

Answer on Question #67076-Physics-Molecular Physics-Thermodynamics

A sonometer wire having cross section area 0.85×10^{-6} is stretched between two rigid supports 1.2 m apart. A tension of 20 N is applied at its free end. If the temperature is reduced by 12°C , calculate the final tension in the wire. Take coefficient of linear expansion and isothermal Young's modulus to be $1.5 \times 10^{-5} \text{K}^{-1}$ and $2.0 \times 10^{11} \text{Nm}^{-2}$, respectively.

Solution

$$\Delta F = -A\gamma\alpha\Delta T$$

$$\Delta F = (0.85 \cdot 10^{-6})(2 \cdot 10^{11})(1.5 \cdot 10^{-5})(12) =$$

$$F' = F + \Delta F = 20 + 30.6 = 50.6 \text{ N.}$$

Answer: 50.6 N.

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