

Young's Modulus for a Metallic Rod



General Aim

Determine Young's modulus for a metallic rod.

Method

Bending of beam

Learning Objectives (ILOs)

- Understand the relation between stress and strain.
- Predict the behavior of material undergoing elastic deformation.
- Determine the value of Young's modulus of elasticity.

Theoretical Background/Context

Young's modulus, also known as the elastic modulus, is a measure of the stiffness of a solid material. It is a mechanical property of linear elastic solid materials. It defines the relationship between stress (force per unit area) and strain (proportional deformation) in a material.

$$Y = \frac{\text{Stress}}{\text{strain}} = \frac{\text{Force} / \text{Area}}{\text{Elongation} / \text{Original length}}$$

Principle of Work

A metal beam supported near its ends, is subjected to a load at its center will suffer a depression that can be used using a gauge. Relating the measured depression to the applied load, will enable us to determine Young's modulus of the beam's material.