

LEMI-13 Young's Modulus Apparatus - Resonance Method



- *Acquire resonance signal on oscilloscope*
- *Supporting and suspending method*
- *High sensitivity and accuracy*
- *Affordable*

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 a metal round bar sample by using the dynamic vibrational resonance method.

The dynamic vibration method is to study the vibrational law of a sample. Mathematically, the vibrational law can be described by a four-order partial differential equation, which shows the relationship between the Young's modulus and vibration frequency of a sample and can be related to three parameters of the sample, i.e. the diameter, length, and mass of the sample. While the three parameters are acquired, the Young's modulus can be determined by measuring the vibrational resonance frequency of the sample. Two methods, i.e. supporting method and suspending method, are used to determine the resonance frequencies of three samples.

Experimental Objectives

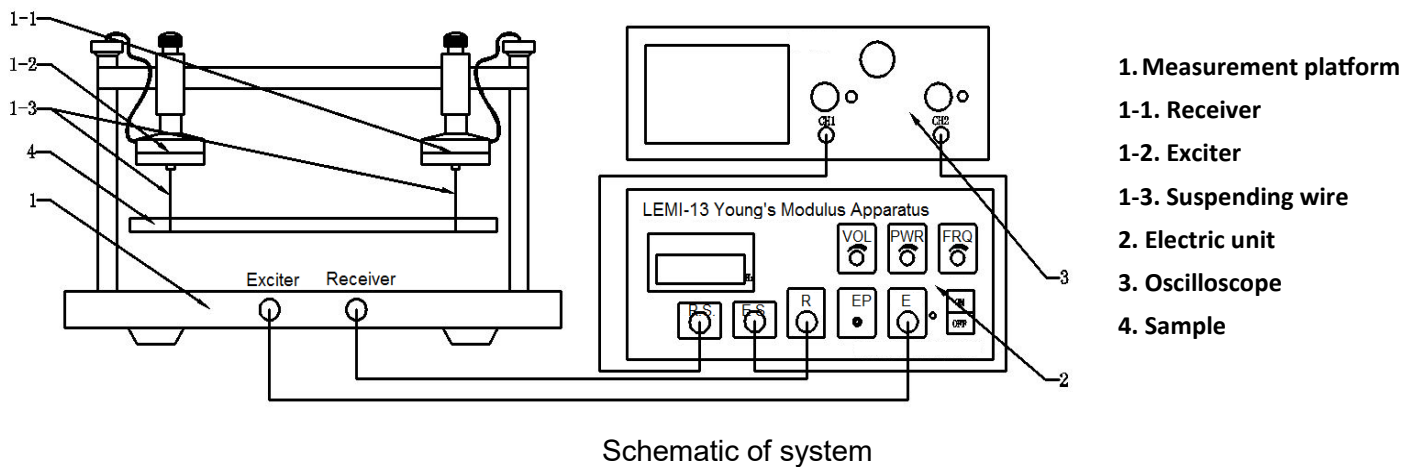
- 1) Learn and master the principle and method of measuring Young’s modulus using dynamic method
- 2) Master the method to observe and determine resonance status using oscilloscope
- 3) Verify resonant node position based on the change of resonant peak
- 4) Enhance the comprehensive ability of students in using physics experimental apparatus

Specifications

Vibration excitation voltage	Range: 0 ~ 5 V
Receiving transducer voltage	Range: 0 ~ 2 V
Signal source output power	600 mW
Frequency	Range: 200 ~ 800 Hz; accuracy: 0.1 Hz
Samples	Copper, steel and aluminum bars

Part List

Name	Qty
Measurement platform	1
Electric unit	1
Aluminum, steel & copper bars	1 each
Wire & cable	1
Instruction manual	1



Note: above product information is subject to change without notice.