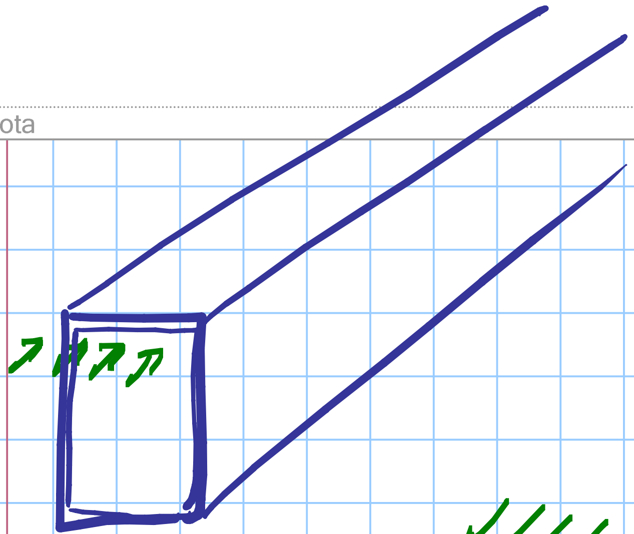
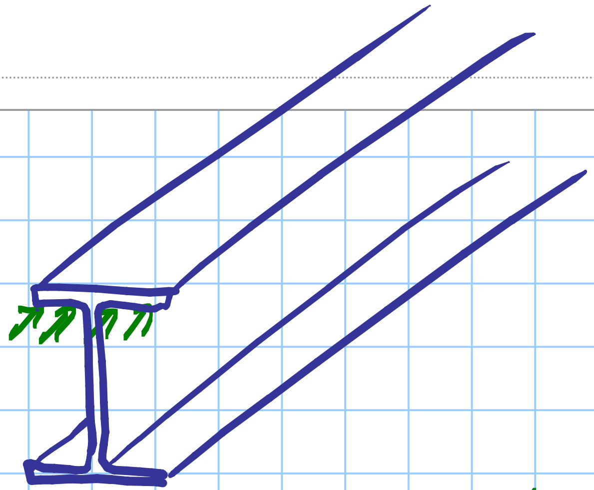
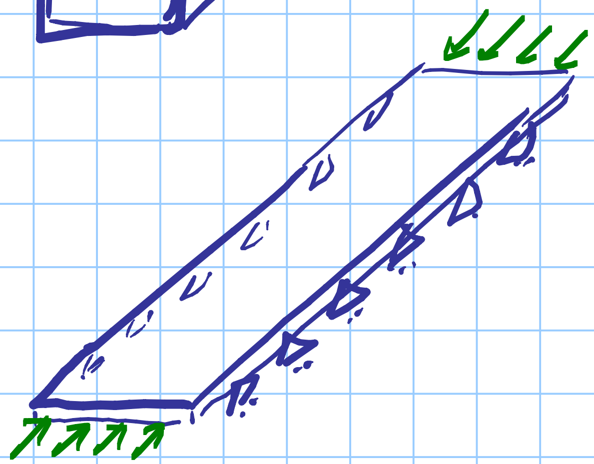
Titolo nota

29/11/2012







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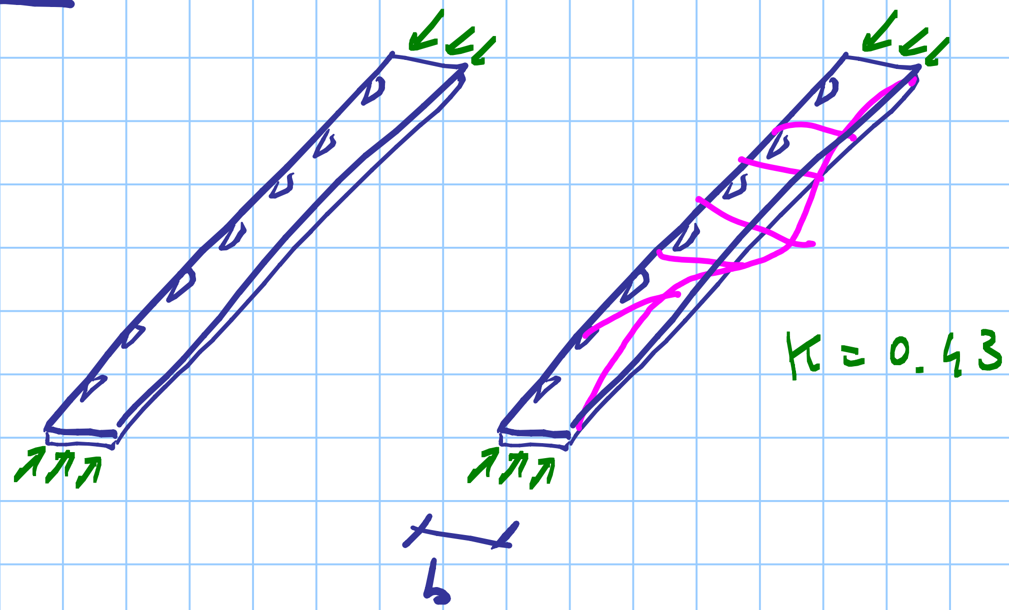
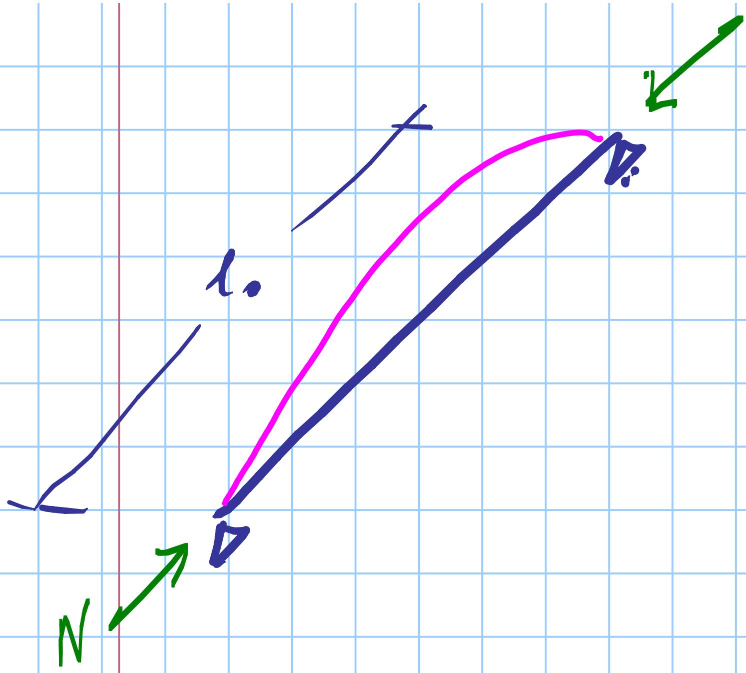
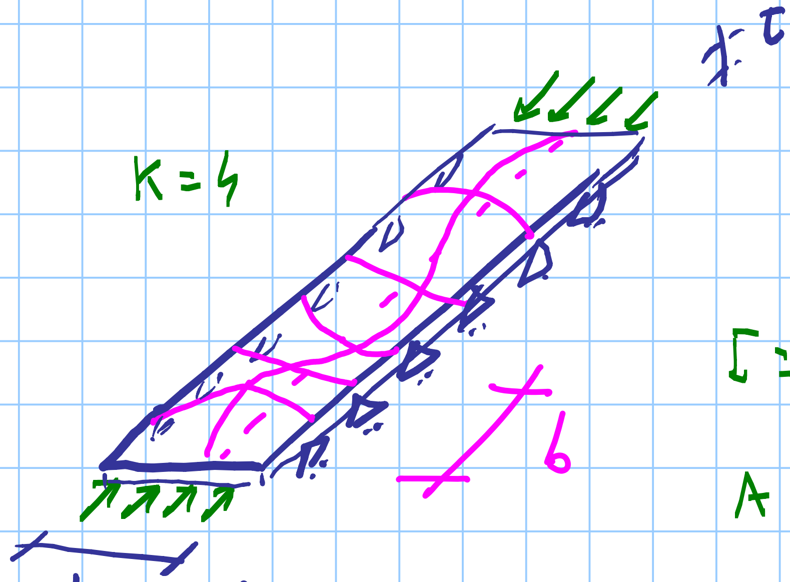




TRAVE



LASTRA

$$I = \frac{b t^3}{12}$$

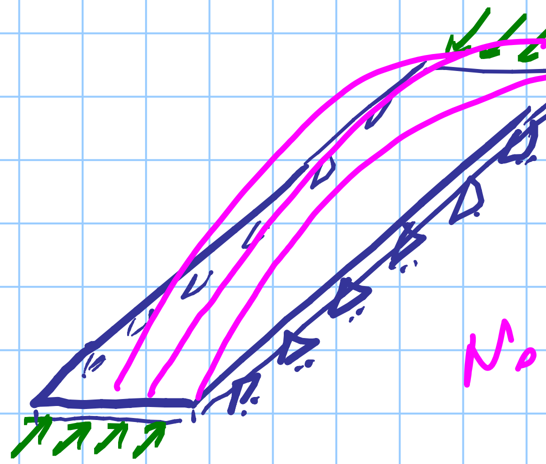
$$A = b t$$

$$N_{cr} = \frac{\pi^2 E I}{l_0^2}$$

$$\sigma_{cr} = \frac{\pi^2 E}{\lambda^2}$$

$$N_{cr} = \frac{K \pi^2 E I}{(1-\nu^2)\, b^2}$$

$$\sigma_{cr} = \frac{K \pi^2 E I}{(1-\nu^2)\, b^2 A} = \frac{K \pi^2 E}{12(1-\nu^2)\left(\frac{b}{t}\right)^2}$$



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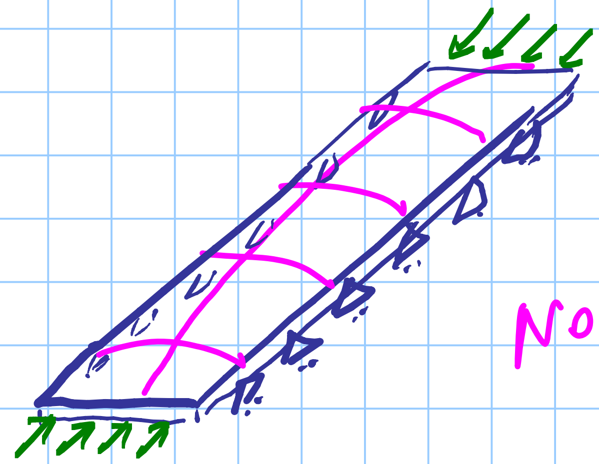
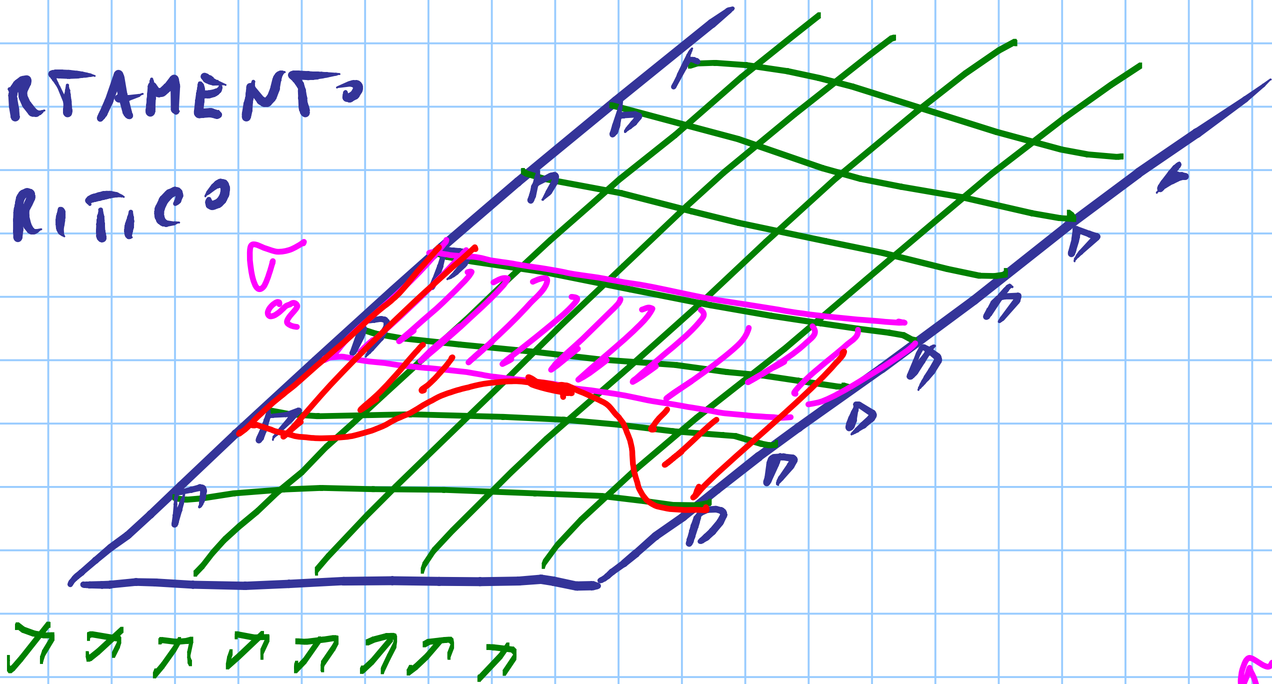
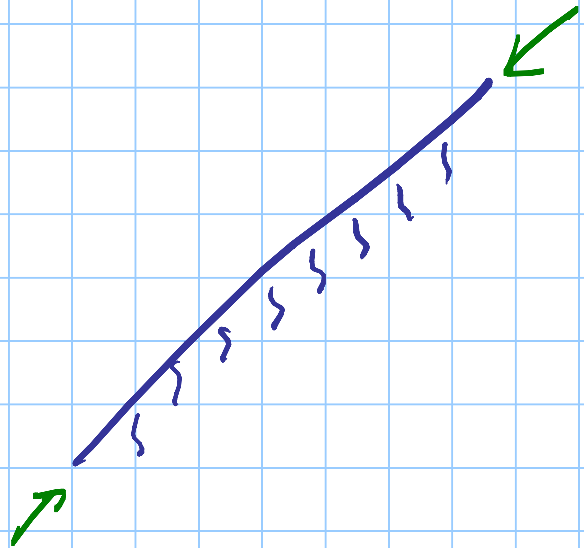
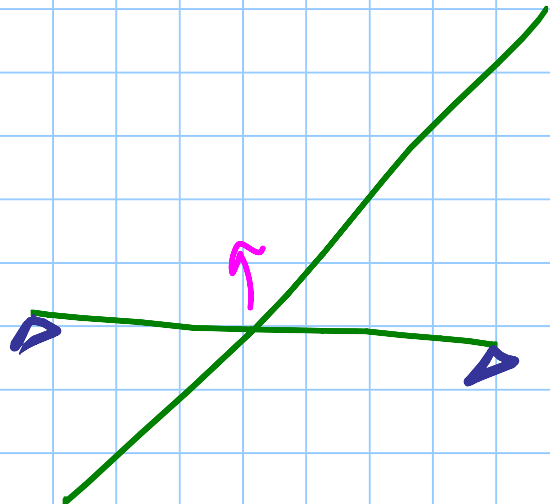


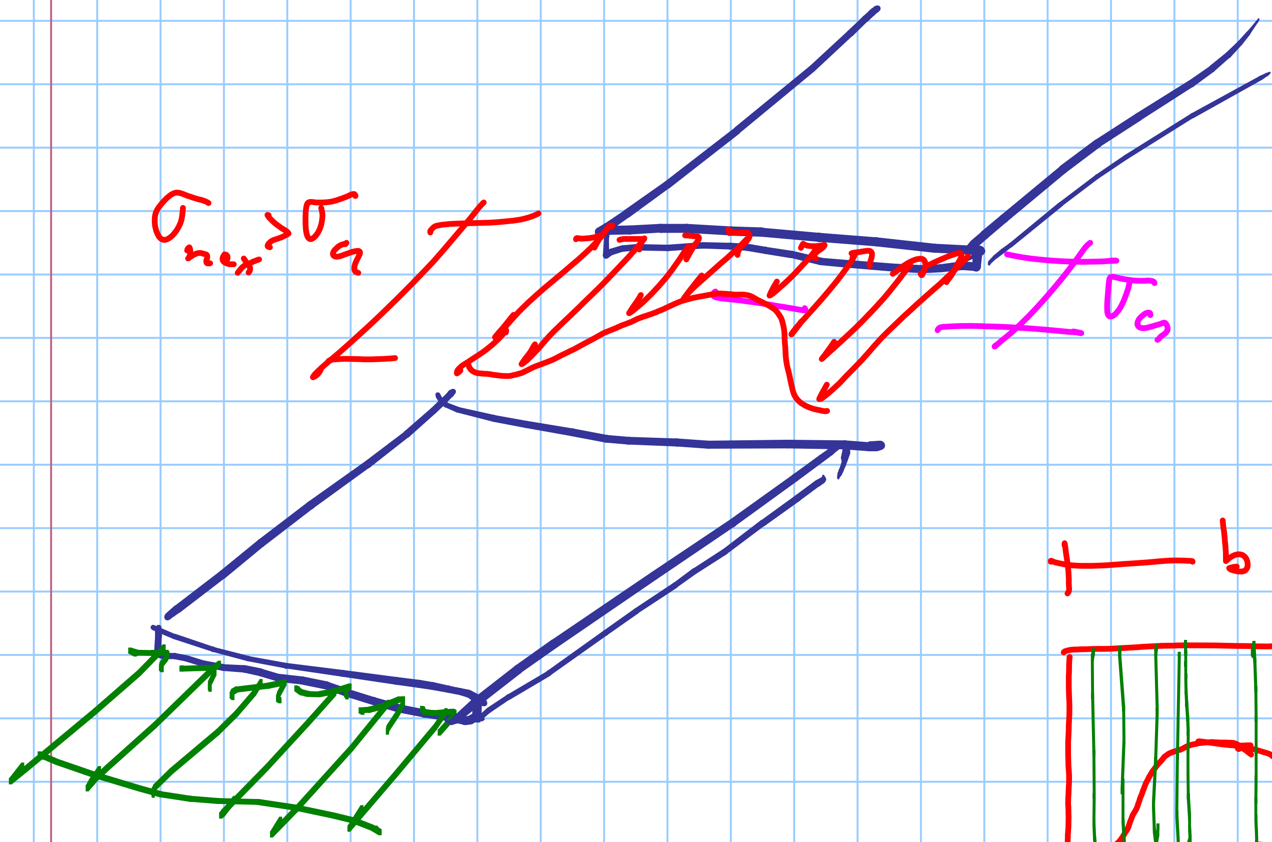
LASTRA

COMPORTAMENTO POST-CRITICO



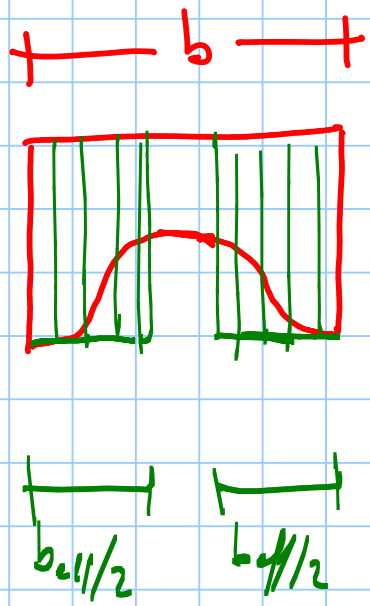






Von Karman

1932



b_{eff}

larghezza efficace

b_{eff} corrisp. a σ_{max}

è quella b per cui $\sigma_{max} = \sigma_{cr}$

$$\sigma_{cr} = \frac{K \pi^2 E}{12(1-\nu^2)\left(\frac{b}{t}\right)^2} \qquad \frac{\sigma_{max}}{\sigma_{cr}} = \frac{b^2}{b_{eff}^2}$$

$$\sigma_{max} = \frac{K \pi^2 E}{12(1-\nu^2)\left(\frac{b_{eff}}{t}\right)^2} \qquad \frac{b}{b_{eff}} = \sqrt{\frac{\sigma_{max}}{\sigma_{cr}}} = \bar{\lambda}_p$$

PLATE

$$\bar{\lambda}_p = \sqrt{\frac{f_y}{\sigma_{cr}}}$$

$$\frac{b}{b_{eff}} = \bar{\lambda}_p \qquad \Rightarrow \rho = \frac{b_{eff}}{b} = \frac{1}{\bar{\lambda}_p}$$

$$\bar{\lambda}_p = \frac{b/t}{28.4\,\varepsilon\,\sqrt{k}} \qquad \varepsilon = \sqrt{\frac{235}{f_y}}$$

$$\bar{\lambda}_p = \sqrt{\frac{f_y \quad 12(1-\nu^2)(b/t)^2}{k\,\pi^2\,E}} = \frac{b}{t}\,\frac{1}{\sqrt{k}}\,\underbrace{\sqrt{\frac{235\;12\,(1-\nu^2)}{\pi^2\;E}}}_{\frac{1}{28.4}}\;\underbrace{\sqrt{\frac{f_y}{235}}}_{\frac{1}{\varepsilon}}$$

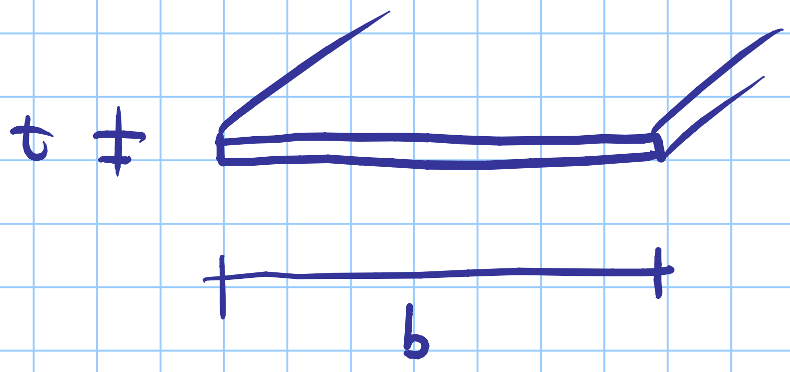
$$\rho = \frac{b_{eff}}{b} = \frac{1}{\bar{\lambda}_p}$$

larghezza efficace
corrisp. a $\sigma_{n,r} = f_y$

$$N_u = f_y \; b_{eff} \; t$$

per tener conto delle imperfezioni

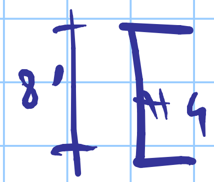
$$\rho = \frac{b_{eff}}{b} = \frac{\bar{\lambda}_p - 0.22}{\bar{\lambda}_p^2}$$



$b = 80\ mm$

$t = 4\ mm$

UPE 80



S275

$$\sigma_{cr} = \frac{k \pi^2 E}{12(1-\nu^2)\left(\frac{b}{t}\right)^2} = \frac{4 \times 3.14^2 \times 206000}{12(1-0.3^2) \times 20^2} = 1862\ MPa$$

$$\bar{\lambda}_p = \sqrt{\frac{f_y}{\sigma_{cr}}} = \sqrt{\frac{275}{1862}} = 0.384$$

$$\rho = \frac{0.384 - 0.22}{0.384^2} = 1.11 > 1$$

$\rho = 1$ $\quad b_{eff} = b$

$$b = 400 \text{ mm}$$

$$t = 4 \text{ mm}$$

$$\varepsilon = \sqrt{\frac{235}{f_y}} = 0.924 \qquad S\,275$$

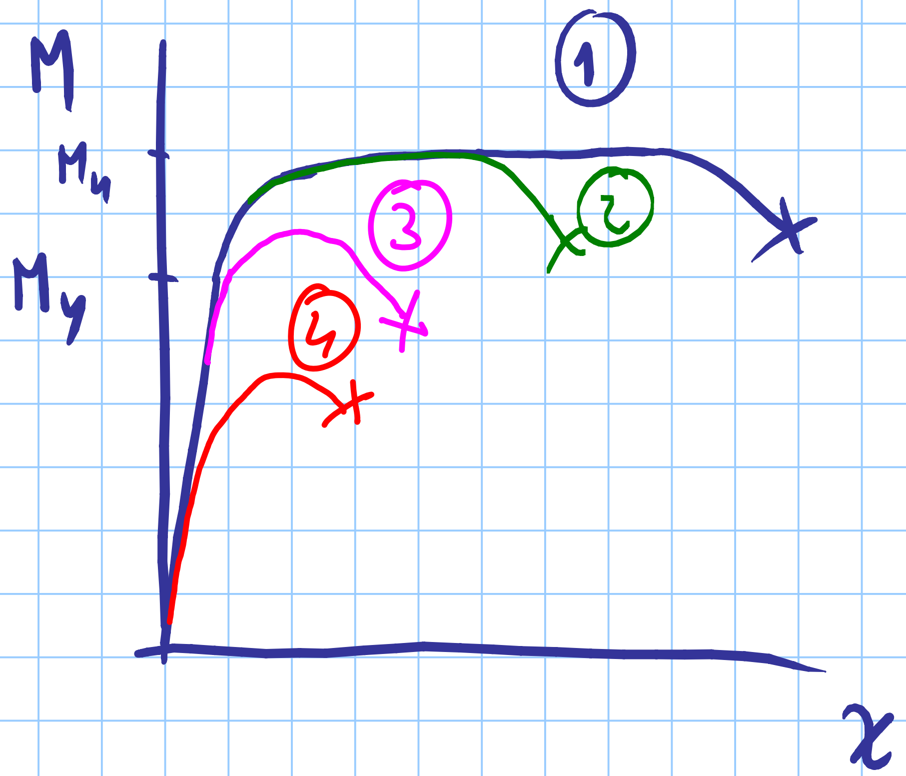
$$\bar{\lambda}_p = \frac{b/t}{28.4\,\varepsilon\sqrt{K}} = \frac{100}{28.4 \times 0.924 \times \sqrt{4}} = 1.905$$

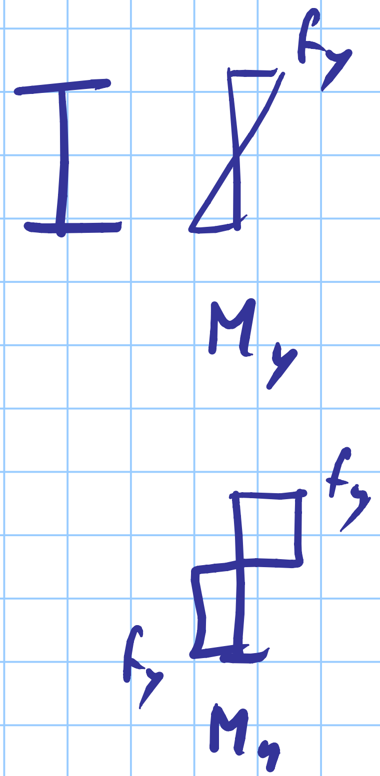
$$\rho = \frac{b_{eff}}{b} = \frac{1.905 - 0.22}{1.905^2} = 0.464$$

$$b_{eff} = 400 \text{ mm} \times 0.464 = 185.6 \text{ mm}$$

$$N_{Rd} = b_{eff} \cdot t \cdot \frac{f_y}{\gamma_{M0}} = \frac{185.6 \times 4}{10^3} \times \frac{275}{1.05} = 194.4 \text{ kN}$$

CLASSIFICAZIONE DELLE SEZIONI





classe 1 max resistenza $M_{Rd} = W_{pl} \dfrac{f_y}{\gamma_{M0}}$

grande duttilità

classe 2 max resistenza " "

media duttilità

classe 3 resistenza lim. a 1° plast $M_{Rd} = W_{el} \dfrac{f_y}{\gamma_{M0}}$

classe 4 fare rif. a sezione efficace $M_{Rd} = W_{el,eff} \dfrac{f_y}{\gamma_{M0}}$