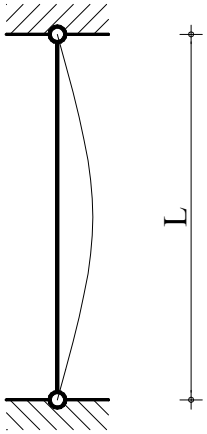
3.2. Potrebno je odrediti dopušteno opterećenje i naprezanje čeličnog štapa pravokutnog poprečnog presjeka 10x5cm koji je zglobno učvršćen, ako je poznato:

$$L = 2.0\text{m}$$

$$E = 2.1 \cdot 10^4 \frac{\text{kN}}{\text{cm}^2}$$

$$\sigma_p = 21.0 \frac{\text{kN}}{\text{cm}^2}$$

$$\nu = 3.0$$



$$L_i = L = 2\text{m}$$

Karakteristike poprečnog presjeka

$$I_{min} = \frac{10 \cdot 5^3}{12} = 104.1\text{cm}^4$$

Kritična sila i naprezanje

$$P_{kr} = \frac{\pi^2 \cdot E \cdot I_{min}}{L_i^{\,2}} = \frac{\pi^2 \cdot 2.1 \cdot 10^4 \frac{\text{kN}}{\text{cm}^2} \cdot 104.1\text{cm}^4}{(200\text{cm})^2} = 540.00\text{kN}$$

$$\sigma_{kr} = \frac{\pi^2 \cdot E \cdot I_{min}}{L_i^{\,2} \cdot A} = \frac{\pi^2 \cdot E}{\lambda^2} = 10.8 \frac{\text{kN}}{\text{cm}^2}$$

$$\lambda = \frac{L_i}{i_{min}} = \frac{L_i}{\sqrt{\frac{I_{min}}{A}}}$$

Dopuštena sila u štapu

$$P_{dop} = \frac{P_{kr}}{\nu} = \frac{540.0}{3.0} = 180\text{kN}$$

$$\sigma_{dop} = \frac{\sigma_{kr}}{\nu} = \frac{10.8 \frac{\text{kN}}{\text{cm}^2}}{3.0} = 3.6 \frac{\text{kN}}{\text{cm}^2}$$