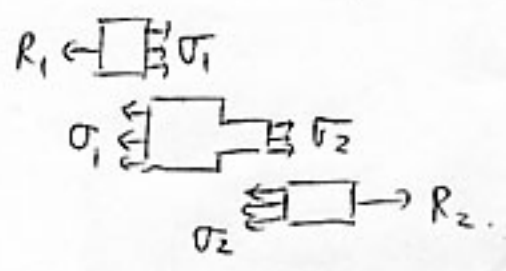
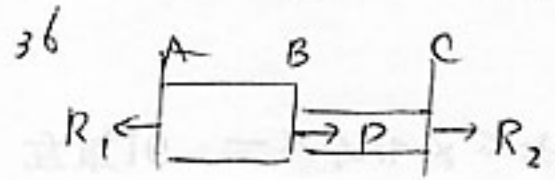


$$35 \quad \Delta l = \frac{P}{E_1 A_1} l_1 + \frac{P}{E_2 A_2} l_2$$



由平衡条件  
 $R_1 = P + R_2 \dots (1)$

AB段  
 $\sigma_1 = \frac{R_1}{A_1} \dots (2), \quad \epsilon_1 = \frac{\sigma_1}{E_1} = \frac{R_1}{E_1 A_1} \dots (3)$

$$\Delta l_1 = \epsilon_1 l_1 = \frac{R_1 l_1}{E_1 A_1} \dots (4)$$

BC段  
 $\sigma_2 = \frac{R_2}{A_2} \dots (5), \quad \epsilon_2 = \frac{\sigma_2}{E_2} = \frac{R_2}{E_2 A_2} \dots (6)$

$$\Delta l_2 = \epsilon_2 l_2 = \frac{R_2 l_2}{E_2 A_2} \dots (7)$$

两端固定时

$$\Delta l_1 + \Delta l_2 = \frac{R_1 l_1}{E_1 A_1} + \frac{R_2 l_2}{E_2 A_2} = 0, \dots (8)$$

$$\therefore R_2 = -\frac{E_2 A_2 l_1}{E_1 A_1 l_2} R_1 \dots (9)$$

由(1)及(9)代入(4),

$$R_1 = P - \frac{E_2 A_2 l_1}{E_1 A_1 l_2} R_1, \quad \therefore R_1 = \frac{E_1 A_1 l_2}{E_1 A_1 l_2 + E_2 A_2 l_1} P$$

于是  
 $R_2 = -\frac{E_2 A_2 l_1}{E_1 A_1 l_2 + E_2 A_2 l_1} P$

$$\Delta l = \Delta l_1 = \frac{R_1 l_1}{E_1 A_1} = \frac{l_1 l_2}{E_1 A_1 l_2 + E_2 A_2 l_1} P$$

37 (1) 心圆面积  $A_1 = \frac{\pi d^2}{4}$ ,

心圆周围面积  $A_2 = 6 \times \frac{\sqrt{3}}{4} a^2 - \frac{\pi d^2}{4} = \frac{3\sqrt{3}}{2} a^2 - \frac{\pi d^2}{4}$

$$P = \sigma_1 A_1 + \sigma_2 A_2 = \frac{\pi d^2}{4} \sigma_1 + \left( \frac{3\sqrt{3}}{2} a^2 - \frac{\pi d^2}{4} \right) \sigma_2$$

(2)  $\Delta l_1 = \epsilon_1 l = \frac{\sigma_1}{E_1} l$

(3)  $\Delta l_2 = \epsilon_2 l = \frac{\sigma_2}{E_2} l$

(4)  $\Delta l = \Delta l_1 = \Delta l_2 \implies \frac{\sigma_1}{E_1} = \frac{\sigma_2}{E_2}$

$$P = \frac{\pi d^2}{4} (\sigma_1 - \sigma_2) + \frac{3\sqrt{3}}{2} a^2 \sigma_2$$

$$= \frac{\pi d^2}{4} \left( 1 - \frac{E_2}{E_1} \right) \sigma_1 + \frac{3\sqrt{3}}{2} a^2 \frac{E_2}{E_1} \sigma_1$$

$$\sigma_1 = \frac{P}{\frac{\pi d^2}{4} \left( 1 - \frac{E_2}{E_1} \right) + \frac{3\sqrt{3}}{2} a^2 \frac{E_2}{E_1}}$$

$$\sigma_2 = \frac{(E_2/E_1) P}{\frac{\pi d^2}{4} \left( 1 - \frac{E_2}{E_1} \right) + \frac{3\sqrt{3}}{2} a^2 \frac{E_2}{E_1}}$$

(5) ~~...~~

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