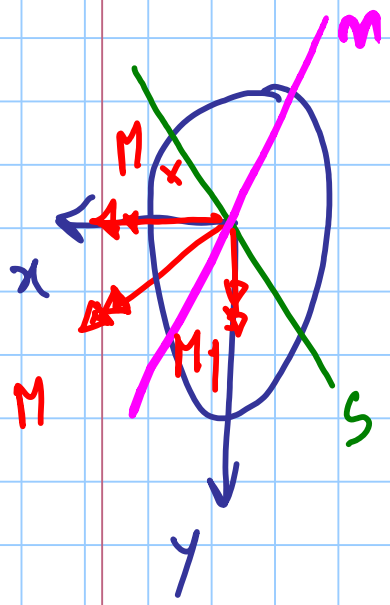
FLESSIONE SEMPLICE

Titolo nota 01/04/2014

1° MODELLO DI COMPORTAMENTO

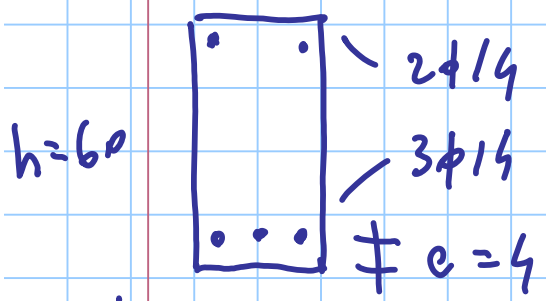


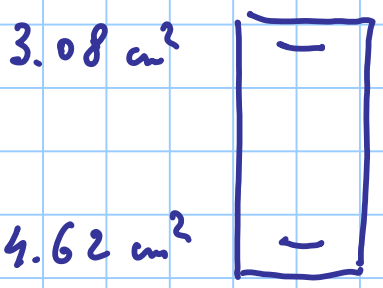
$$\sigma = \frac{N}{A} + \frac{M_x}{I_x} y - \frac{M_y}{I_y} x$$

$$\varepsilon_0 = \frac{N}{EA} \rightarrow = 0$$

asse neutro passa per il baricentro

$M > 0$





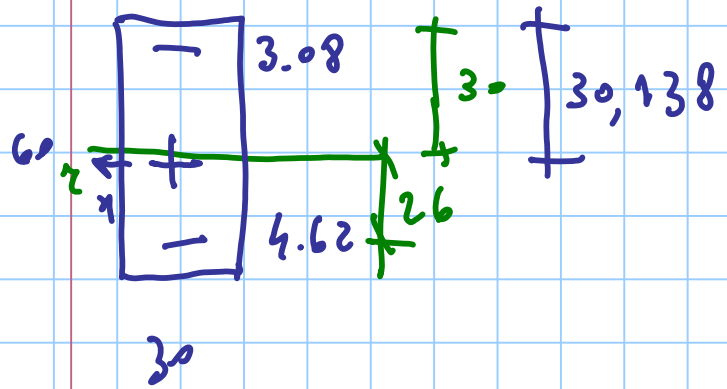
30×60

SEZIONE

- a semplice armatura (solo A_s)
- a doppia armatura (A_s e A'_s)

$M = 100\ kN_m$

C25/30



$n = 6,35$ all'applicazione del carico

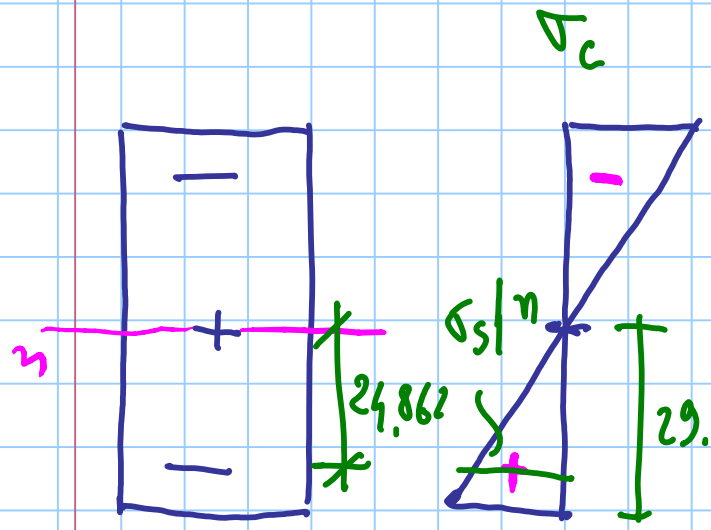
$$A = A_c + n A_s =$$

$$= 1800 + 6,35 \times 7,70 = 1849 \text{ cm}^2$$

$$S_2 = 0 + 6,35 \times 4.62 \times 26 - 6,35 \times 3.08 \times 26 = 255$$

$$\frac{S_2}{A} = \frac{255}{1849} = 0,138 \text{ cm}$$

$$I_x = \frac{30 \times 60^3}{12} + 30 \times 60 \times (0,138)^2 + 6,35 \times 4.62 \times 29.862^2 + 6.35 \times 3.08 \times 30.138^2 = 573053 \text{ cm}^4$$



$$\sigma_{c,inf} = \frac{M}{I} y = \frac{100 \times 10^6}{573053 \times 10^4} \times 301{,}38 =$$

$$= 5.23 \text{ MPa}$$

$$\sigma_{c,inf} = \frac{M}{I} y = \frac{100 \times 10^6}{573053 \times 10^4} \times 298{,}62 =$$

$$= 5{,}23 \text{ MPa}$$

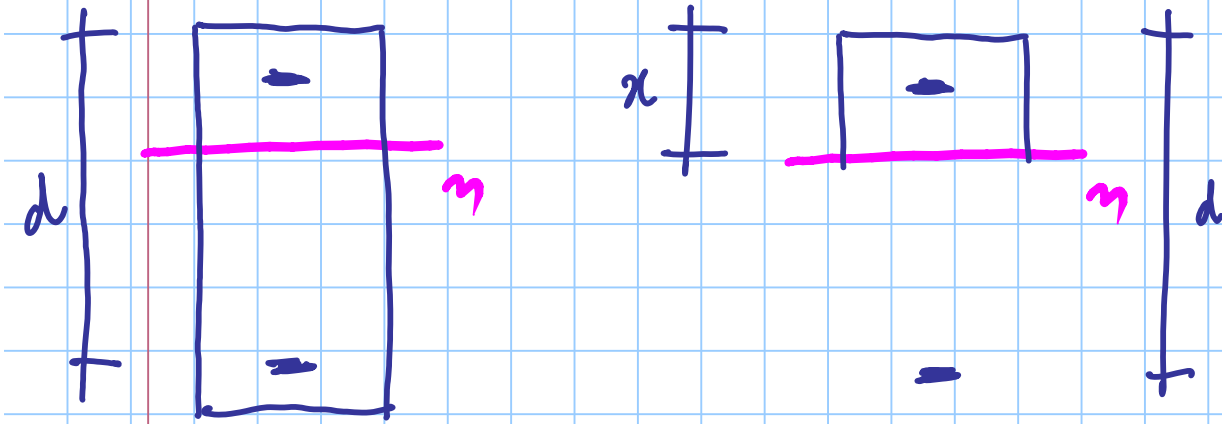
FESSURATO

NOTA: numeri da modificare dopo

$$\sigma_{s,inf} = n \frac{M}{I} y = 6{,}35 \times \frac{100 \times 10^6}{573053 \times 10^4} \times 258{,}62 = 28.8 \text{ MPa}$$

$$f_{cfk} = 2.16 \text{ MPa} \qquad \frac{5.23}{2.16} = 2{,}42 \qquad M_2 = \frac{100}{2{,}42} = 41.3 \text{ KNm}$$

2° MODELLO DI COMPORTAMENTO



ci si riferisce alla sezione reagente omogeneizzata

$d = h - c$ ALTEZZA UTILE

troviamo x dalla condizione $S_n = 0$

$$S_n = -\frac{b x^2}{2} - n A'_s (x - c) + n A_s (d - x) = 0$$

$$\frac{b x^2}{2} + n (A_s + A'_s) x - n (A_s d + A'_s c) = 0$$

$$x^2 + \frac{2n (A_s + A'_s)}{b} x - \frac{2n (A_s d + A'_s c)}{b} = 0$$

$$x = -\frac{n (A_s + A'_s)}{b} \pm \sqrt{\frac{n^2 (A_s + A'_s)^2}{b^2} + \frac{2n (A_s d + A'_s c)}{b}}$$

np

$$x = -\frac{n(A_s + A'_s)}{b} + \frac{n(A_s + A'_s)}{b}\sqrt{1 + \frac{2b(A_s d + A'_s c)}{n(A_s + A'_s)^2}}$$

$$x = \frac{n(A_s + A'_s)}{b}\left[-1 + \sqrt{1 + \frac{2b(A_s d + A'_s c)}{n(A_s + A'_s)^2}}\right]$$

$A_s = 4.62\ cm^2$ $\quad b = 30\ cm$ $\quad n = 6.35$

$A'_s = 3.08\ cm^2$ $\quad d = 56\ cm$

$c = 4\ cm$

$$x = \frac{6.35(4.62+3.08)}{30}\left[-1+\sqrt{1+\frac{2\times 30\,(4.62\times 56+3.08\times 4)}{6.35\,(4.62+3.08)^2}}\right]$$

$$\simeq 9.2 \text{ cm}$$

5.64 ; 43.19

$$I_n = \frac{b\,x^3}{3} + n\,A'_s\,(x-c)^2 + n\,A_s\,(d-x)^2$$

nell'esempio $I_n = 72571 \text{ cm}^4$

$$\sigma_{c,sup} = -\frac{M}{I_m} x$$

nell'estrados $\quad \sigma_{c,sup} = -12,68 \ MPa$

$$\sigma_{s,inf} = n \frac{M}{I_m} (d - x)$$

$$\sigma_{s,inf} = 409,5 \ MPa$$