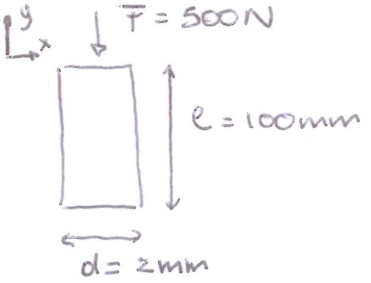
ESERCIZIO (1)



$E = 200\,GPa$

$G = 77\,GPa$

Δl ?

Δd ?

$$A = \pi r^2 = \pi (1\times10^{-3})^2 = 3.14e^{-6}\ m^2$$

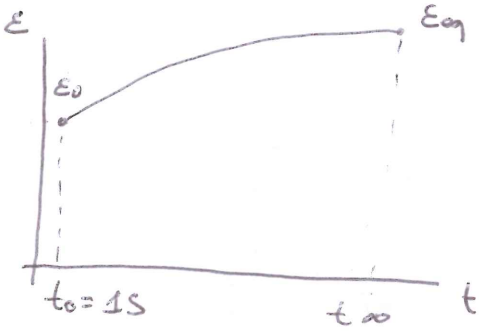
$$\varepsilon_y = \frac{\sigma}{E} = \frac{F/A}{E} = \frac{-500/3.14e^{-6}\ N/m^2}{200\times e^9\ Pa} = -7{,}9\,e^{-4}$$

$$\Delta l = \varepsilon_y l = -79\ \mu m \quad \text{(si accorcia)}$$

$$E = 2G(1+\nu) \Rightarrow \nu = \frac{E}{2G} - 1 = 0.29 \qquad \nu = -\frac{\varepsilon_x}{\varepsilon_y} \qquad \varepsilon_x = -\nu\varepsilon_y$$

$$\Delta d = -\nu\varepsilon_y d_{mm} = 0.46\ \mu m \quad \text{(si allarga)}$$

ESERCIZIO (2)



$$\varepsilon_0 = \frac{d_0}{h} = \frac{400\ \mu m}{10\ mm} = 0.04 \qquad \varepsilon_{eq} = 0.06$$

$$\varepsilon(t) = \frac{\sigma_0}{E}\left(1 - e^{-t/\tau}\right) \qquad \tau = \frac{\eta}{E}\ [Pas]\ [Pa]$$

$$t\to\infty \quad \varepsilon(t\to\infty) = \varepsilon_{eq} = \frac{\sigma_0}{E} \Rightarrow E = \frac{\sigma_0}{\varepsilon_{eq}} = \frac{7\,KPa}{0.06} = 116.67\ KPa$$

$$t = t_1 \quad \frac{\varepsilon_0}{\varepsilon_{eq}} = \left(1 - e^{-t\frac{E}{\eta}}\right) \qquad \frac{0.04}{0.06} - 1 = -e^{\frac{-116.67\ KPa\cdot 1s}{\eta}}$$

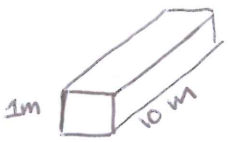
$$+0.33 = +e^{\frac{-116.67\,KPas}{\eta}}$$

$$+1.1 = +\frac{116.67\,KPas}{\eta}$$

$$\eta = 105{,}45\ KPaS$$

$$\tau = \frac{\eta}{E} = \frac{105.45\ KPas}{116.67\ KPa} = 0.9\ s$$

ESERCIZIO (3)



$\alpha = 0.0043\ °C$

$\rho_{20°C} = 2.7\,e^{-8}\ \Omega m$

$R_{25°C}$?

$$\rho_{25°C} = \rho_{20°C}\,(1+\alpha\Delta T) = 2.7\,e^{-8}\ \Omega m\ [1 + 0.0043\,(20-25\ °C)]$$
$$= 2.619\,e^{-8}\ \Omega m \quad (\rho\downarrow, T\uparrow)$$

$$R_{25°C} = \rho_{25°C}\,\frac{L}{A} = 2.619\,e^{-8}\ \Omega\cancel{m}\ \frac{10\cancel{m}}{1\ m^{\cancel{2}}} = 2.6\,e^{-7}\ \Omega$$