

Answer on Question #81690 - Physics - Mechanics – Relativity

What is the percentage increase in length of a wire of diameter 2.5 mm stretched by a force of extra kg weight young modulus of elasticity of air 12.5 in 11 dyne per CM square?

Solution

Seems like “Young modulus of elasticity of air” actually means “Young modulus of elasticity of wire” and “12.5 in 11 dyne per CM square” means $12.5 \cdot 10^{11}$ dyne/cm².

First, calculate the cross-section of the wire:

$$A = \frac{\pi d^2}{4}.$$

Force of **one** extra kg of weight m is

$$F = mg.$$

Young modulus is

$$Y = \frac{FL}{A \cdot \Delta L} \Rightarrow \frac{\Delta L}{L} \% = \frac{F}{AY} \cdot 100\% = \frac{4mg}{\pi d^2 Y} \cdot 100\% = \frac{4 \cdot 1 \cdot 9.8/10^{-5}}{3.14 \cdot 0.25^2 \cdot 12.5 \cdot 10^{11}} \cdot 100\% = 1.6 \cdot 10^{-3} \%$$

Answer

$1.6 \cdot 10^{-3} \%$.

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