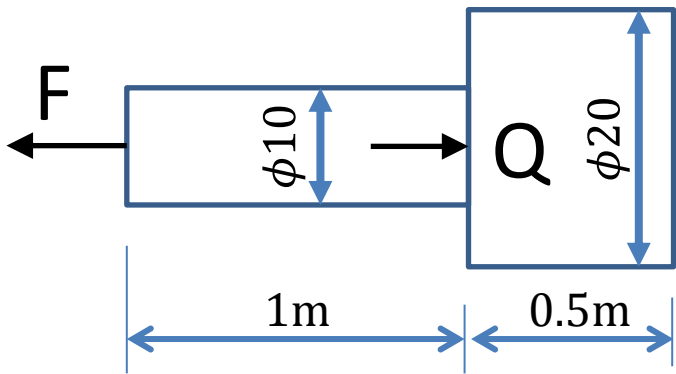


3-2 试求图示钢杆各段内横截面上的应力和杆的总伸长。钢的弹性模量 $E = 2 \times 10^5 \text{MPa}$, $F = 12\text{KN}$, $Q = 3\text{KN}$ 。

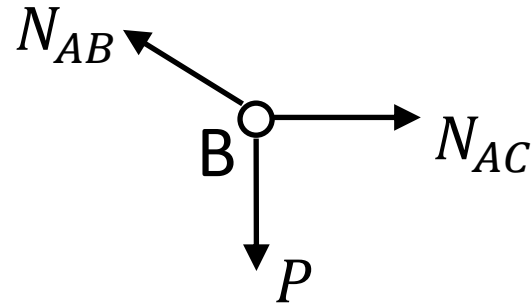
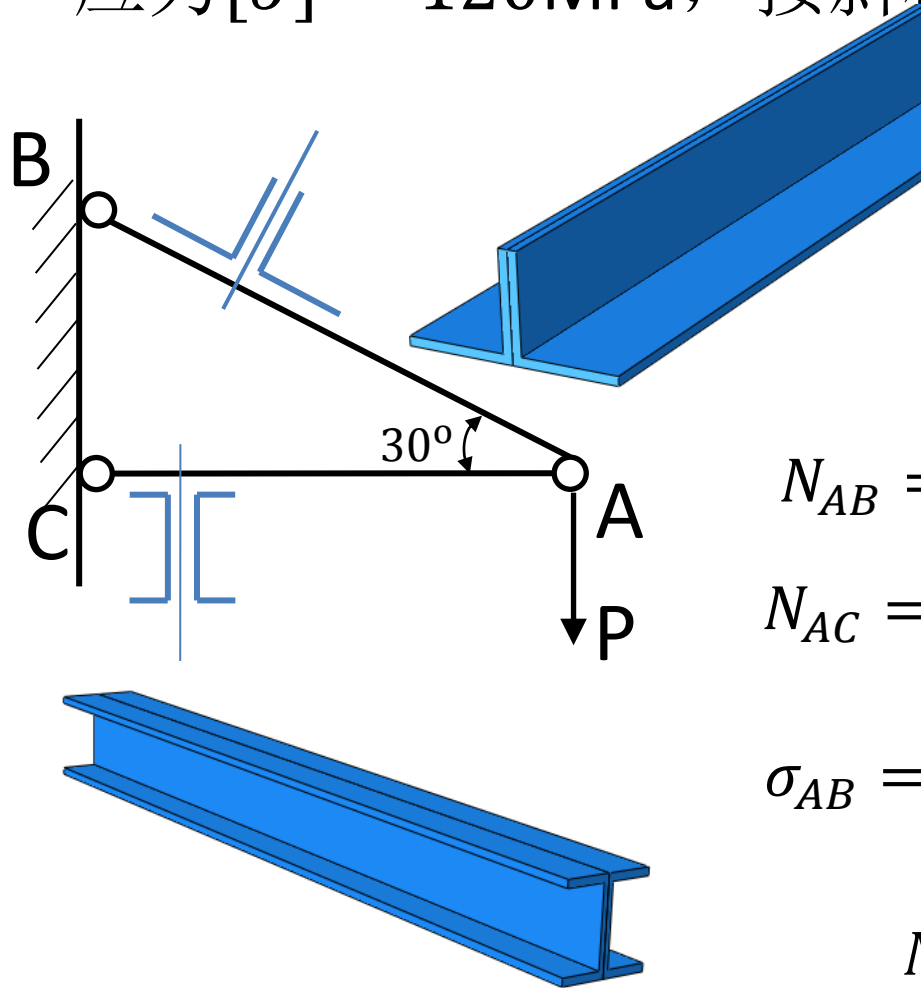


$$\sigma_1 = \frac{F}{A_1} = \frac{12000}{\pi \times 0.005^2} = 1.5279 \times 10^8 \text{Pa} = 152.79 \text{MPa}$$

$$\sigma_2 = \frac{F - Q}{A_2} = \frac{12000 - 3000}{\pi \times 0.01^2} = 2.865 \times 10^7 \text{Pa} = 28.65 \text{MPa}$$

$$\Delta L = \Delta_1 + \Delta_2 = \frac{\sigma_1}{E} L_1 + \frac{\sigma_2}{E} L_2 = \frac{152.79}{2 \times 10^5} \times 1 + \frac{28.65}{2 \times 10^5} \times 0.5 = 8.36 \times 10^{-4} \text{m}$$

3-11 图示三角架，斜杆由两根 $80 \times 80 \times 7$ 等边角钢组成，横杆由两根10号槽钢组成，材料均为Q235，许用应力 $[\sigma] = 120\text{MPa}$ ，按斜杆AB强度确定许可载荷P。



$$N_{AB} = 2P \quad A_{AB} = 2 \times 1071 = 2142\text{mm}^2$$

$$N_{AC} = \sqrt{3}P \quad A_{AC} = 2549.6\text{mm}^2$$

$$\sigma_{AB} = \frac{N_{AB}}{A_{AB}} = \frac{2P}{2142} \leq [\sigma] \quad P \leq 128520\text{N}$$

$$\sigma_{AC} = \frac{N_{AC}}{A_{AC}} = \frac{\sqrt{3}P}{2549.6} \leq [\sigma] \quad P \leq 176641\text{N}$$