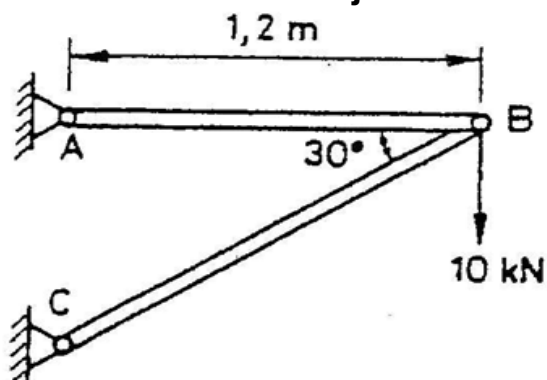


TMKS0600 STATIIKKA JA LUJUUSOPPI

Tehtävä L5-8

Määritä varmuus nurjahduksen suhteen



$$\begin{aligned}
 E &= 210 \text{ GPa} & L_1 &= 1200 \text{ mm} \\
 A &= 800 \text{ mm}^2 & D &= (4 \cdot A / \pi)^{1/2} = 32 \text{ mm} \\
 L &= 1200 / \cos \alpha = 1385,640646 \text{ mm} & &= L_n
 \end{aligned}$$

$$\begin{aligned}
 F_n &= \pi^2 E_T I_T / L_n^2 & I &= \pi D^4 / 64 \\
 F_n &= 54978 \text{ N} & I &= 50929,58 \text{ mm}^4
 \end{aligned}$$

Tarkistus:

$$\begin{aligned}
 L_n &= 1386 \text{ mm} \\
 \lambda &= L_n / i = 173,66 > \lambda_{\min}, \text{ nurjahtaa Eulerin mukaisesti} \\
 i &= (I/A)^{1/2} = 7,9788 \\
 I &= \pi D^4 / 64 = 50929,6 \text{ mm}^4 \\
 A &= 800 \text{ mm}^2 \\
 \lambda_{\min} &= 105 \text{ taulukosta}
 \end{aligned}$$

$$\begin{aligned}
 n &= F_n / F & F &= F_1 / \sin \alpha & F_1 &= 10 \text{ kN} \\
 F &= 20 \text{ kN} & \alpha &= 30^\circ \\
 n &= 2,7488936
 \end{aligned}$$