Answer on Question #72282-Physics-Mechanics-Relativity

A string under tension 1080N, of mass per unit length 0.003kg/m has many resonant frequency on such frequency is 450 Hz and the next higher frequency is 600Hz How long is the string?

Solution

$$f = \frac{n}{2l}\sqrt{\frac{T}{\mu}}$$

$$f' = \frac{n'}{2l}\sqrt{\frac{T}{\mu}}$$

$$f' - f = \frac{n' - n}{2l}\sqrt{\frac{T}{\mu}}$$

$$f' - f = \frac{1}{2l}\sqrt{\frac{T}{\mu}}$$

The length is

$$l = \frac{1}{2(f' - f)}\sqrt{\frac{T}{\mu}} = \frac{1}{2(600 - 450)}\sqrt{\frac{1080}{0.003}} = 2\ m.$$

Answer: $2\ \boldsymbol{m}$.