

$$41. (1) \Delta l_T = \alpha l_0 (T_1 - T_0) = l_1 - l_0$$

$$\therefore T_1 = T_0 + \frac{l_1 - l_0}{\alpha l_0}$$

$$(2) \sigma_T = E \left(\frac{l - l_0}{l_0} - \frac{\Delta l_T}{l_0} \right) = E \left(\frac{l - l_0}{l_0} - \alpha \Delta T \right)$$

$$42 (1) \sigma_1 = -E_1 \alpha_1 \Delta T, \quad \sigma_2 = -E_2 \alpha_2 \Delta T$$

$$(2) \left. \begin{array}{l} \sigma_1 A_1 + \sigma_2 A_2 = 0 \quad \dots (1) \\ \sigma_1 = E_1 \left(\frac{\Delta l}{l_0} - \alpha_1 \Delta T \right) \quad \dots (2) \\ \sigma_2 = E_2 \left(\frac{\Delta l}{l_0} - \alpha_2 \Delta T \right) \quad \dots (3) \end{array} \right\}$$

以(1)代入

$$E_1 A_1 \left(\frac{\Delta l}{l_0} - \alpha_1 \Delta T \right) + E_2 A_2 \left(\frac{\Delta l}{l_0} - \alpha_2 \Delta T \right) = 0$$

$$= (E_1 A_1 + E_2 A_2) \frac{\Delta l}{l_0} - (E_1 A_1 \alpha_1 + E_2 A_2 \alpha_2) \Delta T = 0$$

$$\therefore \frac{\Delta l}{l_0} = \frac{E_1 A_1 \alpha_1 + E_2 A_2 \alpha_2}{E_1 A_1 + E_2 A_2} \Delta T \quad \dots (4)$$

④代入②, ③, 得

$$\sigma_1 = E_1 \left(\frac{E_1 A_1 \alpha_1 + E_2 A_2 \alpha_2}{E_1 A_1 + E_2 A_2} \Delta T - \alpha_1 \Delta T \right) = \frac{E_1 E_2 A_2 (\alpha_2 - \alpha_1)}{E_1 A_1 + E_2 A_2} \Delta T$$

$$\sigma_2 = -\frac{A_1}{A_2} \sigma_1 = -\frac{E_1 E_2 A_1 (\alpha_2 - \alpha_1)}{E_1 A_1 + E_2 A_2} \Delta T$$

(3) 省略