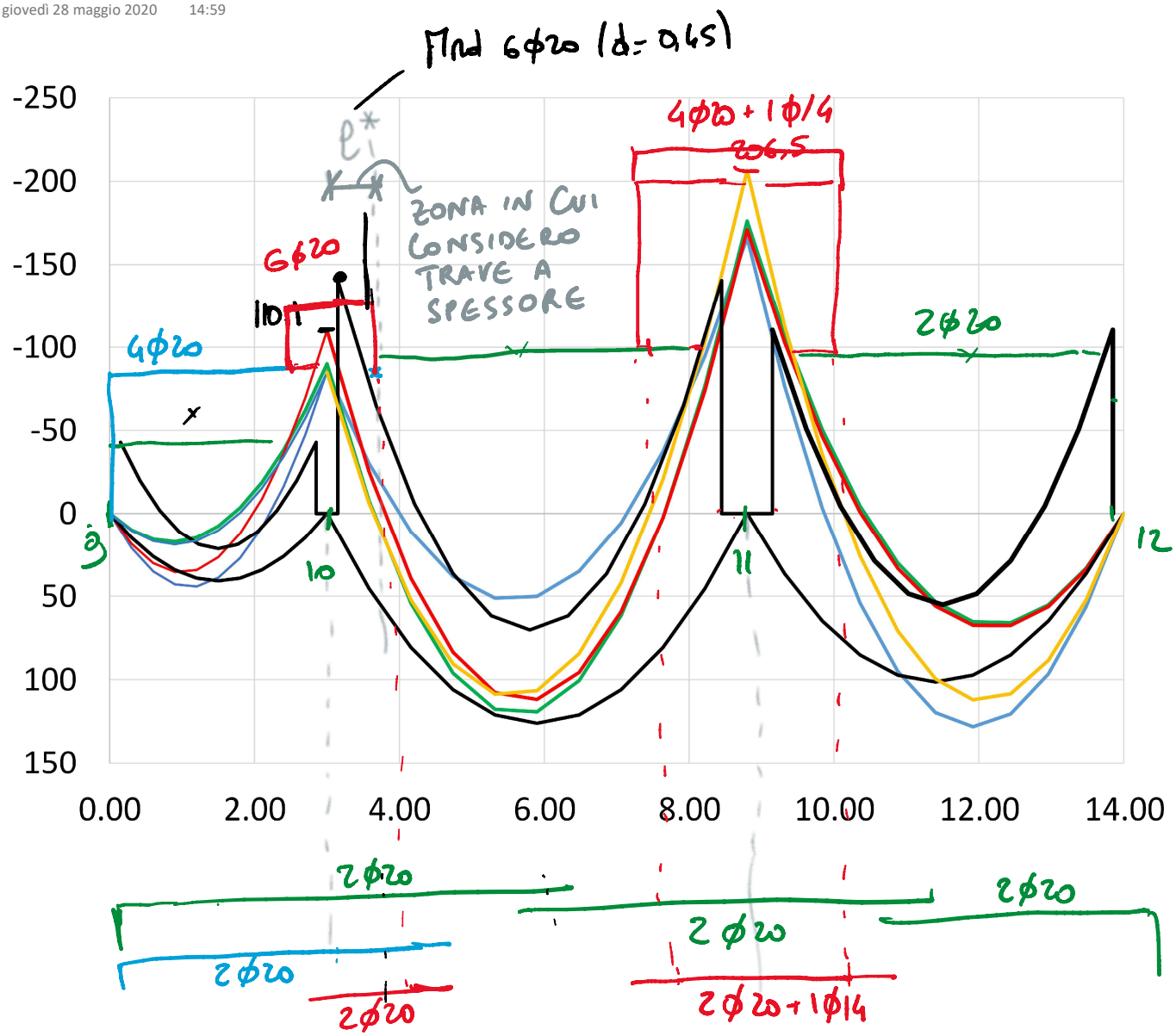


SEZIONE A-A



APPLICAZIONE AL NOSTRO CASO

giovedì 28 maggio 2020 14:59



ARMATURA REGGI - STAFFA : $M_{max} = 206,5\ kNm$

$0,4 \times 206,5\ kNm \Rightarrow 82,6\ kNm$

$$A_s = \frac{82,6\ kNm}{391,3\ N/mm^2 \times 0,9 \times 0,45\ m} \times 10 = 5,21\ cm^2 \Rightarrow 2\phi 20$$

$$M_{Rd\ 2\phi 20} = 6,28\ cm^2 \times 0,9 \times 0,45\ m \times 391,3\ \frac{N}{mm^2}\ \frac{1}{10}$$

$$= 98,5\ kNm$$

ARMATURA NECESSARIA APPOGGIO 12

$$M_{ed} = 206,5 \text{ kNm} \Rightarrow A_s = \frac{206,5}{391,3 \times 0,9 \times 0,45} \times 10$$

$$\Rightarrow A_s = 13,03 \text{ cm}^2 \rightarrow 4\phi 20 + 1\phi 14$$

$4\phi 20 \rightarrow 12,56 \text{ cm}^2 + 1,54 = 14,10 \text{ cm}^2$

$\Rightarrow$ AGGIUNGO MONCONI : $2\phi 20 + 1\phi 14$

ARMATURA NECESSARIA TRAVE A SPESSORE

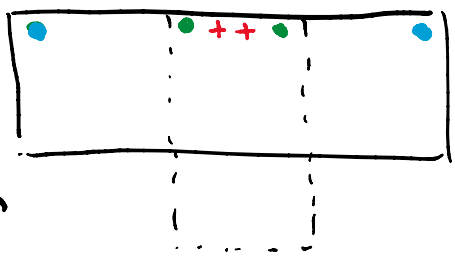
APPOGGIO 10

$M = 110.1 \text{ kNm}$ $\quad d = 0.18 \text{m}$

$$A_s = \frac{110.1 \text{ kNm} \times 10}{391,3 \frac{N}{mm^2} \times 0,9 \times 0,18 \text{m}} = 17,37 \text{ cm}^2$$

$$\Rightarrow n_{\phi 20} = \frac{17,37}{3.14} = 6\phi 20$$

SEZIONE TRAVE A SPESSORE



$$M_{Rd\,\phi 20} = 3,14 \text{ cm}^2 \times 0,9 \times 0,18 \times 391,3 \frac{N}{mm^2} \frac{1}{10} = 19,9 \text{ kNm}$$

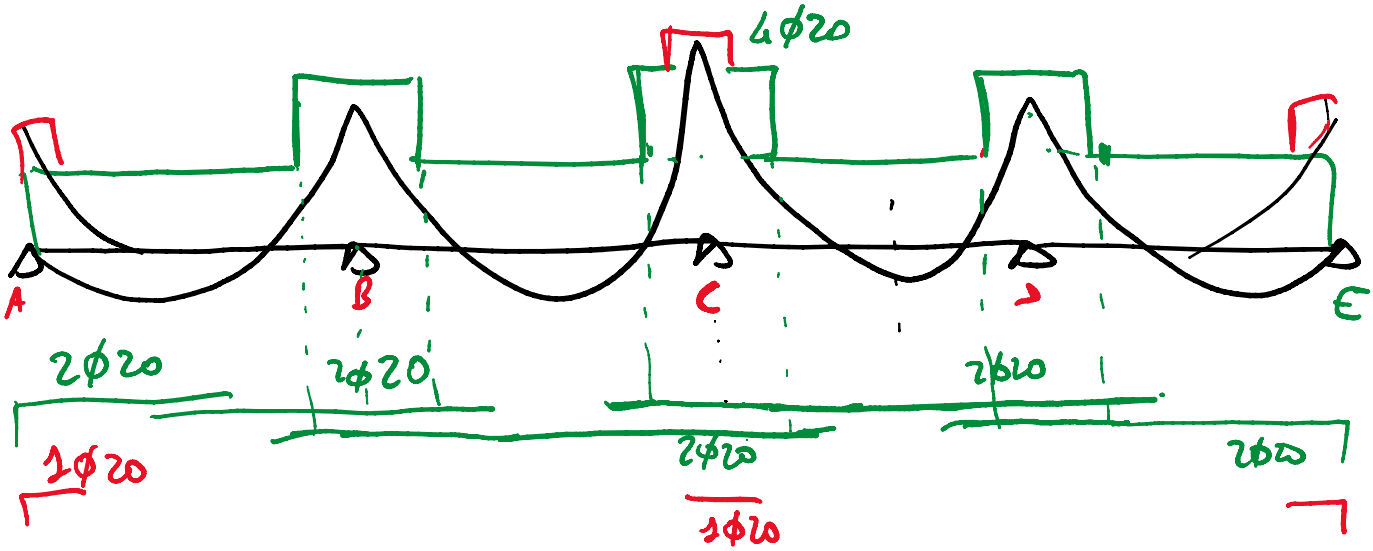
$4\phi 20 \rightarrow M_{ed} = 4 \times 19,9 \text{ kNm} = 73,6 \text{ kNm}$

$6\phi 20 \rightarrow M_{ed} = 6 \times 19,9 \text{ kNm} = 119,4 \text{ kNm}$

METODO 2

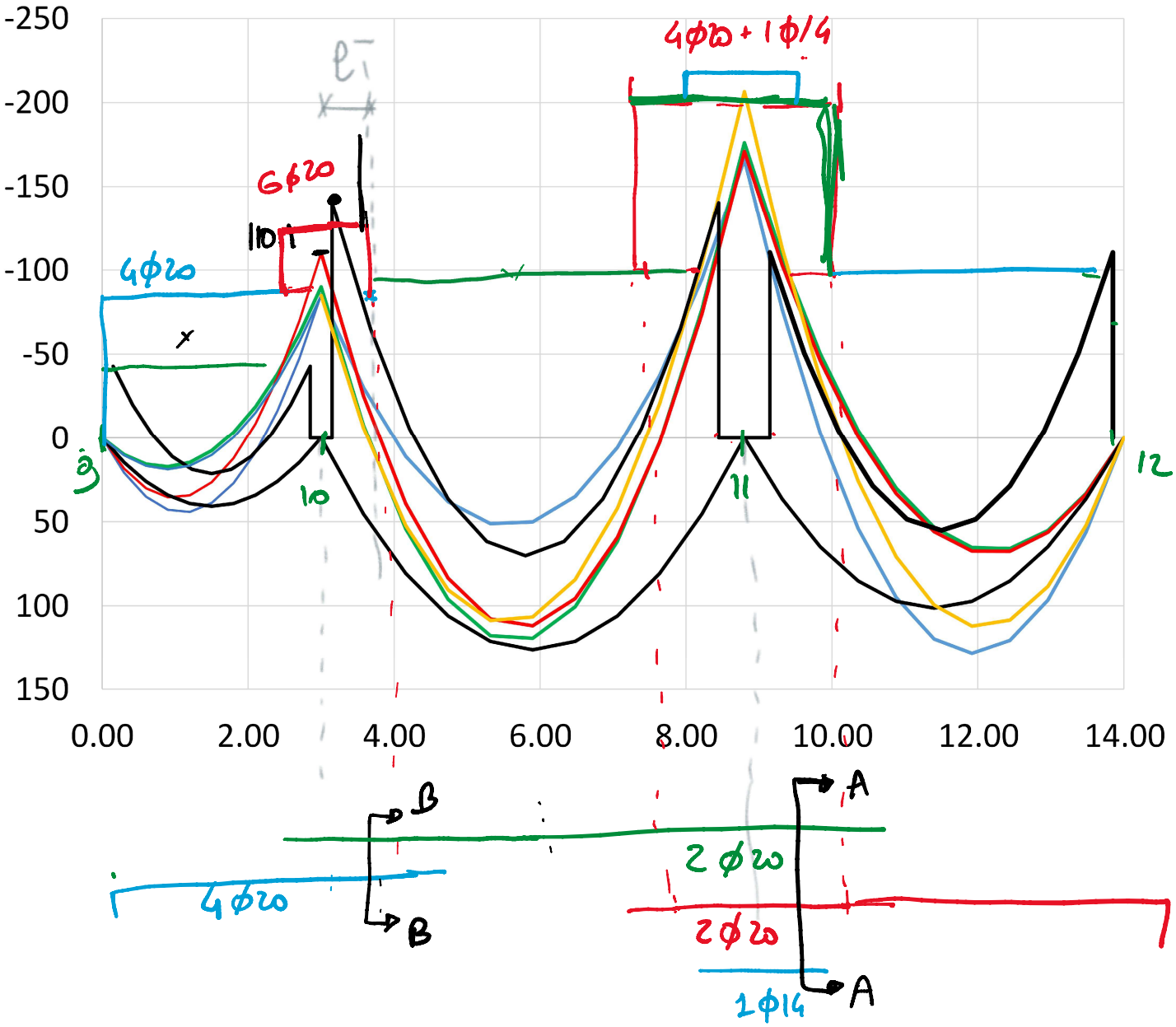
giovedì 28 maggio 2020 15:18

- RIDURRE IL NUMERO DEI MONCONI NECESSARI
- DISPOSIZIONE ARMATURA AD ABBRACCIO
- SFRUTTO LA SOVRAPPOSIZIONE DELLE ARMATURE AGLI APPOGGI

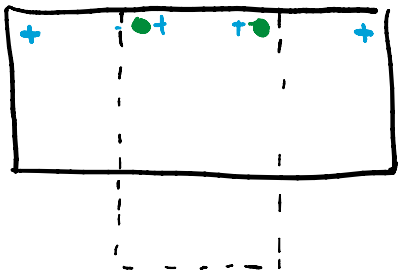


APPLICAZIONE AL NOSTRO CASO

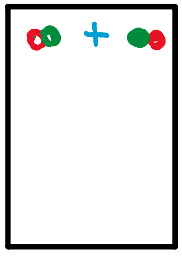
giovedì 28 maggio 2020 14:59



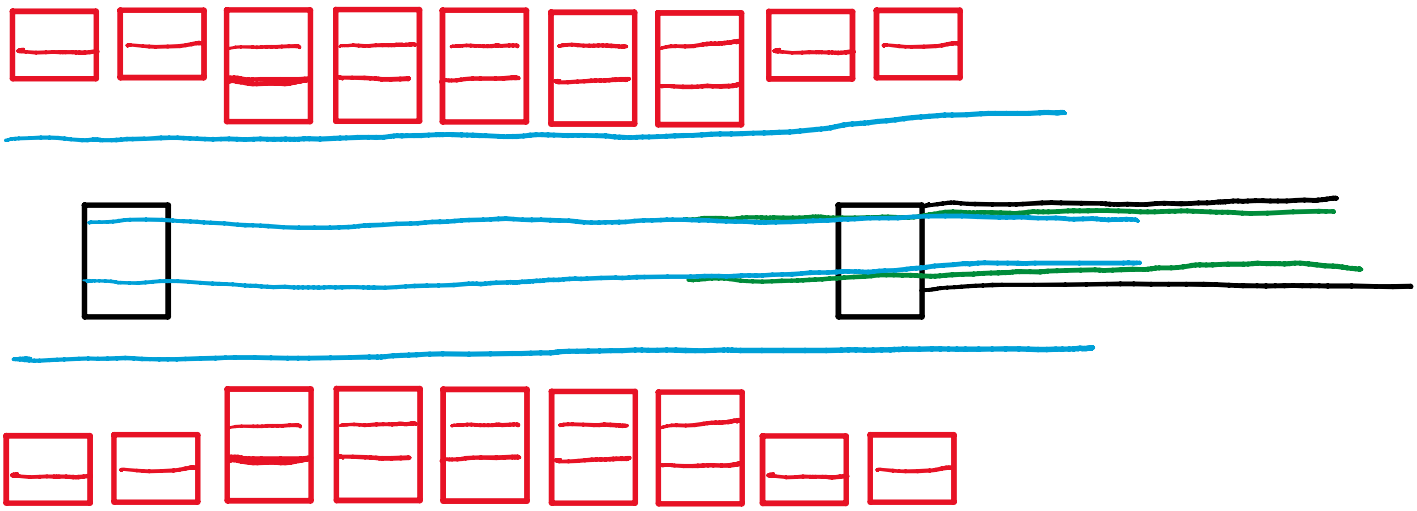
SEZIONE B-B



SEZIONE A-A



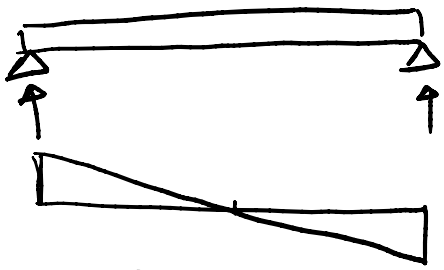
STRALCIO DI CARPENTERIA : TRAVE A SPESSORE



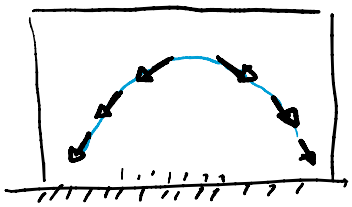
TAGLIO

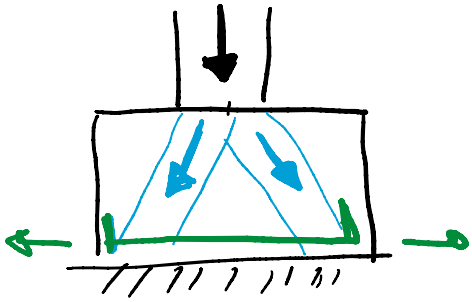
giovedì 28 maggio 2020 15:35

- LIMITAZIONI TEORIA DELLA TRAVE



- ALTRI MECCANISMI : EFFETTO ARCO

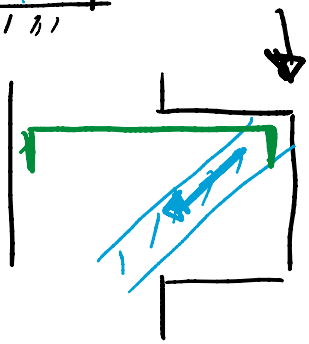




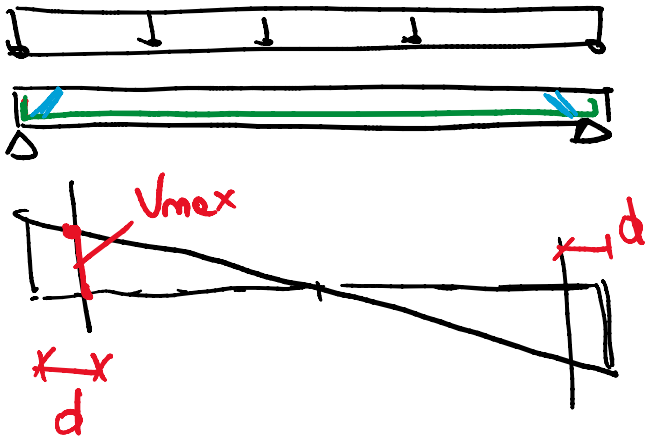
TOZZO

STRUT & TIE

PUNTONE E TIRANTE



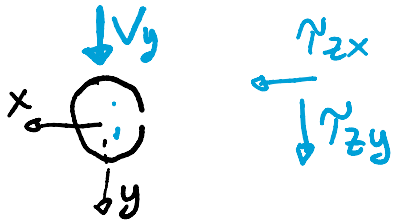
INDICAZIONI DI NORMATIVA



$$V = F\frac{a}{2d}$$

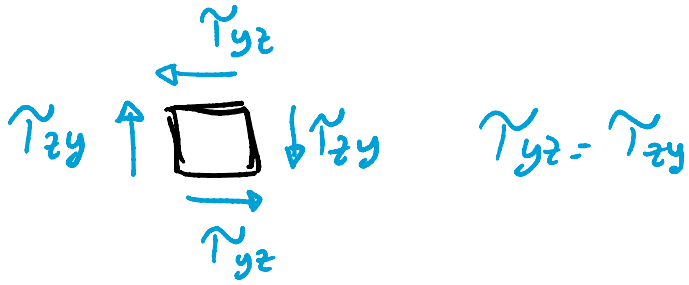
MATERIALE OMOGENEO E ISOTROPO

giovedì 28 maggio 2020 15:43

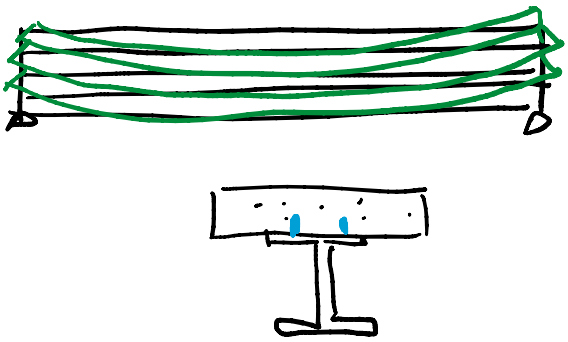


$$\int \tau_{zy}\, dA = V_y$$

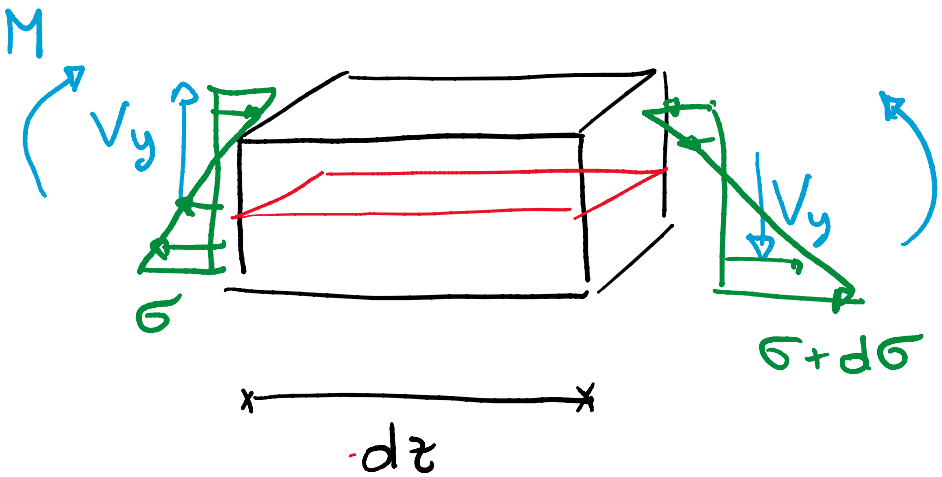
$$\int \tau_{zx}\, dA = 0$$



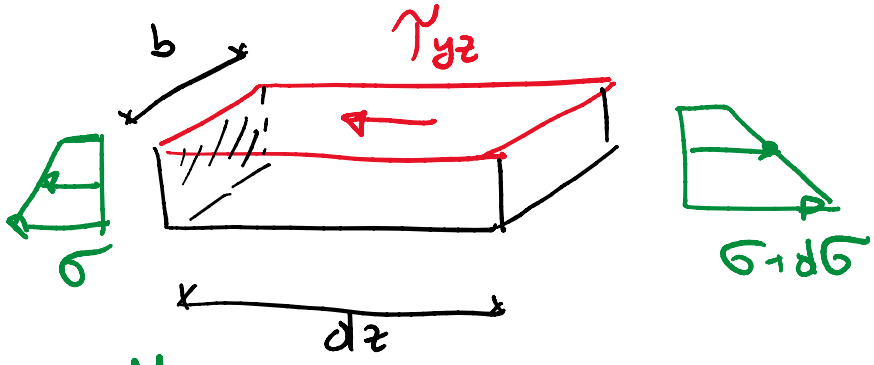
RISULTANTE τ_{yz} IN UN TRATTO **FORZA DI SCORRIMENTO**



TEORIA DI JOURAWSKY



$$dM = V_y \cdot dz$$



$$\sigma = \frac{M}{I} y \qquad \sigma + d\sigma = \frac{M}{I} y + \frac{dM}{I} y \qquad (dM = V\,dz)$$

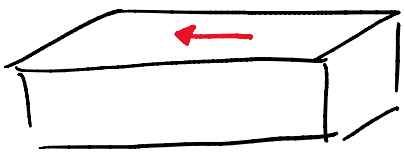
EQ. TRASLAZIONE

$$\cancel{\int_{AINF} \sigma\, dA} + \tau_{yz\,medio}\, dz \cdot b = \cancel{\int_{AINF} \sigma\, dA} + \int_{AINF} d\sigma\, dA$$

$$\tau_{yz} \cdot dz \cdot b = \int_{AINF} \frac{V \cdot dz}{I} y\, dA$$

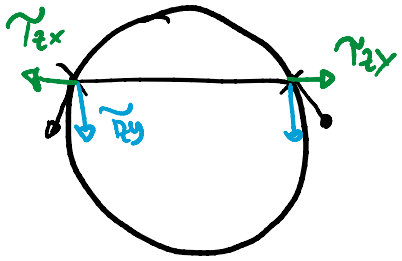
$$\tau_{yz} \cdot \cancel{dz} \cdot b = V \frac{\cancel{dz}}{I} \int_{AINF} y\, dA \quad \Rightarrow$$

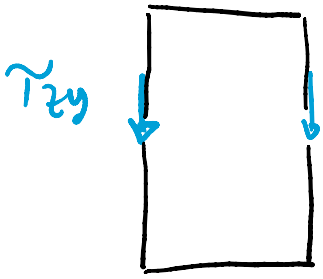
$$\tau_{yz} = \boxed{\tau_{zy} = \frac{V}{I \cdot b} S_{INF}}$$



TRATTAZIONE SEMPLIFICATA

τ_{zy} = COSTANTE LUNGO LA CORDA

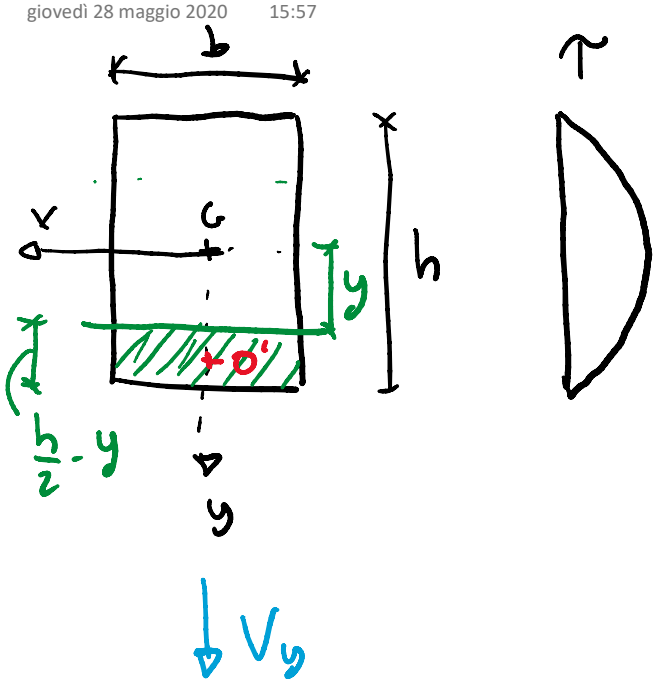




$\tau_{zx} = 0$

SEZIONE RETTANGOLARE

giovedì 28 maggio 2020 15:57



$$\tau = \frac{V \cdot S}{I\, b}$$

V_y

$$I = \frac{bh^3}{12} \qquad S = b\left(\frac{h}{2} - y\right) d_{o'G}$$

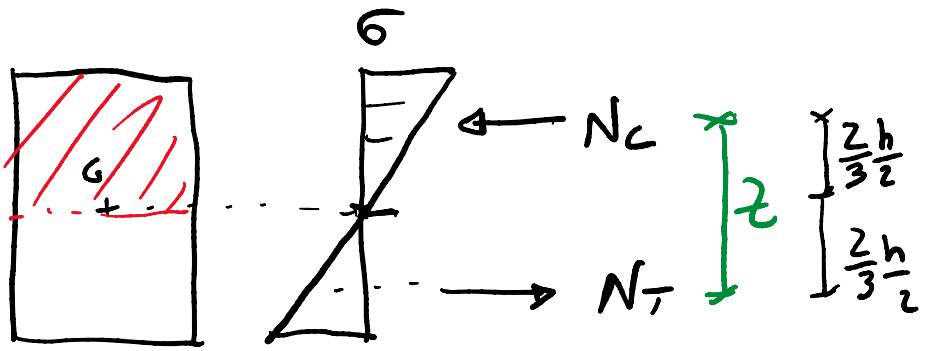
$$d_{o'G} = \frac{2y}{2} + \frac{1}{2}\left(\frac{h}{2} - y\right) = \frac{1}{2}\left(\frac{h}{2} + y\right) \Longrightarrow$$

$$S = \frac{b}{2}\left(\frac{h}{2} - y\right)\left(\frac{h}{2} + y\right) = \frac{b}{2}\left(\frac{h^2}{4} - y^2\right)$$

$$\tau_{max} \quad (y = 0) = V \cdot \frac{bh^2}{8_2} \cdot \frac{12^3}{bh^3} \cdot \frac{1}{b}$$

$$\tau_{max} = \frac{3}{2}\frac{V}{bh}$$

NEL CASO DI FLESSIONE SEMPLICE



$$\sigma = E \cdot \chi \cdot y$$

$$N_c = \int_{A_c} \sigma \, dA = \int_{A_c} E \chi y \, dA = E\chi \int_{A_c} y \, dA$$

$$= E\chi \cdot S_{comp}$$

$$M \leftrightarrow \chi = \frac{M}{EI}$$

$$N_c = \cancel{E} \cdot S_{comp} \cdot \frac{M}{\cancel{E} I} \rightarrow \frac{I}{S_{com}} = \frac{M}{N_c} = z$$

z BRACCIO DELLA COPPIA INTERNA

$$\tau = \frac{V \cdot S}{I \cdot b} \Rightarrow \tau_{MAX} \text{ CORDA BARICENTRICA}$$

$$\tau = \frac{V}{b z}$$

$$z = \frac{2}{3} h \Rightarrow \tau_{max} = \frac{3V}{2bh}$$

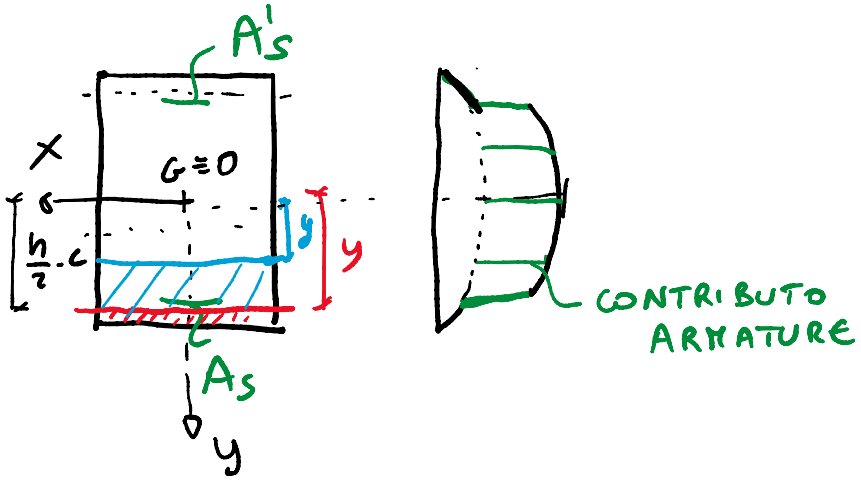
SEZIONE IN C.A.

giovedì 28 maggio 2020 16:06

IL TAGLIO È SEMPRE ASSOCIATO A M

I VALORI DI M E N MODIFICANO LA SEZIONE REAGENTE

I STADIO $\Longrightarrow$ SEZIONE OMOGENEIZZATA



$A_s = A'_s$

$\tau = \frac{V \cdot S}{I \cdot b}$

$$I = \frac{bh^3}{12} + nA_s\left(\frac{h}{2}-c\right)^2 + nA'_s\left(\frac{h}{2}-c\right)^2$$

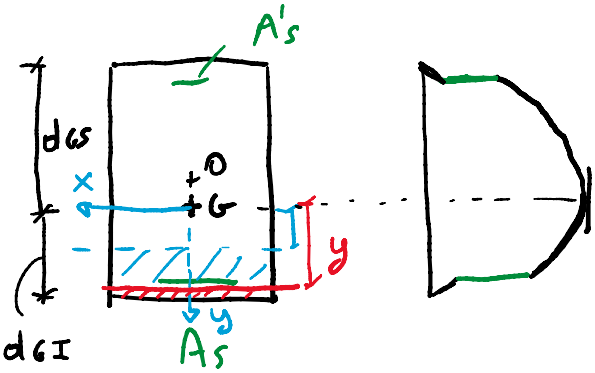
SE $\frac{h}{2}-c \le y \le \frac{h}{2} \rightarrow S = \frac{1}{2}b\left(\frac{h^2}{4}-y^2\right)$

SE $-\left(\frac{h}{2}-c\right) \le y \le \frac{h}{2}-c \rightarrow S = \frac{1}{2}b\left(\frac{h^2}{4}-y^2\right) + nA_s\left(\frac{h}{2}-c\right)$

SE $-\frac{h}{2} \le y \le -\left(\frac{h}{2}-c\right) \rightarrow S = \frac{1}{2}b\left(\frac{h^2}{4}-y^2\right) + nA_s\left(\frac{h}{2}-c\right) - nA'_s\left(\frac{h}{2}-c\right)$

I STADIO $A_s > A'_s$

giovedì 28 maggio 2020 16:14



$$\tau = \frac{V}{I_{xG}} \cdot \frac{S}{b}$$

1. TROVARE G $\qquad d_{G,sup} = \dfrac{S_{sup}}{A_{ci}}$

2. $$I_{xG} = \frac{b d_{GS}^3}{3} + \frac{b d_{GI}^3}{3} + n A_s \left(d_{GI} - c \right)^2 + n A'_s \left(d_{GS} - c \right)^2$$

$$d_{GI} - c \le y \le d_{GI} \Rightarrow S = \frac{1}{2} b \left(d_{GI}^2 - y^2 \right)$$

$$-(d_{GS} - c) \le y \le d_{GI} - c \rightarrow S = \frac{1}{2} b \left(d_{GI}^2 - y^2 \right) + n A_s \left(d_{GI} - c \right)^2$$