

Answer on Question #62918, Physics / Mechanics | Relativity

A 5-meter long wire is fixed to the ceiling. A weight of 10kg is hung at the lower end and is 1 meter above the floor. The wire was elongated by 1mm. The energy stored in the wire due to stretching is.

Solution:

The energy of the deformed wire is determined by the formula

$$w = \frac{1}{2}kl^2$$

Hooke's law

$$F = kl$$

Whence

$$k = \frac{F}{l}$$

Then

$$w = \frac{1}{2} \times \frac{F}{l} \times l^2$$

Where

$$F = mg$$

Finally

$$w = \frac{1}{2} \times mg \times l$$

$$w = \frac{1}{2} \times 10kg \times 9.8m/s^2 \times 0.001m = 0.05 \text{ joule}$$

Answer: 0.05 joule

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