Solid Mechanics axial load problem solution

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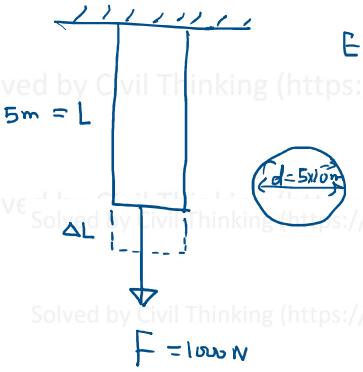
**Calculate the tensile stress , total deformation and relative strain of a Dural bar of length l=5m and diameter d=5mm tensioned by a force F = 1000N. Young modulus for Dural is equal E = 72 GPa**




$E = 72 \times 10^9\ Pa$

$$\Delta L = \frac{FL}{AE} = \frac{1000 \times 5\,m}{\frac{\pi}{4}(5\times10^{-3})^2 \times 72\times10^9} \simeq 0.00354\,m = 3.54\,mm$$

$$\varepsilon = \frac{\Delta L}{L} = \frac{3.54\times10^{-3}\,m}{5\,m} = 0.000708$$

$$\sigma = E \times \varepsilon = 72\times10^9 \times 0.000708 = 50976000\ N/m^2 \simeq 51\ MPa$$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