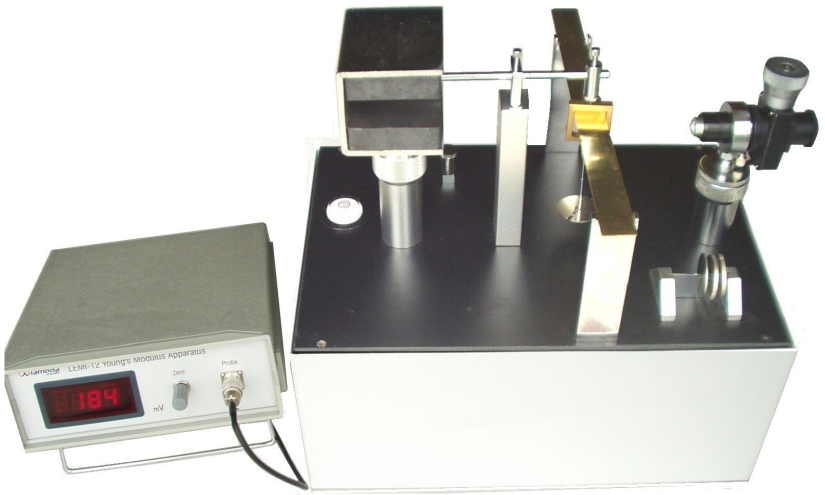
Construct, Conduct & Comprehend Physics Experiments

LEMI-12 Young's Modulus Apparatus- Hall Sensor Method



- *Hall micro-displacement sensing*
- *Simple structure and stable performance*
- *High accuracy (error <3%)*
- *Ideal demonstration system*

When rigid materials are subject to particular stress or forces, deformation (compressed, twisted, stretched, etc.) may occur. For many materials, when suffered from force or stress, the resisting or restoring force that tends to return the material to its original shape is proportional to the deformation. Young's Modulus, *E*, is a constant that describes the material's mechanical property of stiffness and is expressed as the ratio of stress to strain for a material experiencing tensile or compressive stress.

This apparatus is designed to study the deformation characteristics of thin metal sheet samples under load. Deformation (bending) is created by applying a small force *F* on the sheet. A micro-displacement sensor based on Hall effect is used to measure the deformation, where the output voltage is proportional to the amount of displacement.

Experimental Examples

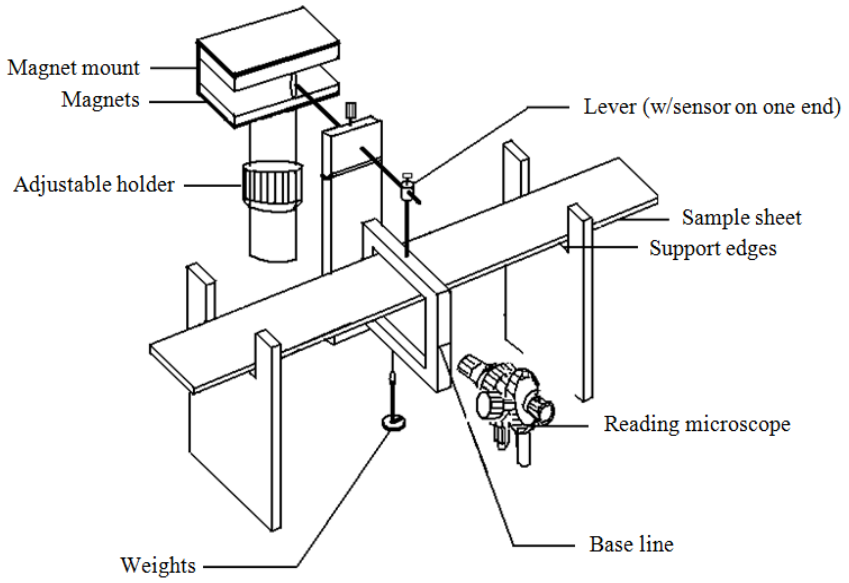
1) Understand the characteristics of a Hall displacement sensor
2) Measure the Young's modulus of a brass sample using the bending method
3) Calibrate a Hall displacement sensor
4) Measure the Young's modulus of a malleable iron sample

Specifications

Reading Microscope	Range: 8 mm; resolution: 0.01 mm; magnification: 20 X
Weights	10.0 g and 20.0 g
Digital Multimeter	3-1/2 digit; range: 0 ~ 2000 mV
Samples	Copper and malleable cast-iron sheets
Relative Uncertainty of Measurement	< 3%

Part List

Name	Qty
Electronic unit	1
Mechanical unit	1
Reading microscope	1
Hall sensor	1
Connection wire	1
Weight (10 g)	8
Weight (20 g)	2
Level bulb	1



Schematic of system

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