

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		

Sm Experimental Method I M T B

LM Reder



Sm Experimental Method I M T B:

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

This book delves into Sm Experimental Method I M T B. Sm Experimental Method I M T B is an essential topic that needs to be grasped by everyone, from students and scholars to the general public. The book will furnish comprehensive and in-depth insights into Sm Experimental Method I M T B, encompassing both the fundamentals and more intricate discussions.

1. This book is structured into several chapters, namely:
 - Chapter 1: Introduction to Sm Experimental Method I M T B
 - Chapter 2: Essential Elements of Sm Experimental Method I M T B
 - Chapter 3: Sm Experimental Method I M T B in Everyday Life
 - Chapter 4: Sm Experimental Method I M T B in Specific Contexts
 - Chapter 5: Conclusion
 2. In chapter 1, the author will provide an overview of Sm Experimental Method I M T B. This chapter will explore what Sm Experimental Method I M T B is, why Sm Experimental Method I M T B is vital, and how to effectively learn about Sm Experimental Method I M T B.
 3. In chapter 2, the author will delve into the foundational concepts of Sm Experimental Method I M T B. This chapter will elucidate the essential principles that need to be understood to grasp Sm Experimental Method I M T B in its entirety.
 4. In chapter 3, the author will examine the practical applications of Sm Experimental Method I M T B in daily life. The third chapter will showcase real-world examples of how Sm Experimental Method I M T B can be effectively utilized in everyday scenarios.
 5. In chapter 4, the author will scrutinize the relevance of Sm Experimental Method I M T B in specific contexts. The fourth chapter will explore how Sm Experimental Method I M T B is applied in specialized fields, such as education, business, and technology.
 6. In chapter 5, the author will draw a conclusion about Sm Experimental Method I M T B. The final chapter will summarize the key points that have been discussed throughout the book.
- This book is crafted in an easy-to-understand language and is complemented by engaging illustrations. It is highly recommended for anyone seeking to gain a comprehensive understanding of Sm Experimental Method I M T B.

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