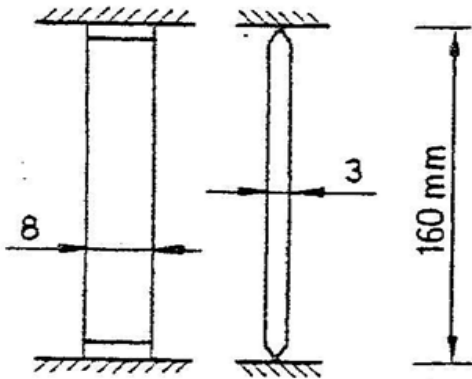


TMKS0600 STATIIKKA JA LUJUUSOPPI

Tehtävä L5-6

Määritä lämpötilaero



$$E = 210 \text{ GPa}$$

$$B = 8 \text{ mm}$$

$$L = 160 \text{ mm}$$

$$H = 3 \text{ mm}$$

$$L_n = L = 160 \text{ mm}$$

$$F_n = \pi^2 E_T I_T / L_n^2$$

$$F_n = 1457 \text{ N}$$

$$I = B H^3 / 12$$

$$I = 18 \text{ mm}^4$$

Tarkistus:

$$L_n = 160 \text{ mm}$$

$$\lambda = L_n / i = 184,75 > \lambda_{\min}, \text{ nurjahtaa Eulerin mukaisesti}$$

$$i = (I/A)^{1/2} = 0,8660$$

$$I = B H^3 / 12 = 18,0 \text{ mm}^4$$

$$A = 24 \text{ mm}^2$$

$$\lambda_{\min} = 105 \text{ taulukosta}$$

$$F_{\text{sall}} = F_n - 200 \text{ N} = 1257 \text{ N}$$

$$\sigma = -E\alpha\Delta t; \sigma = -F/A \Rightarrow \Delta t = F/(EA\alpha)$$

$$\alpha = 0,000012 \text{ } ^\circ\text{C}^{-1}$$

$$\Delta t = 20,8 \text{ } ^\circ$$

$$\text{loppulämpötila} = \text{alkulämpötila} + \Delta t$$

$$t = 30,8 \text{ } ^\circ$$