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MSE 2001H
Quiz 6
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A rod of uniform cross section (area = 1 cm^2 = 10^{-4} m^2) is made from a high carbon steel with a Young's modulus, E, of 200 GPa = 200 x 10^9 Pa.

The rod is subjected to a uniaxial tensile load of 20,000 N.

Compute the resulting elastic strain, ε.

$$\sigma = E\varepsilon$$

$$E = 200 \times 10^9 \ Pa$$

$$\sigma = \frac{20,000 \ N}{10^{-4} \ m^2} = 2 \times 10^8 \ Pa$$

$$\varepsilon = \frac{\sigma}{E} = \frac{2 \times 10^8}{2 \times 10^{11}} = 10^{-3}$$

$$\boxed{\varepsilon = 10^{-3}}$$