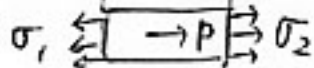
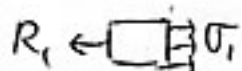
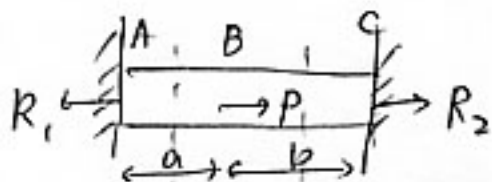


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自由体图

在自由体图中
加平衡条件

$$R_1 = P + R_2 \quad \text{--- ①}$$

AB段

$$\sigma_1 = \frac{R_1}{A} \quad \text{--- ②}, \quad \epsilon_1 = \frac{\sigma_1}{E} = \frac{R_1}{EA} \quad \text{--- ③}$$

$$\Delta l_1 = \epsilon_1 a = \frac{R_1}{EA} a \quad \text{--- ④}$$

BC段

$$\sigma_2 = \frac{R_2}{A} \quad \text{--- ⑤}, \quad \epsilon_2 = \frac{\sigma_2}{E} = \frac{R_2}{EA} \quad \text{--- ⑥}$$

$$\Delta l_2 = \epsilon_2 b = \frac{R_2}{EA} b \quad \text{--- ⑦}$$

两端固定时

$$\Delta l_1 + \Delta l_2 = \frac{1}{EA} (R_1 a + R_2 b) = 0, \quad R_2 = -\frac{a}{b} R_1 \quad \text{--- ⑧}$$

⑧式代入①式

$$R_1 = P + \frac{a}{b} R_1, \quad \therefore R_1 = \frac{b}{a+b} P, \quad R_2 = -\frac{a}{a+b} P \quad \text{--- ⑨}$$

代入②式

$$(1) \quad \sigma_1 = \frac{R_1}{A} = \frac{b}{a+b} \left(\frac{P}{A} \right), \quad \epsilon_1 = \frac{b}{a+b} \left(\frac{P}{EA} \right)$$

$$(2) \quad \sigma_2 = \frac{R_2}{A} = -\frac{a}{a+b} \left(\frac{P}{A} \right), \quad \epsilon_2 = -\frac{a}{a+b} \left(\frac{P}{EA} \right)$$

$$(3) \quad \Delta l_1 = \epsilon_1 a = \frac{ab}{a+b} \left(\frac{P}{EA} \right)$$

$$(4) \quad R_1 = \frac{b}{a+b} P, \quad R_2 = -\frac{a}{a+b} P$$

Yuzo