

ME 391: Measurements and Instrumentation Laboratory
Experiment Title: SM – Strain Measurement

1. Purpose

The student will learn the basic operating principles of strain gauges and the use of the Wheatstone bridge for accurate strain measurement. The experiment uses a cantilever beam (with gauges already attached) and the student will measure and calculate the axial and transverse strains as well as the deflection in the beam. Young's modulus and Poisson's ratio for the beam material will be calculated using experimental data. The student will also gain experience in collecting experimental data via a USB interface.

2. Learning Objectives

- a. Become familiar with the operation of resistive strain gauges.
- b. Understand the use of the Wheatstone bridge.
- c. Measure and calculate the surface strains and deflection of a cantilever beam, given the dimensions and material of the cantilever and the location of the strain gauges.
- d. Connect a strain gauge readout box for quarter-bridge and half-bridge configurations.
- e. Calculate Young's Modulus and Poisson's ratio from experimental data.
- f. Use an oscilloscope for dynamic strain measurements.
- g. Measure resonant frequency and compare to theoretical results.

3. References

Beckwith, *Mechanical Measurements*, 6th ed., Pearson/Prentice Hall, 2007
Student Manual for Strain Technology, Bulletin 309D, Vishay Measurement Group, Inc.

4. Equipment

Cantilever Beam Apparatus	Vishay P3 Strain Gauge Box	Caliper
Oscilloscope	Dial indicator	Flat beam (Alum. 6061-T6)
Set of weights	Ruler	BNC cable
Strain gauges attached to beam	Scale	USB cable
2 jumper wires for P3		

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Hands-On Labs



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Sm-1 Hands-On Labs,2007-02 **Experimental Method and Measurement** S. D. Probert,J. P. Marsden,T. W. Holmes,1971

Sm Experimental Method I M T B Book Review: Unveiling the Magic of Language

In a digital era where connections and knowledge reign supreme, the enchanting power of language has become more apparent than ever. Its ability to stir emotions, provoke thought, and instigate transformation is really remarkable. This extraordinary book, aptly titled "**Sm Experimental Method I M T B**," published by a highly acclaimed author, immerses readers in a captivating exploration of the significance of language and its profound effect on our existence. Throughout this critique, we shall delve into the book's central themes, evaluate its unique writing style, and assess its overall influence on its readership.

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