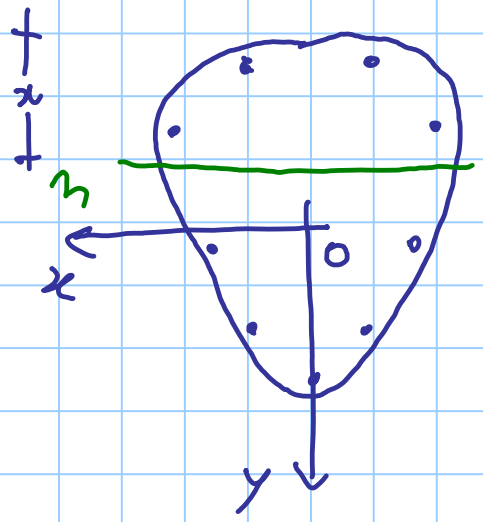
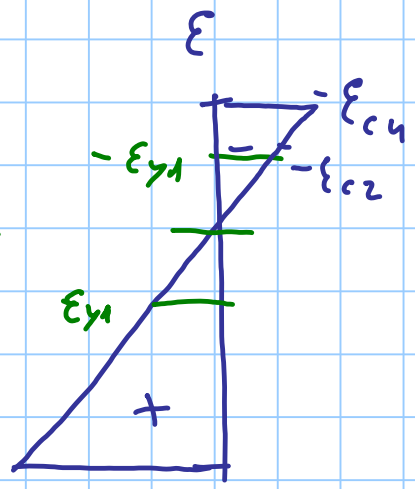
FLESSIONE SEMPLICE

3° m.A. cap.

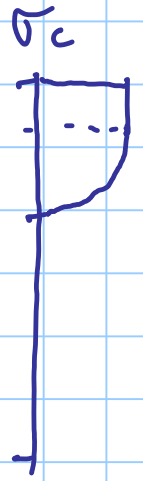
Titolo nota 10/11/2016

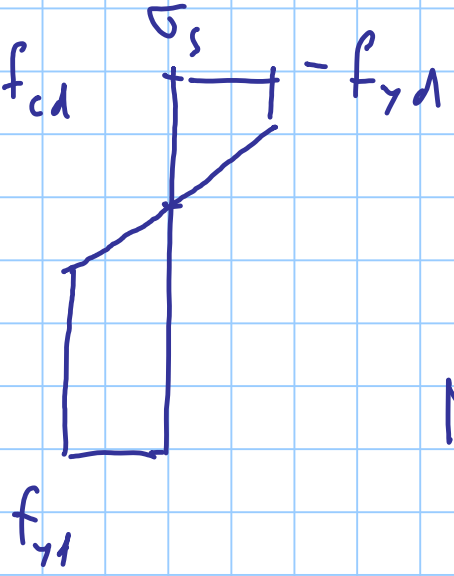
$M > 0$





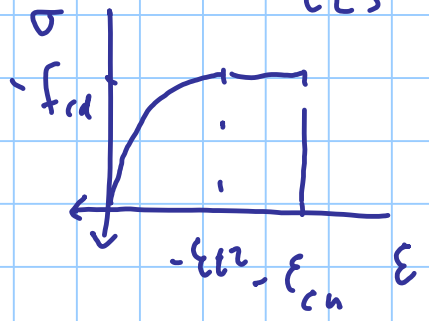
(retta)





$$M = \int \sigma\, y\, dA$$

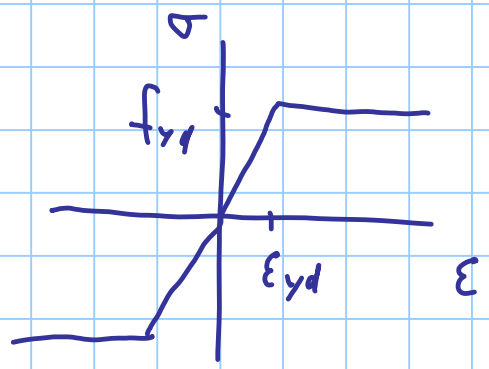
CLS

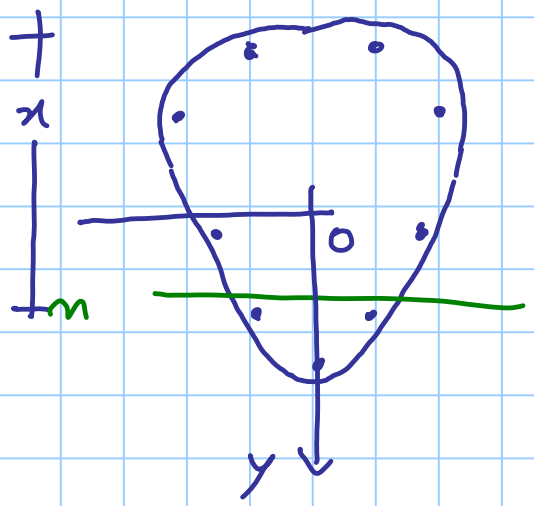


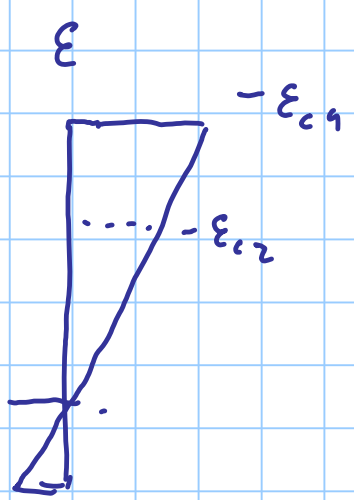
$$0 \le \eta \le 1 \qquad \sigma_c = -\eta(2-\eta) f_{cd}$$

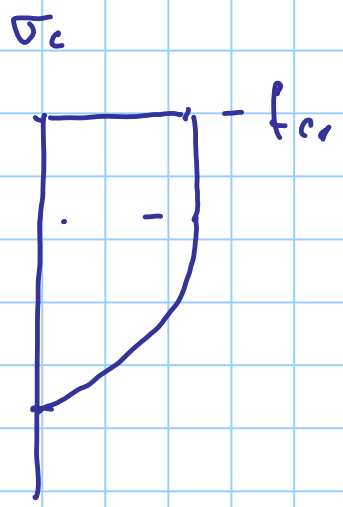
$$1 < \eta \le \frac{\varepsilon_{cu}}{\varepsilon_{c2}} = \frac{7}{4} \qquad \sigma_c = -f_{cd}$$

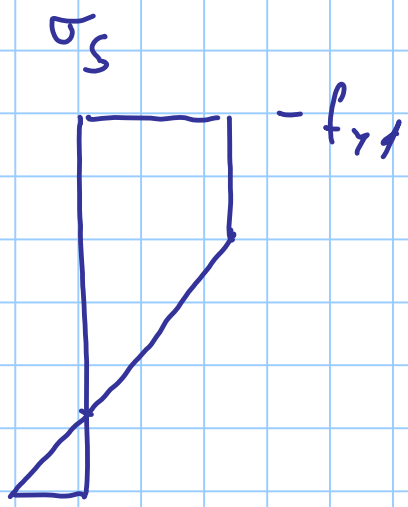
$$\eta = \frac{\varepsilon_c}{-\varepsilon_{c2}}$$







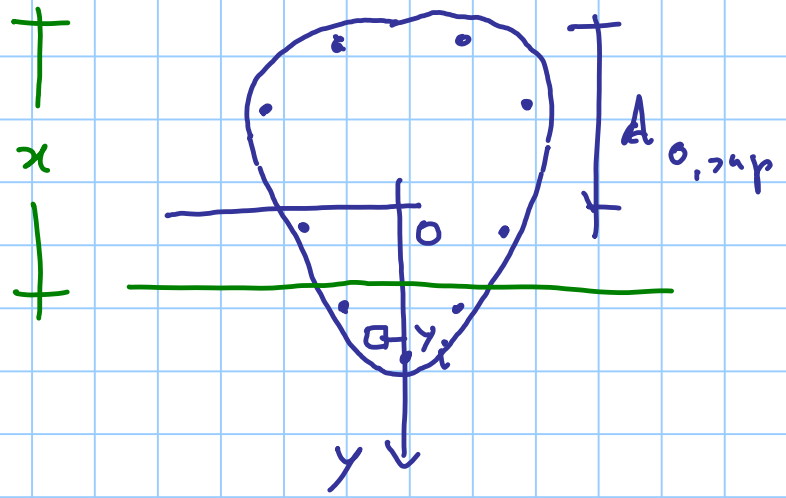


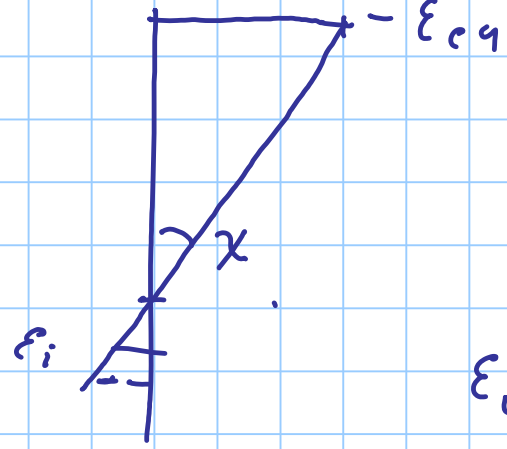


$$N = \int \sigma \, dA = 0$$

$$M = \int \sigma \, y \, dA$$

x deve essere tale che $N = \int \sigma \, dA = 0$





$$\chi = \frac{d\varepsilon}{dy} = \frac{\varepsilon_{cu}}{x}$$

$$\varepsilon_i = \chi \left(d_{o,sup} + y_i - x \right)$$

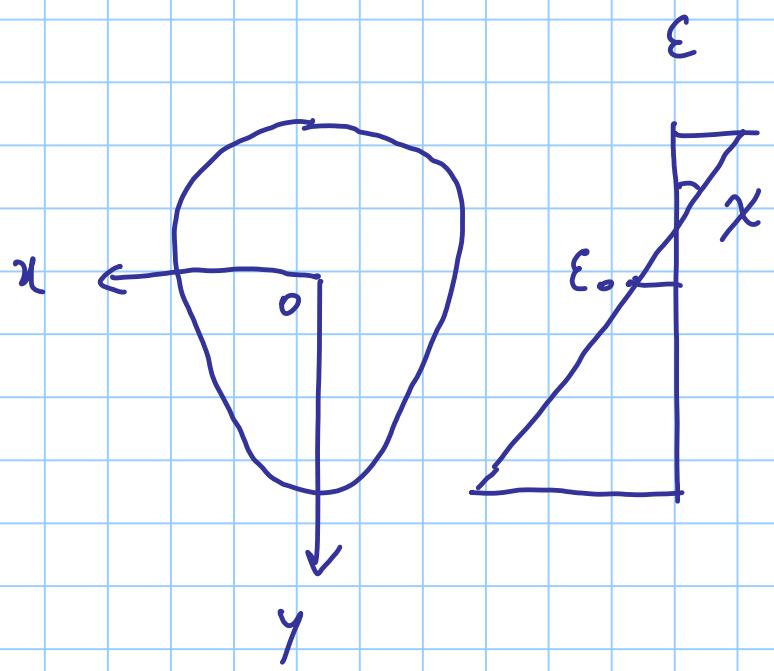
$$\varepsilon = \frac{\varepsilon_{cu}}{x} \left(d_{o,sup} + y - x \right)$$

$$\eta = -\frac{\varepsilon_{cu}}{x\,\varepsilon_{c2}} \left(d_{o,sup} + y - x \right)$$

$\sigma_c = 0$

$\sigma_c = -\eta(2-\eta) f_{cd}$

$\sigma_c = -f_{cd}$



$$\varepsilon = \varepsilon_0 + \chi\, y$$

$$\eta = \frac{\varepsilon}{-\varepsilon_{c2}} = -\frac{\varepsilon_0}{\varepsilon_{c2}} - \frac{\chi}{\varepsilon_{c2}}\, y$$

$$\sigma = -\eta\,(2-\eta)\, f_{cd}$$

$$\sigma = \left(\frac{\varepsilon_0}{\varepsilon_{c2}} + \frac{\chi}{\varepsilon_{c2}}\, y\right)\left(2 + \frac{\varepsilon_0}{\varepsilon_{c2}} + \frac{\chi}{\varepsilon_{c2}}\, y\right) f_{cd}$$

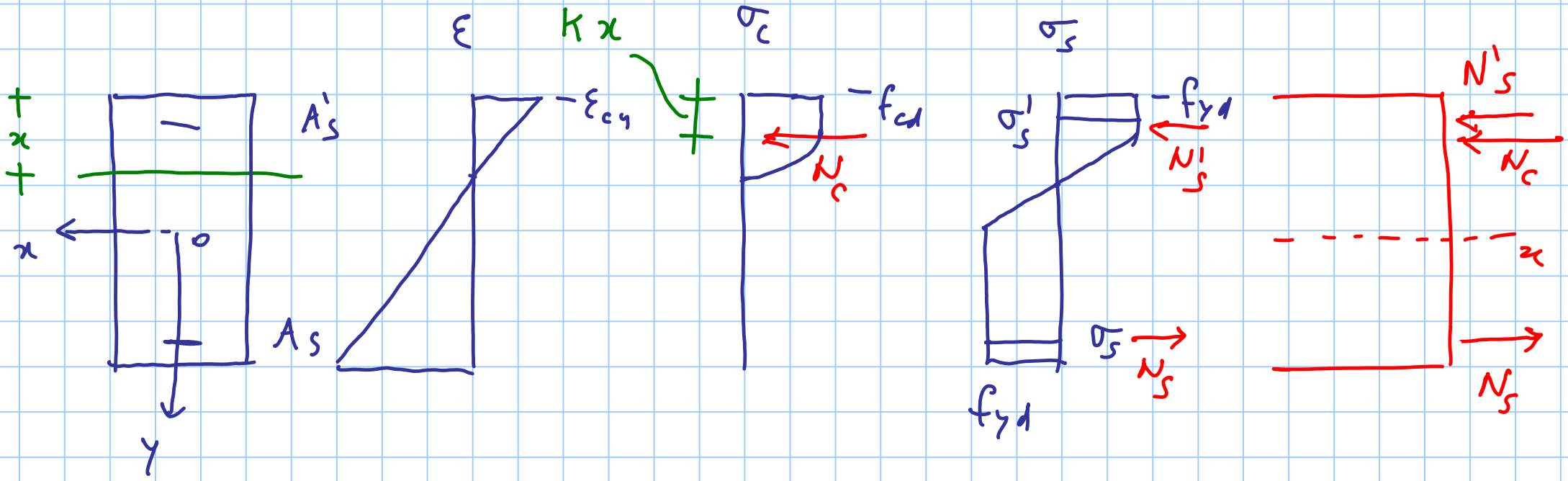
$$\sigma = \left\{ \frac{\varepsilon_0}{\varepsilon_{c2}} \left(2 + \frac{\varepsilon_0}{\varepsilon_{c2}} \right) + \left[\frac{\chi}{\varepsilon_{c2}} \left(2 + \frac{\varepsilon_0}{\varepsilon_{c2}} \right) + \frac{\varepsilon_0}{\varepsilon_{c2}} \frac{\chi}{\varepsilon_{c2}} \right] y + \left(\frac{\chi}{\varepsilon_{c2}} \right)^2 y^2 \right\} f_{cd} =$$

$$= - \left(t_0 + t_1 y + t_2 y^2 \right) f_{cd}$$

$$t_0 = - \frac{\varepsilon_0}{\varepsilon_{c2}} \left(2 + \frac{\varepsilon_0}{\varepsilon_{c2}} \right)$$

$$t_1 = - \frac{\chi}{\varepsilon_{c2}} 2 \left(1 + \frac{\varepsilon_0}{\varepsilon_{c2}} \right)$$

$$t_2 = - \frac{\chi^2}{\varepsilon_{c2}^2}$$



$$N_s = A_s \sigma_s$$

$$N'_s = A'_s \sigma'_s$$

$$N_c = \int \sigma_c \, dA_c$$

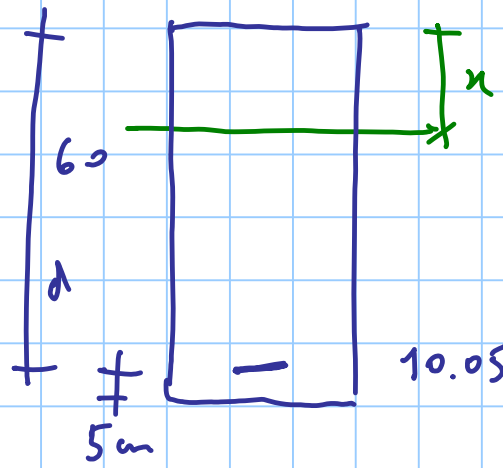
$$N_c = -b x f_{cd} \beta$$

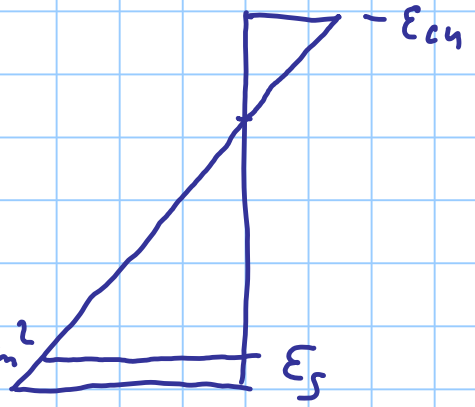
$\beta < 1$

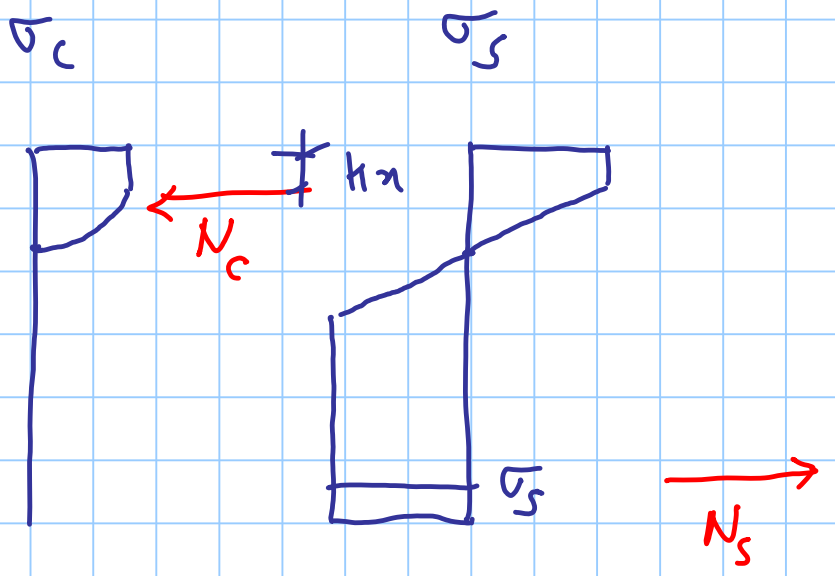
SEZ. RETT.

$\beta = 0.810$

$K = 0.416$







$\sigma_s = f_{yd}$

$N_s = A_s \, f_{yd}$

$\beta = 0.810$

$N_c = - \beta \, b \, x \, f_{cd}$

$N_c + N_s = 0$

$A_s \, f_{yd} = \beta \, b \, x \, f_{cd}$

$$x = \frac{A_s \, f_{yd}}{\beta \, b \, f_{cd}}$$

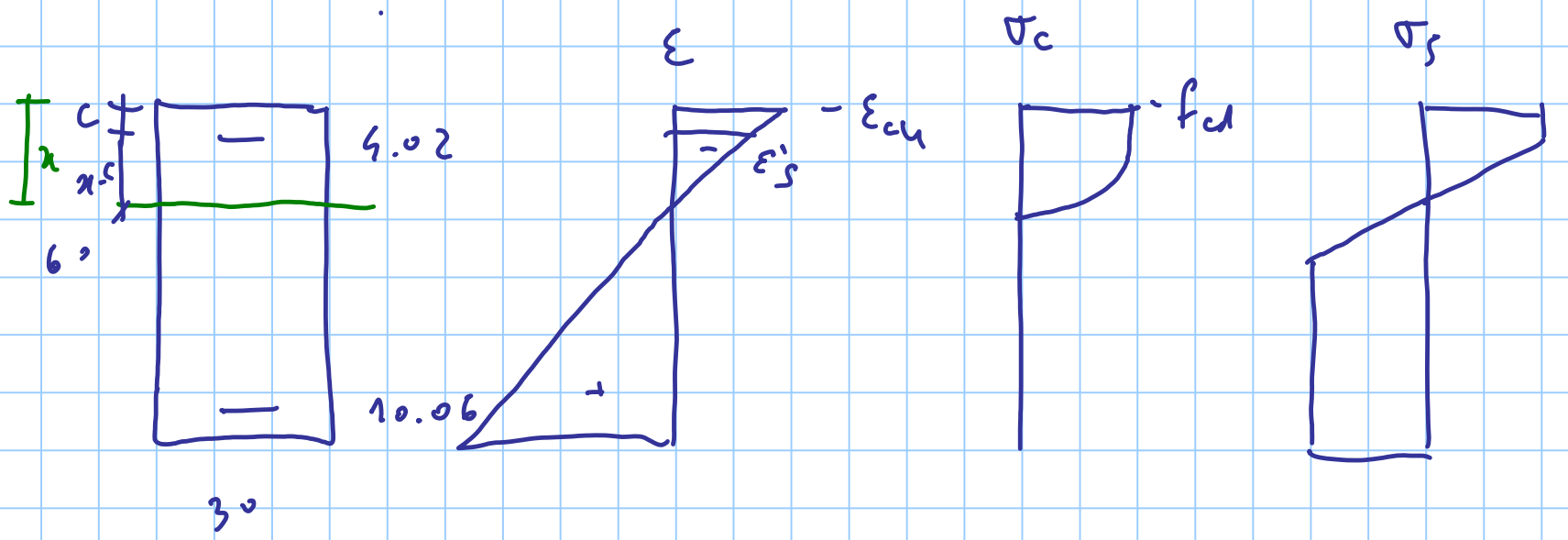
$$x = \frac{10.05 \times 391.3}{0.810 \times 30 \times 14.17} = 11.4 \text{ cm}$$

z braccio della coppia interna

$$z = d - Kx = 55 - 0.416 \times 11.4 = 50.3 \text{ cm}$$

$$N_s = A_s f_{yd} = \underset{\times 10^2}{10.05} \times \underset{\times 10^{-3}}{391.3} = 393.3 \text{ kN}$$

$$M_{Rd} = N_s z = 393.3 \times 50.3 \times 10^{-2} = 197.8 \text{ kN m}$$



ε'_s

$$\frac{-\varepsilon_{cu}}{x} = \frac{\varepsilon'_s}{x-c} \quad \Rightarrow \quad \varepsilon'_s = -\frac{x-c}{x}\varepsilon_{cu}$$