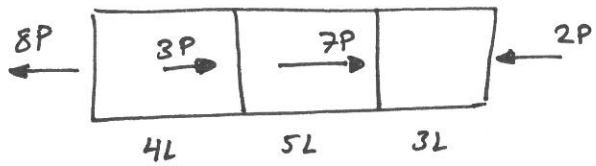
2.1.13.

Givet



* Mtrlparam E
* Tvärsnittsarea A

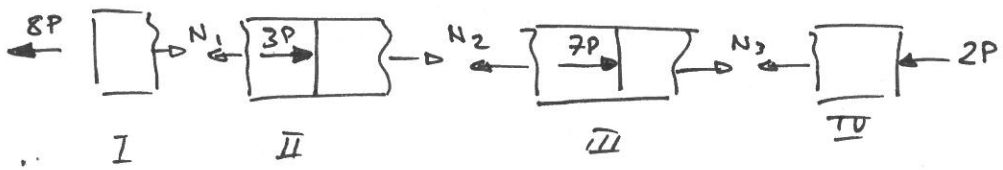
Sökt Total förlängning δ

Lösning

(1. Frilägg)

(2. Jämviktl

3. Snitta



4. Jämviktl

$\rightarrow_I$: $-8P + N_1 = 0 \Rightarrow \underline{N_1 = 8P}$

$\rightarrow_{II}$: $-N_1 + 3P + N_2 = 0 \Rightarrow \underline{N_2 = 5P}$

$\rightarrow_{III}$: $-N_2 + 7P + N_3 = 0 \Rightarrow \underline{N_3 = -2P}$

5. Normalspänning

$$\sigma_1 = \frac{8P}{A} \qquad \sigma_2 = \frac{5P}{A} \qquad \sigma_3 = \frac{-2P}{A}$$

6. Konstitutivt samband

$$\sigma = E\varepsilon \rightarrow \varepsilon = \frac{\sigma}{E} \rightarrow \begin{cases} \varepsilon_1 = \frac{8P}{EA} \\ \varepsilon_2 = \frac{5P}{EA} \\ \varepsilon_3 = \frac{-2P}{EA} \end{cases}$$

7. Kompabilitet

$$\delta_{tot} = \delta_1 + \delta_2 + \delta_3 = \left\{ \delta = \int \varepsilon \, dx \right\} = \frac{8P}{EA}\int_0^{4L} dx + \frac{5P}{EA}\int_0^{5L} dx + \frac{-2P}{EA}\int_0^{3L} dx$$

$$\underline{\delta_{tot} = 51 \cdot \frac{PL}{EA}}$$