

MODELING AND USE OF FEM ON STATIC STRUCTURE

A SECOND YEAR PROJECT REPORT

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF B.Sc. IN COMPUTATIONAL MATHEMATICS

BY

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SCHOOL OF SCIENCE
KATHMANDU UNIVERSITY
DHULIKHEL, NEPAL

April, 2022

CERTIFICATION

This project entitled "Modeling and use of FEM on static structure" is carried out under my supervision for the specified entire period satisfactorily, and is hereby certified as a work done by following students

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Dr. Gokul KC

Assistant Professor

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Date: March 29, 2022

APPROVED BY:

I hereby declare that the candidate qualifies to submit this report of the Math Project (MATH-252) to the Department of Mathematics.

Head of the Department

Department of Natural Sciences

School of Science
Kathmandu University
Date: March 29, 2022

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LIST OF SYMBOLS

Your parameters here.

CHAPTER 1

MOTIVATION/INTRODUCTION

1.1 Context/Rationale/Background

In this section, the author(s) shall discuss the historical background related to the work along with the introduction of the topic in brief.

Guidelines for Layout and Format of B.Sc. Computational Mathematics Project Reports

1. Preliminary pages should be numbered: **i, ii, iii, iv, v, vi**, etc. A page number should not be shown on the title page even though it is counted as 1.
2. Margins should be maintained on all pages as follows:
Left margin = **3 cm** (wider for binding)
Top margin = **2 cm**
Right & bottom margins = **2 cm**
3. Page number should be placed at the **bottom, center** or **bottom, right** of page.
4. For labeling of Chapters and Sections follow the systematic order:
 1. Chapter 1
 - 1.1. Section 1
 - 1.1.1. Sub-section 1
 - 1.1.2. Sub-section 2, etc.
 - 1.2. Section 2
 - 1.3. Section 3, etc.
 2. Chapter 2
 3. Chapter 3, etc.
5. Use 1.5 line spacing for all text in the main body of the dissertation.
6. Use Times New Roman, 12 point font size, or Aerial 11 point for text.
7. Label Appendices or Annexes as: A, B, C, etc.; and give name (title) to each.
8. Label figure captions at bottom of the figure and according to the Chapter it appears in such as, Figure 1.1, Figure 1.2, Figure 2.1, Figure 2.2, Figure 3.1, etc.
9. Label table headings at the top of the table and according to the chapter it appears in, similar to the figures, e.g., Table 1.1, Table 1.2, Table 2.2, etc.
10. Cite references in the text of the dissertation according to the convention:
"author's last name (date)" -- in case there is only one author
"last name of first author" and "last name of second author" (date) -- in case of two authors
"last name of first author" *et al.* (date) -- in case of multiple authors

Note: Math/Phy students are to typeset the Dissertation in L^AT_EX₂ε. They can cite the reference in the text in *amspain* format.
11. List references alphabetically and using correct citations for books, journal articles and conference/seminar proceedings as shown in the examples (following pages).
12. If more than one reference of the same author exists then the references with the same author should be listed chronologically according to publishing date (year).
13. If more than one of the same author's publications exist in the same year (date), then use suffixes a, b, c, etc., after the publication year {e.g., 1998a; 1998b; etc.)


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1.1.2 AMS Plain Format for References and Citation in Text

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Online resource in AMS format as in Doe [1]

Proceeding in AMS format is as in Gokul [2]

PhD Dissertation in AMS format is as in Gurung [3].

Book in AMS format is as in Kopka and Daly [4]

Article in AMS format is as in Roy et al. [5].

—

- If your citation of an article/book contains one or two authors, then **cite it writing authors surname**. For example as shown in **Kopka and Daly [4]**.
- If your citation of an article/book contains more than two authors, then **cite it writing first author surname followed by et al.** . For example as shown in **Roy et al. [5]**.

The current use of reference style is **amsplain** in KU M.Phil and PhD Dissertation guideline. The other styles used in **L^AT_EX** package are **abbrv**, **acm**,

alpha, plain, amsalpha, apalike, ieetr, siam, unstr.

1.2 Objectives

1. To set up differential equations with variable boundary conditions.
2. To learn to perform numerals manually and then implement those in a high level programming language
3. To learn about FEM, its variations, and its application to various mechanical problems.
4. Visualization and Project Writing.

1.3 Significance/Scope

In this section, the author(s) shall discuss the relevance and the underlying problems that may rise to the need to do this project/work.

Table 1.1: Name and Notation.

Category	Intuitive meaning	Typical element
<i>Nml</i>	numerals	N
<i>UnOps</i>	unary operators	α
<i>BinOps</i>	binary operators	ω
<i>Ide</i>	identifiers	I
<i>Exp</i>	expressions	E
<i>Cmd</i>	commands	C

1.4 Limitations

In this section, the author(s) should enlist or elaborate the possible limitations of the project or the difficulty foreseeable during the work.



Figure 1.1: Shiva Statue Sangha

CHAPTER 2

METHODOLOGY/MODEL

EQUATION

2.1 Theoretical/Conceptual Framework

In this section, the author(s) should describe the theoretical/mathematical principles behind the whole work relative to the project. The information collected from literature review shall be relevant in this section.

2.2 Model Equation

Your second section of Section 2 of Chapter 2.

2.2.1 Right Aligned Numbering of an Equation

Your first subsection of Section 2 of Chapter 2.

Follow the right aligned numbering of an equation.

$$\rho c \frac{\partial u}{\partial t} = \nabla \cdot (k \nabla u) + \rho_b c_b w_b (u_a - u) + q_m \quad (2.1)$$

2.2.2 Subsection 2

Your second subsection of Section 2 of Chapter 2.

CHAPTER 3

RESULTS AND DISCUSSIONS

3.1 Result1

In this chapter, the author(s) shall present the results and simulations (in the form of numerical data or graphical form) of the theory described in CHAPTER-2 and finally discuss the results.

3.2 Formation of Table in L^AT_EX 2_ε

Table 3.1: Values of parameters at different atmospheric temperatures.

Atm.Temp. T_a °C	$m = M_{max} = (m_b c_b)_{max}$ cal/cm ³ -min °C	$s = S_{max}$ cal/cm ³ -min	$E(\times 10^{-3})$ g/cm ² -min
15	0.003	0.0357	0
23	0.018	0.018	0, 0.48
33	0.0315	0.018	0.48, 0.96

3.2.1 Subsection 1

Your first subsection of Section 2 of Chapter 3.

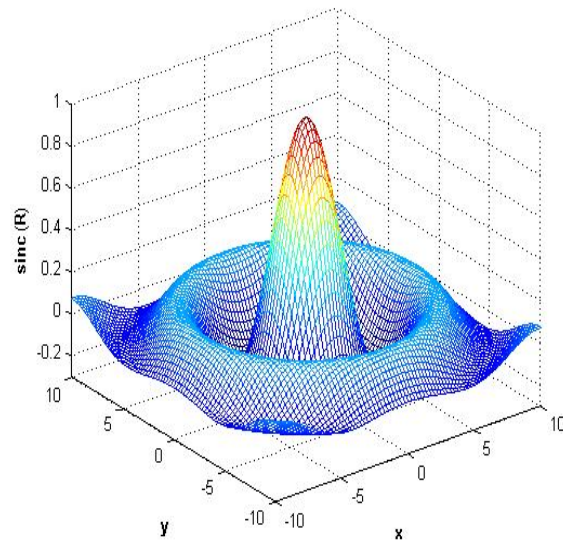


Figure 3.1: Graph of Sinc.

3.2.2 Subsection 2

Your second subsection of Section 2 of Chapter 3.



Figure 3.2: Tulips Flower.

CHAPTER 4

CONCLUSIONS

In this section, the author(s) shall summarize the main points and the results of the work. Include key facts from the background research to help explain your results as needed.

REFERENCES

- [1] R. Doe, *Miktex url*, <http://www.miktex.org>, June 2009.
- [2] K. C. Gokul, D. B. Gurung, and P. R. Adhikary, *Fem approach for one dimensional temperature distribution in the human eye*, Proceedings of National Conference on Mathematics (Kathmandu) (P. R. Adhikary, K. Jha, and C. Bhatta, eds.), Nepal Mathematical Society, 2012, pp. 35–46.
- [3] D. B. Gurung, *Mathematical study of abnormal thermoregulation in human dermal parts*, PhD Dissertation, Kathmandu University, 2008, pp. 1–188.
- [4] H. Kopka and P. W. Daly, *A guide to latex*, Addison-Wesley, Reading, MA, 1999.
- [5] B. Roy, S. K. Roy, and D. B. Gurung, *Holling-Tanner model with Beddington-DeAngelis functional response and time delay introducing harvesting*, Mathematics and Computers in Simulation **142** (2017), 1–14.