

$$\epsilon = \frac{P}{E}$$

課題1

(1)

$$\epsilon' = \frac{2.5 \times 10^{-6}}{1.0 \times 10^{-2}}$$

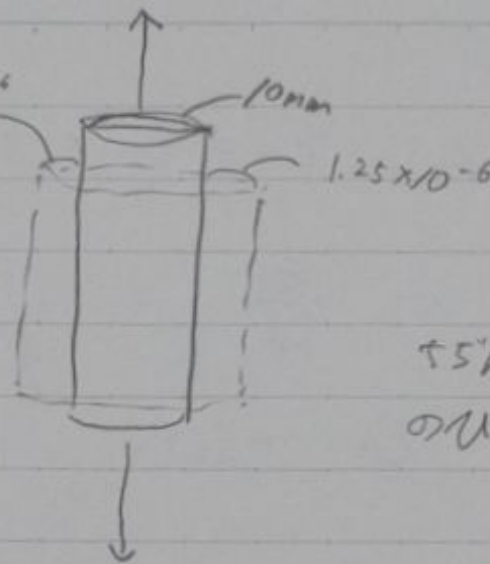
銅のヤング率

210 GPa

ポアソン比

0.25

$$\lambda = \frac{2.5 \times 10^{-4}}{1.0 \times 10^{-2}}$$



5mm → 21mm
0.1mm → 7mm

(2)

$$\epsilon_B + \frac{\epsilon'}{\nu} = - \frac{2.5 \times 10^{-4}}{0.25} = + \frac{2.5 \times 10^{-4}}{2.5 \times 10^{-1}} = +1.0 \times 10^{-3}$$

(3)

$$\sigma = 210 \times 1.0 \times 10^{-3}$$

5mm

21mm

0.1mm

$$= 2.1 \times 10^{-1}$$

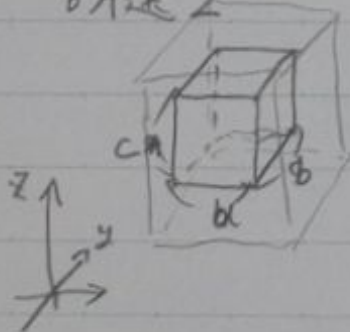
$$P = \sigma \cdot S = 2.1 \times 10^{-1} \times (5.0 \times 10^{-3})^2 \times \pi$$

$$= 1.6 \times 10^{-5} \text{ N}$$

$$= 1.6 \times 10^{-5} \text{ N}$$

課題2

(1)



$$\epsilon_x = \frac{\Delta a}{a}$$

$$\epsilon_y = \frac{\Delta b}{b}$$

$$\epsilon_z = \frac{\Delta c}{c}$$

$$\Delta a = \epsilon_x a$$

$$\Delta b = \epsilon_y b$$

$$\Delta c = \epsilon_z c$$

$$V' = a(\epsilon_x + 1) \times b(\epsilon_y + 1) \times c(\epsilon_z + 1)$$

$$= abc (\epsilon_x + 1) (\epsilon_y + 1) (\epsilon_z + 1)$$

$$V = abc$$

$$\Delta = \frac{V' - V}{V} = (\epsilon_x + 1) (\epsilon_y + 1) (\epsilon_z + 1) - 1$$

$$= (\epsilon_x \epsilon_y + \epsilon_x + \epsilon_y + 1) (\epsilon_z + 1) - 1$$

$$= \epsilon_x \epsilon_y \epsilon_z + \epsilon_x \epsilon_z + \epsilon_y \epsilon_z + \epsilon_z$$

$$\epsilon_x \epsilon_y + \epsilon_x + \epsilon_y + 1$$

(2)

$$\Delta = \epsilon_x + \epsilon_y + \epsilon_z$$

$$V = - \frac{\epsilon_x}{\epsilon_z}$$

$$V = - \frac{\epsilon_2}{\epsilon_2}$$

$$\Sigma A: -V E_z$$

$$\xi_y = -\mu \xi_z$$

$$\Delta = \epsilon_x + \epsilon_y + \epsilon_z$$

$$\rightarrow \cancel{E_r} (1 - 2V)$$