Question 32000

We are given $S = 6 \cdot 10^{-5} m^2 ; l = 50\, cm = 0.5\, m ; x = 0.2\, mm ; F = 3000\, N$.

By definition, mechanical stress is $\sigma = \dfrac{F}{S}$, which from the other side might be written as $\sigma = \epsilon E$,

where E - Youngs modulus and $\epsilon = \dfrac{x}{l}$ - is the engineering strain (Cauchy strain), which is the ratio of total deformation to the initial dimension of the body. Combining last three equations, obtain

$$\frac{F}{S} = \frac{x}{l} \cdot E \Rightarrow E = \frac{Fl}{Sx} = 125000\, MPa \quad .$$