

Lab Report Template

MAE 221

Thermodynamics

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TAs:

Princeton University
Mechanical & Aerospace Engineering

MAE 221
Thermodynamics

Lab Report #
Title

Group Members:

Name 1 ID1

Name 2 ID2

Name 3 ID3

Name 4 ID4

Date

Instructor:

TA:

Abstract:

The abstract is a brief statement explaining what you have done, why you have done it, and what major results you have obtained. It should be clear and concise (about 50 – 200 words). It is presented on a separate page following the title page. Having read the abstract, the report should hold no surprises for the reader.

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Nomenclature:

Symbol	Description	[units]
D	Diameter of jet	[m]
ρ	Density	[kg/m ³]

List symbols alphabetically followed by Greek symbols and then subscripts.

Introduction:

The introduction gives the non-specialist reader background on the nature of the work. It explains what the problem is, why you have investigated it, and how you have planned to investigate the problem.

“The first function of the Introduction is to identify immediately and unmistakably the exact subject of the report. What is going to be considered in the report?

A second, and equally important, function of the Introduction is to state clearly the reasons for discussing the particular subject. Just why was the report written? It should indicate the importance of the subject to the reader, relate the report to previous and similar work, and make clear your objective.

A third primary function of the Introduction is to lay out the organization that will be followed in the report. Just how is your subject going to be discussed? Give your readers a look at what lies ahead; furnish them an itinerary.” [1]

Objectives:

This is a brief, summarizing statement of what you aimed to accomplish with your experiment. The objectives can be a separate statement or part of the introduction.

Theory:

The theory presents scientific and mathematical theories used in obtaining your results. Number key equations (in the right margin) so you can refer to them easily. The theory is more than simply a list of equations; there needs to be text to guide the reader in the presentation of theory and equations.

Description of Experiment & Apparatus:

Outlines the scope of the experiments and states what quantities were measured. Briefly describes the test equipment so that the reader knows how the data were obtained. One or more photograph and schematic drawings are usually helpful.

The test apparatus should be described in sufficient detail that someone who has not seen the test can reproduce the apparatus and replicate your measurements.

Procedure:

Briefly outline the procedures followed in carrying out the experiment.

“Describe the test procedures in enough detail that your readers can judge the value of the results and could repeat the experiment.” [1]

Results:

The presentation and discussion of the results is the heart of the technical report.

The purpose of this section is to provide a well-organized and objective presentation of the results. Tables and figures that show the results should have sufficient supporting description to permit the reader to interpret them quickly and accurately. [1]

Be sure each table and figure has:

- a. A title – this should be descriptive (x vs. y is not a good title)
- b. A key, if necessary
- c. Labeled axes with units on figures, labeled columns and rows on a table with units

Discussion:

Discussion shows some depth and imagination in the understanding of the experiment and the subject at large. This section offers an explanation of what the data mean in relation to the problem. If the data are skewed or faulty, reason should be offered to explain this.

Conclusions & Recommendations:

Directly reflects the statement of the problem in the introduction. This section should summarize the main points of interest in the experiment, results and their relation to the objectives. Each conclusion should be one sentence.

References:

Citations are to be correctly ordered and should include authors, title, periodical title or publisher as appropriate, and date of publication. References in the body of the report are numbered in the order they appear. Use ASME style guide for reference.

Appendices:

The reason for using appendices is to provide the reader with essential supporting or supplementary material which, if included in the main body of the report would be confusing or would interrupt the orderly development of the main report. Appendices should be complete enough that the reader can verify the accuracy of the data analysis and presentation, and assess the validity of the error analysis and conclusions.

Appendices may include:

- Sample calculations
- Computer programs
- Lengthy derivations
- Uncertainty analysis
- Raw data

Helpful hints:

- Remember “A picture is worth a 1000 words” . . . a clear figure should speak for itself
- Make use of Equation Editor in presenting equations.
- Theory and equations should flow. Use words, paragraph form to present equations.
- Use proper English in describing the procedure. “Take the reading” is not proper English. It is better to say “Record the water level”.
- Sloppy sketches are not acceptable. It is okay to draw but this is an engineering report so you need engineering drawings or computer generated figures.
- Plots experimental values as symbols, theoretical values as lines
- Digital photography . . . It’s fine if it serves the purpose of clarifying the experiment and adequately describing the apparatus. It must be labeled and clear. It is better to include an engineering drawing / sketch in addition to the photograph.

Mechanical Engineering Citation Style

The following section is from

<https://www.asme.org/shop/proceedings/conference-publications/references>

Text Citation. Within the text, references should be cited in numerical order according to their order of appearance. The numbered reference citation should be enclosed in brackets.

Example: It was shown by Prusa [1] that the width of the plume decreases under these conditions.

In the case of two citations, the numbers should be separated by a comma [1,2]. In the case of more than two references, the numbers should be separated by a dash [5-7].

List of References. References to original sources for cited material should be listed together at the end of the paper; footnotes should not be used for this purpose. References should be arranged in numerical order according to the sequence of citations within the text. Each reference should include the last name of each author followed by his initials.

(1) Reference to journal articles and papers in serial publications should include:

- last name of each author followed by their initials
- year of publication
- full title of the cited article in quotes, title capitalization
- full name of the publication in which it appears
- volume number (if any) in boldface (Do not include the abbreviation, "Vol.")
- issue number (if any) in parentheses (Do not include the abbreviation, "No.")
- inclusive page numbers of the cited article (include "pp.")

(2) Reference to textbooks and monographs should include:

- last name of each author followed by their initials
- year of publication
- full title of the publication in italics
- publisher
- city of publication
- inclusive page numbers of the work being cited (include "pp.")
- chapter number (if any) at the end of the citation following the abbreviation, "Chap."

(3) Reference to individual conference papers, papers in compiled conference proceedings, or any other collection of works by numerous authors should include:

- last name of each author followed by their initials
- year of publication
- full title of the cited paper in quotes, title capitalization
- individual paper number (if any)
- full title of the publication in italics
- initials followed by last name of editors (if any), followed by the abbreviation, "eds."
- publisher
- city of publication
- volume number (if any) in boldface if a single number, include, "Vol." if part of larger identifier (e.g., "PVP-Vol. 254")
- inclusive page numbers of the work being cited (include "pp.")

(4) Reference to theses and technical reports should include:

- last name of each author followed by their initials
- year of publication
- full title in quotes, title capitalization
- report number (if any)
- publisher or institution name, city

Sample References

- [1] Ning, X., and Lovell, M. R., 2002, "On the Sliding Friction Characteristics of Unidirectional Continuous FRP Composites," *ASME J. Tribol.*, **124**(1), pp. 5-13.
- [2] Barnes, M., 2001, "Stresses in Solenoids," *J. Appl. Phys.*, **48**(5), pp. 2000–2008.
- [3] Jones, J., 2000, *Contact Mechanics*, Cambridge University Press, Cambridge, UK, Chap. 6.
- [4] Lee, Y., Korpela, S. A., and Horne, R. N., 1982, "Structure of Multi-Cellular Natural Convection in a Tall Vertical Annulus," *Proc. 7th International Heat Transfer Conference*, U. Grigul et al., eds., Hemisphere, Washington, DC, **2**, pp. 221–226.
- [5] Hashish, M., 2000, "600 MPa Waterjet Technology Development," *High Pressure Technology*, PVP-Vol. **406**, pp. 135-140.
- [6] Watson, D. W., 1997, "Thermodynamic Analysis," ASME Paper No. 97-GT-288.
- [7] Tung, C. Y., 1982, "Evaporative Heat Transfer in the Contact Line of a Mixture," Ph.D. thesis, Rensselaer Polytechnic Institute, Troy, NY.
- [8] Kwon, O. K., and Pletcher, R. H., 1981, "Prediction of the Incompressible Flow Over A Rearward-Facing Step," Technical Report No. HTL-26, CFD-4, Iowa State Univ., Ames, IA.
- [9] Smith, R., 2002, "Conformal Lubricated Contact of Cylindrical Surfaces Involved in a Non-Steady Motion," Ph.D. thesis, <http://www.cas.phys.unm.edu/rsmith/homepage.html>