The linear density of a vibrating string is 1.3 × 10−4 kg m−1. A transverse wave is propagating on the string and is described by the equation
y (x, t) = 0.021 sin (x − 30t)
where x and y are in metres and t is in seconds. Calculate the tension in the string.

Solution

$$v = f\lambda = \frac{\omega}{2\pi}\frac{2\pi}{k} = \frac{\omega}{k} = \frac{30}{1} = 30\frac{m}{s}$$

To obtain the tension is a bit more complicated because it appears

within a square root:

$$v = \sqrt{\frac{T}{\mu}} \gg T = \mu v^2 = 1.3 \times 10^{-4} \times 30^2 = 0{,}117N$$

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