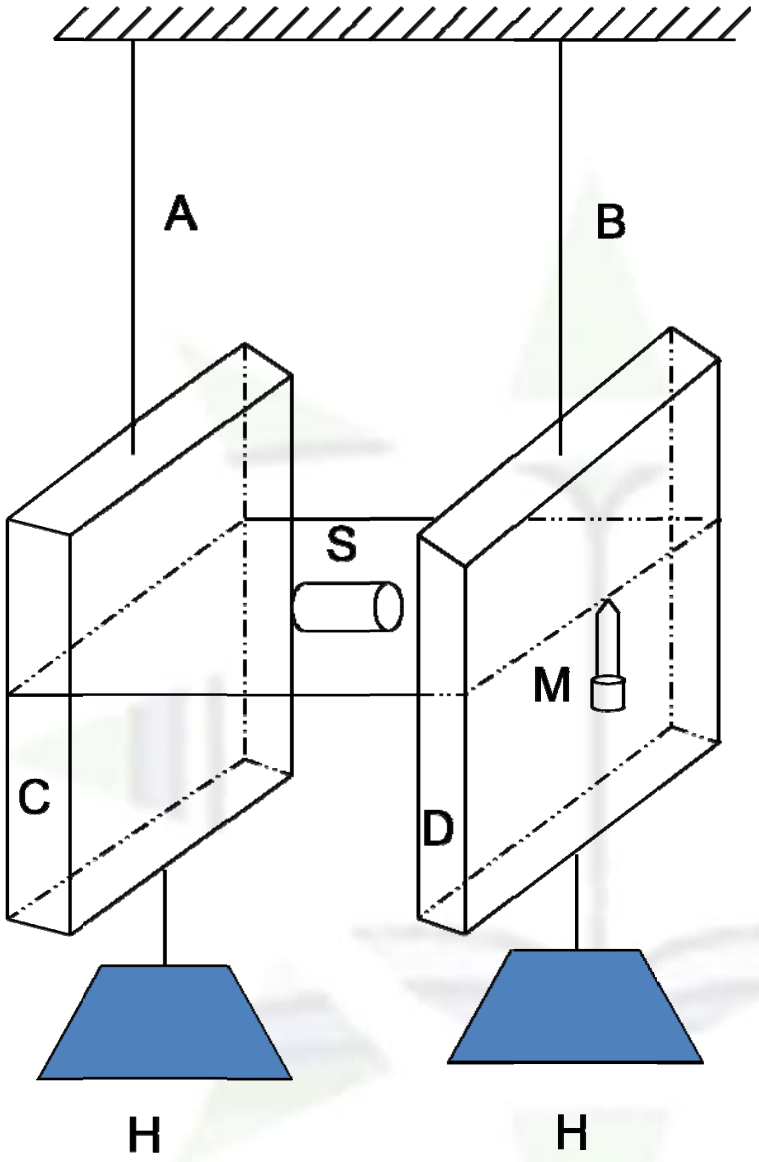
Experimental determination of Young's modulus of a material given in the form of a wire by using Searle's method:



Description: From a rigid support two specimen wires A & B of exactly same length and diameter are suspended. Wire A is known as reference wire and wire B is experimental wire. At the two free ends of the wire two rectangular frames C & D are suspended. A wooden board W is kept between the two frames with one edge hinged in frame C & the other edge is supported by a micrometer screw M in frame D. By rotating the screw M the inclination of the board can be changed. Two hangers H, H' are suspended from the bottoms of the frame on which load can be applied.

Experiment: (1) Dead load is put on both the hangers to keep the wires taught. The original length of the experimental wire is measured. The diameter of the experimental wire is also measured at few different places.

(2) A ½ kg load is placed on the hanger in the frame D. Length of the wire B increases. The board gets inclined and the bubble in S shifts, rotate the screw M till the bubbles comes at the center. Reading of the screw M is noted.

(3) Repeat the same by increasing loads in steps of ½ kg up to 5 kg.

(4) Loads are then decreased in steps of ½ kg and in each step screw M is rotated to bring the bubble back at the center and the readings are noted.

Observation Table

L = Original length of the wire

r = radius of the wire

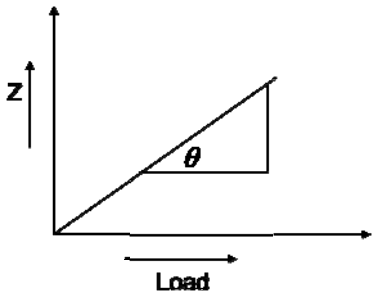
No of observation	Loads(Kg)	Reading of screw M		Change in length		Mean extension
		Load increasing	Load decreasing	Load increasing	Load decreasing	
1	0	x1	y1			
2	0.5	x2	y2	x2-x1	y2-y1	z1
3	1	x3	y3	x3-x1	y3-y1	z2
4	1.5	x4	y4	x4-x1	y4-y1	z3
	.	.	.	.	.	.
	5			x10-x1	x10-y1	

A graph is then plotted with load along X-axis and the mean extension along Y axis which is found to

$$Y = \frac{mg/\pi r^2}{l/L} = \frac{L}{\pi r^2}\frac{mg}{l}$$

from the graph $\tan\theta = \frac{l}{mg}$

$$Y = \frac{L}{\pi r^2}\frac{1}{\tan\theta}$$



be straight line.