

Iowa State University
Aerospace Engineering

AER E 322 Lab 7
Column Buckling

Matthew Mehrtens, Peter Mikolitis, and Natsuki Oda

March 31, 2023

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Aerospace Structures Laboratory Summary
Lab 7 Column Buckling

Section 4 Group 2

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Spring 2023

1. Introduction

In this lab, we studied column buckling by using the Instron machines to apply a compressive load to five different column specimens. The columns varied in shape/dimensions, material, length, and “end-configuration”. We tested a cylindrical and rectangular aluminum column and three cylindrical steel columns. By varying the properties of the columns, we were able to make connections between the theoretical or calculated material properties and the physical behavior of columns. In doing so, we gained a better insight into static column design and analysis.

2. Objectives

- Accurately predict the force at which the sample will buckle
- Visually observe the column buckling and record the force at which buckling first occurred
- Use the analysis of observations from the lab to design a new column

3. Hypothesis

For the rectangular specimen, we expected the column to buckle about the axis with the lowest moment of inertia, *i.e.*, the axis with the least resistance to bending. We also expected the cylindrical aluminum column and the one-pivot-one-fixed cylindrical steel column to have the least perceptible “jolt” due to their relatively low slenderness ratios.

4. Work Assignments

Refer to Table 1 for the distribution of work during this lab.

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Table 1: Work assignments for AER E 322 Lab 7.

Task	Matthew	Peter	Natsuki
<i>Lab Work</i>			
Data Recording	X	X	X
Exp. Setup	X	X	X
Exp. Work	X	X	X
Exp. Clean-Up	X	X	X
<i>Report</i>			
Introduction	X	X	
Objectives		X	
Hypothesis		X	
Materials			X
Apparatus			X
Procedures			X
Data	X		
Analysis	X	X	X
Conclusion	X	X	
Editing			

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- 5. Materials
- 6. Apparatus
- 7. Procedures
- 8. Data
- 9. Analysis
- 10. Conclusion