

Answer on Question #70068-Physics-Other

The modulus of rigidity of a wire is $\eta = (2LN)/(\pi r^4 \theta)$. The following measurements are made for L, r and θ : $L = 400 \pm 2 \text{ mm}$, $r = 1.5 \pm 0.05 \text{ mm}$, $\theta = 6.00 \pm 0.20 \text{ rad}$, $N = 1 \text{ m}^{-1}$. Obtain the best value of η .

Solution

The modulus of rigidity of a wire is

$$\eta = \frac{2LN}{\pi r^4 \theta} = \frac{2L}{\pi r^4 \frac{\theta}{N}}$$

$$\eta = \frac{2(0.4)}{\pi(0.0015)^4(6.00)} = 8.38 \cdot 10^9 \text{ Pa} = 8.38 \text{ GPa}.$$

Answer: 8.38 GPa.

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