## EXPERIMENT NO. 10

**Aim : To find the relation between the resonance length and tension of a wire for a constant frequency, using a sonometer.**

**Apparatus : Sonometer, tuning fork, weights, rubber cork.**

**Theory : The resonant frequency of a wire of length l is given b y :**

$$\nu = \frac{1}{2l}\sqrt{\frac{T}{\mu}}$$ **; where T is the tension and μ its mass/length.**

**For constant frequency and for a given wire, ν and μ are constants.**
**i.e. the ratio** $\frac{\sqrt{T}}{l}$ **is a constant and therefore the graph between T & $l^2$ will be a straight line.**

**Procedure:**

1. **Make the pulley of the sonometer frictionless and put a suitable mass, say 1kg, on the hanger.**
2. **Place a paper rider on the wire to see the vibrations of the wire.**
3. **Strike the tuning fork on the rubber cork and place it vertically on the sonometer.**
4. **Adjust the length of the wire by moving the wooden bridges so that the wire & the paper rider vibrates the maximum.**
5. **Measure the length of the wire between the wooden bridges using the scale attached.**
6. **Repeat the experiment for masses 1.5kg & 2kg and find the corresponding resonance lengths.**
7. **Plot a graph between T and $l^2$**

**Result : From the graph, we conclude that, $T \propto l^2$**

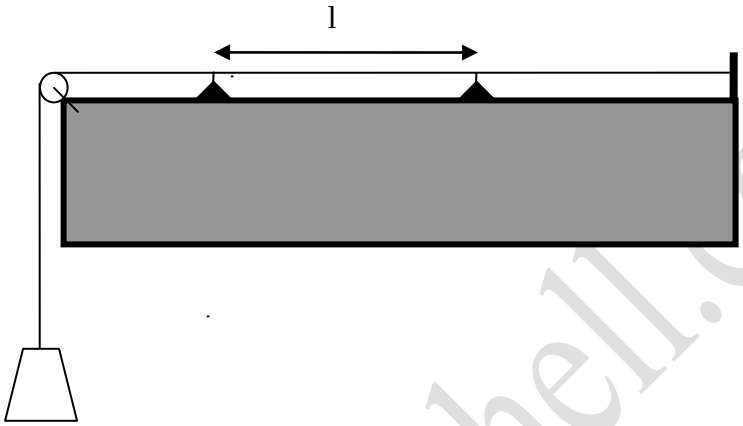
**Precautions :**

1. **Pulley should be frictionless**
2. **Weight of the hanger should be included**

**Sources of error :**

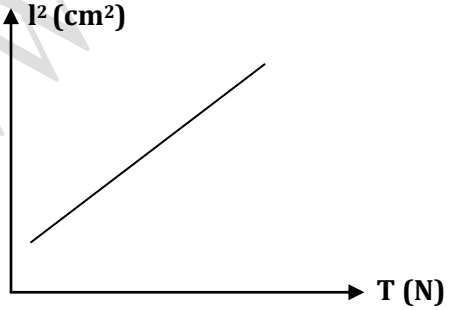
1. **Bridges may not be sharp**
2. **Pulley may have friction.**

**Eby P Kurien**
**mail@selltheshell.com**




| Sr. No | Mass on the hanger m (kg) | Tension on the string (T)= mg | Resonance length of the wire $l = (l_2 - l_1)$ cm | $l^2$ ( $cm^2$) |
|---|---|---|---|---|
| 1 | 0.5 | | | |
| 2 | 1.0 | | | |
| 3 | 1.5 | | | |

**Graph :**

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