

CENTRE FOR INFORMATION TECHNOLOGY AND ENGINEERING

MANONMANIAM SUNDARANAR UNIVERSITY

TIRUNELVELI - 627012

THESIS MANUAL

PREFACE

In this document, we will use the word "thesis" as pertaining to both master's and doctoral works. A thesis (*) must satisfy two sets of criteria: 1) Academic and intellectual requirements assessed by the faculty of the university. 2) A document which embodies intellectual requirements and the original point of view that is proposed. This Manual is mostly concerned with the second aspect of a thesis.

Suggestions to Students: All students must carefully read the content of this Manual before writing their theses. If a student's style of manuscript does not conform to the standards of this Manual, the candidate's Thesis will not be approved by the Head. It is imperative to be consistent in format and style throughout the thesis. Graduate College provides a list of unofficial typists, however, IIT can in no way be held responsible for the quality of work performed or the costs of service rendered by any thesis typist. Every student must consult the Guide for compliance of the thesis format.

If the indicated deadlines are not met, the student's graduation may be delayed until the following semester. A mock pre-submission viva voce will be arranged to help students to avoid unforeseen hurdles in the thesis evaluation and final viva voce examination to be conducted by the external examiner and to provide suggestions otherwise unavailable to students. Throughout this Manual a preliminary draft of a thesis refers to the one prepared for discussion with the Guide which must include samples of items on starred items on page 4 as well as samples of tables, figures and photos. No preliminary draft will be rejected by the Guide; however, the extent of corrections required for an acceptable final draft will vary with the stage of development of the preliminary draft.

(*) "thesis (the'sis)n., pl. -ses (-sez') 1. A proposition as one advanced by a candidate for an academic degree, that is maintained by argument. 2. A dissertation advancing an original point of view as a result of research, especially as a requirement for an academic degree." "dissertation (dis'ar-ta'shan)n. A lengthy and formal treatise or discourse, especially one written by a candidate for the doctoral degree at a university; thesis."

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CHAPTER I

GENERAL INFORMATION

The bound thesis will be placed at the central library; therefore, it is imperative to present the thesis in an acceptable form according to the rules and standards established in this Manual. These standards reflect those of the University Microfilms and Dissertation Abstracts for Ph.D. dissertations; the standards apply to M.Tech. theses as well.

Contents of a Thesis

Every thesis, typed double spaced, must consist of three major divisions:

- Preliminaries,
- Text,
- Supplementary information.

These divisions may in turn be composed of sub-divisions. Each item will be discussed in the following chapters. The divisions must be prepared in the following order (starred items are requested in all cases):

Preliminaries

- * Title page
- * Certificate (GUIDE) and Declaration (candidate)
- Acknowledgments (optional but usually included)
- * Table of Contents
- List of Tables (if thesis contains tables)
- List of Figures/Plates (if thesis contains figures/Plates)
- List of Abbreviations (if thesis contains symbols and abbreviations)
- Abstract

Text

- * Introduction
- * Historical Review or Survey of the Literature
- * Body of the Report
 - Methods and Procedures
 - Results
 - Conclusions
- * Summary (and recommendations for further studies)

Supplementary Information

- Appendix (if thesis requires appendix)
- Vitae (optional)
- * Bibliography

clear copies with sharp, black letters. Subscript, superscripts and special symbols must be large enough to be meaningful (7 points minimum). Clean white papers are to be used with no lines, erasures, corrections or extraneous imperfections visible in the background.

Prior Publications

Depositing of a thesis in the IIT Library constitutes archival publication, which represents an original and previously unpublished work. It is certainly to the student's advantage to publish some of the thesis material in an outside source before the thesis itself is submitted for the degree. The Dean of the Graduate College will entertain a petition from the student endorsed by the research adviser, stating the part of the thesis to be published, the name of the publication and the author's names. This procedure is necessary to protect the student if at some later date the credibility was to be challenged. A reprint of an article (assuming that the permission is granted by the publisher of the article) may appear in the Appendix, and if any part of the article is to appear in the text, a related Bibliography entry and a citation must be provided in the text.

Special Requirements for Ph.D. Candidates

IIT participates in the services offered by University Microfilms in Ann Arbor, Michigan, to doctoral students: (1) your thesis is "published" by being placed on microfilm for subsequent sale to others upon request, and (2) an abstract is printed in Dissertation Abstracts announcing to the public that your thesis is available from University Microfilms.

The Ph.D. student must sign a University Microfilms Agreement Form authorizing them to deposit and publish the thesis, while holding them harmless from any damages which might arise from copyright violations. The original copy of both the thesis and the agreement are sent to University Microfilms. When the original copy of the thesis is returned to IIT, it is bound and becomes the archival library copy.

For publishing in Dissertation Abstracts, the Ph.D. student must provide two copies of an abstract in Dissertation Abstracts form. (One copy is sent with the thesis to University Microfilms, and one copy is kept in the student's file in the Graduate College.) The abstract is separate from the thesis and is expected to give a succinct account of the dissertation, so that a reader can decide whether to read the complete dissertation.

The heading of the Dissertation Abstract must include the following: (1) Title (all capitals), (2) author's name and title, (3) school (Illinois Institute of Technology) and date of graduation, (4) adviser's name. Although 350 words is the maximum length, nearly all abstracts would be shorter. An abstract of this sort contains: (1) statement of the problem, (2) procedure or methods, (3) results and (4) conclusions. The abstract will be published without editing or revision. The copy must be printed on one side of the paper only and must be double-spaced. An abstract never contains footnotes.

CHAPTER II

PRELIMINARY PAGES

The preliminary pages are double-spaced with lower case Roman numeral page numbers. Omit the page number on page i, which is the title page. Throughout the thesis, paragraphs must be indented five spaces from the left margin regardless of the sub-heading indentation; the number of spaces used for indentation must be uniform throughout the thesis. Examples of the preliminaries pages are given at the end of this chapter.

Title Page

Your title will determine how widely the subject matter of the thesis will be disseminated. Academic research is to be shared, and the thesis is a major way of doing this. The Dissertation Abstracts uses an automated keyword retrieval system to index at least 34,000 dissertation titles a year. To make retrieval easier and more accurate, they suggest the following: A) Use words in the title that describe the dissertation content. B) Eliminate words which add little or nothing to an understanding of content, words like : "A Study of ..." "The Origin and Development of ..."

A good title will be less than ten words in length, and a reasonable title should be less than fifteen words in length. Subtitles are to be avoided if possible. The title must be centered on about the sixth double-space from the top edge of the paper. The single word BY must be typed in capital letters and centered on about the thirteenth double-spaced line from the top edge of the paper. The author's full name in capital letters must be centered a double-space below the word BY. A submission statement must be typed, each line centered, beginning on about the twentieth double-spaced line from the top of the paper:

Submitted in partial fulfillment of the
requirements for the degree of
(official name of degree as shown in Graduate Bulletin)
in the Graduate College of the
Illinois Institute of Technology

On about the twenty-sixth double-spaced line from the top of the paper, and beginning at the center of the page, should appear the word "Approved" followed by an underscored line that extends to one inch from the right edge of the paper, and on the next single line must appear the word "Adviser" centered below the underscored line. If there is a co-adviser, then a similar underscored line, double-spaced below the word adviser, the same length as the first underscored line, must be added with the word "Co-adviser" single-spaced and centered below the second underscored line.

In the center of the page at the bottom must appear "Chicago, Illinois." Centered one single-space below must be the month and year of conferring of the degree, e.g., "December 1976" with one inch margin below.

The original copy must bear an original signature of the adviser (and co-adviser) on the title page when it is submitted to the Thesis Examiner for final approval. All other copies of the thesis must bear signatures, but these may be either originals or copies of the original signatures.

Copyright Page

It is optional to copyright a thesis. If the thesis is to be copyrighted, a copyright page (page ii) must be inserted immediately after the title page. (In an uncopied thesis, page ii is blank.) The copyright bears the following double-spaced citation in the center of the page:

© Copyright by

(Full legal name of the author)

(Year of publication)

The inclusion of c within the circle is a mandatory legal requirement. The page number, ii, is centered, one-half inch from the bottom of the page. If the thesis is not to be copyrighted, then this is a completely blank page with no number typed.

Master's students make all arrangements for copyright independently. A doctoral student may arrange for University Microfilms to act as the agent to secure the copyright in the student's name by signing the agreement form in the appropriate place and by submitting a \$35 certified check or money order made out to University Microfilms at the time the thesis is submitted to the Thesis Examiner for final approval. This includes the copyright registration fee plus the cost of two microfilm copies required by the Copyright Office. A student who wishes to copyright a Ph.D. thesis after graduation must make arrangements independent of IIT.

Acknowledgment

An acknowledgment is not a mandatory part of a thesis, but it gives the student, who wishes to, a chance to express appreciation for the receipt of financial support or for contributions of others to the work. It should be simple and sincere; one should not overdo one's expression of gratitude in a thesis. The word ACKNOWLEDGMENT must be centered, in capital letters, at the top of the page. The acknowledgment is indented five spaces as a paragraph a triple space below the heading. The acknowledgment must not

exceed one page in length. The page number iii is centered one-half inch from the bottom of the page.

A thesis does not include a dedication, and material in the nature of a preface should be included at the beginning of Chapter I of the text, not in the acknowledgment.

Table of Contents

The words TABLE OF CONTENTS must appear in capital letters centered on the top line of the page. Triple spaced below the heading at the right margin (one inch from the edge of the paper) the word "Page" must appear. On the next line, the first heading of the Preliminary section appears at the left margin (one and one-half inches from the edge of paper), all in capitals and then followed by a series of periods extending to two spaces before the space immediately below the P in the word "Page." Periods in subsequent lines should be aligned with those in this first line. No period should follow the section titles. The last digit of the column of page numbers should fall under the "e" in the word "Page." The word CHAPTER follows the list of preliminary pages double-spaced and at the left margin. On the next single spaced line the capital Roman numeral I and a period "I." must appear under the letters E and R respectively in CHAPTER. The Chapter titles follow in the third spaces after the periods, with all capitals just as they appear on the pages indicated. CHAPTER I must always be page 1.

Major sections are separated by double spaces above and below them. Sub-headings are indented two additional spaces and are single spaced. If the major heading is more than one line long, it should be continued on the next line, flush with the initial line of the heading. Every chapter title and first order sub-heading title must appear in the Table of Contents exactly as shown on the page indicated. If a sub-heading is more than one line long, then the carry over should be indented two additional spaces. Second or third order sub-headings normally are not included in the Table of Contents.

If the Table of Contents is continued on a second page, then the page break must be between chapters, and the heading is not repeated. The words CHAPTER and "Page" should appear at the top of the second page, and the rest of the page should be spaced like the first page.

List of Tables

If tables are used in the thesis, the words LIST OF TABLES must appear in capital letters on the first page of the list of tables, centered at the top of the typed page. On the first page and on succeeding pages of the List of Tables, the heading and page numbers should be set up in the same way as those in the Table of Contents; the last digit of the column of page numbers should fall under the "e" in the word "Page." The decimal point in the table number should align with "e" in "Table," and the title of the table follows after two spaces. The title in the List of Tables must appear exactly as the title of the table on the page indicated. Only the first letters of principal words are capitalized. Titles are

double-spaced; carry-overs are single-spaced with a two space indentation followed by periods to within two spaces before the space immediately below the P in the word "Page." In the case of a long table, only the page number on which the table began must be given. Tables appearing in the Appendix should be included in the List of Tables.

List of Figures

If illustrations in any form are used in a thesis, such as drawings, graphs, maps, charts, photographs or structural formulae, they should all be identified as figures. The words LIST OF FIGURES must appear in capital letters on the first page of the List of Figures, centered at the top of the typed page. The format is the same as for the List of Tables. The decimal point in the Figure number should align with the "e" in Figure. Figures appearing in the Appendix must be included in the List of Figures.

List of Abbreviations and Symbols

A separate list of abbreviations, symbols and nomenclature (if available) must be given in the preliminary pages. The words LIST OF ABBREVIATIONS (or SYMBOLS AND NOMENCLATURE) must appear in capital letters on the first page of the list centered at the top for the page.

The word "Abbreviations" (or Symbols) must appear triple spaced below the title beginning at the left margin, and the word "Term" should be centered on the same line. Double spaced below appear abbreviations and the respective terms, which are aligned down the page. A definition which is more than one line long is carried over to the next single-spaced line.

If the list of abbreviations exceeds one page in length, then the subsequent pages omit the title but show the same headings for "Abbreviation" and "Term." Commonly accepted abbreviations such as cm and BTU should not be included in the list of abbreviations. If a separate list of abbreviations is not used, then in the text all words should be spelled out the first time the term is used, followed by the abbreviation in parentheses. Subsequently, only the abbreviation without parentheses is used except in the Summary and in the Abstract where the word should be spelled out the first time followed by the abbreviation in parentheses.

Abstract

An abstract is optional, but if used it must be included in the preliminary pages. (This abstract is different from the two separate Ph.D. abstracts required for University Microfilms).

The word ABSTRACT must be centered on the top line of the typed page. The abstract begins on the fourth line with a paragraph indentation of five spaces. Abbreviations in the abstract should be spelled out the first time used, followed by the

abbreviation in parentheses. Subsequently only the abbreviation without parentheses is used. Footnotes are never used in an abstract.

The examples of some of the preliminary pages are given on the following pages.

FUZZY LEAST MEDIAN SQUARE ESTIMATOR
IN POWER SYSTEMS

BY
KEMALA CITA MARWALI

Submitted in partial fulfillment of the
requirements for the degree of
Master of Science in Electrical Engineering
in the Graduate College of the
Illinois Institute of Technology

Approved _____
Adviser

Chicago, Illinois
December 1994

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LIST OF SYMBOLS

Symbol	Definition
β	probability of non-detecting bad data
Δ	denotation of increment/decrement
ε	fraction of contaminated data
λ	detection threshold value
μ	mean value
μ_c	membership function
ν	ordered number of median value in LMS
θ_i	phase angles at bus i
ρ_{ij}	residual of i^{th} measurement while residual of j^{th} measurement is optimal
σ_i	standard deviation of noise for the i^{th} measurement in WLS
σ_r	standard deviation of the LMS estimator
ζ	statistical variable concern (r_{wi}, r_{ni} or J) with mean μ and variance σ^2
B'	P - θ Jacobian constant matrix
B''	Q - V Jacobian constant matrix
C_i	extreme justifiable residual for measurement i
C_i^+	highest justifiable residual for measurement i
C_i^-	lowest justifiable residual for measurement i
$Const$	fit factor in standard dispersion of LMS

CHAPTER III

TEXT CHAPTERS

It may be helpful to review the General Information (Chapter I) for margins, pagination and sub-headings. All text chapters are to be double spaced; additional information for writing text chapters is given as follows.

Symbols, Equations and Formulae

All material must be prepared on computer or typewriter; no hand-drawn or hand-written material will be accepted in the final version of the thesis. It is easiest to begin equations with a uniform small left-hand indentation rather than to attempt to center each one. If the formula or equation is identified by a number, then that number should be typed in on the right hand side of the page, maintaining the standard one inch right margin (see the example on page 25).

Hyphenation

Words divided at the end of the line with a hyphen should be divided between syllables as shown in a dictionary. Such divisions should be avoided if the first syllable is short; also names, numbers, dates and words in headings should not be divided. Uses of hyphens or dashes should be minimized and used only where needed, never as ornamentation.

Punctuation

Excessive punctuation can be obstructive and superfluous: A period should be followed by two spaces except when it is used after an abbreviation within a sentence. An introductory subordinate clause should be followed by a comma. Commonly accepted abbreviations such as cm, gm, sec, should not be followed by periods. Short quotations in the text should be enclosed in quotation marks with the final period, question mark or comma preceding the final quotation mark. Foreign words and titles of books and publications are usually underscored in the text. Underscoring for emphasis may be used, however, overuse may destroy its value in a thesis. Ditto marks should never be used in a thesis.

Numbers

In the text, numbers less than ten should be spelled out. Any number at the beginning of a sentence must be spelled out. Dates, page numbers, section or chapter numbers, figure numbers, table numbers, street and telephone numbers, exact pages, sums of money, compound fractions, decimals, percentages, and units of measure should be given in

figures. A decimal number less than one must be preceded by a zero in front of the decimal point.

Division Headings and Sub-Headings

The major sub-division of the text is called a CHAPTER followed by a Roman numeral in capitals. Each chapter must begin on a new page. The chapter and the chapter number must be centered on the top line of the page. The title of the chapter must be in capital letters and centered a double space below the chapter designation.

Chapter titles should be followed by a triple space before the text paragraph or first order sub-heading. If centered first order sub-headings are used, then they should be placed two double spaces below the text that precedes them and followed by a triple space for the first line of the text that follows. Second and third order sub-headings have the normal double space below the preceding text.

If the chapter title is longer than one line, then the subsequent lines should be single-spaced and arranged in an inverted pyramid style with the lines separated at logical places.

First Order Sub-Headings

The principal sub-headings must start with the left hand margin, typed with initial capitals and underlined or bolded. Subsequent text should start a double space below with a five-space indentation.

Second Order Sub-Headings. A second order sub-heading is indented five spaces. The heading is typed with initial capitals, underlined or bolded, terminated with a period and followed by the text on the same line.

Third Order Sub-Headings. Third order sub-headings should be avoided, however, if used they should be indented ten spaces with initial capitals, underlined or bolded, terminated with a period and followed by the text on the same line.

In the event additional degrees of sub-heading are necessary, then the first order sub-heading titles should be changed to centered headings, typed with initial capitals and underlined. The text must follow three spaces below the centered heading. The subsequent sub-headings must each be moved up one step in the above.

Quotations

It is not advisable to use many or long quotations. A long quotation, arbitrarily defined here as consisting of four or more lines, must be set off from the rest of the text by being single spaced and indented in its entirety three spaces from the left margin and separated from the text both above and below it by a triple space.

There are no quotation marks allowed at the beginning or end, and the work quoted must be faithfully reflected, including original errors in the quote. Short quotations are enclosed in quotation marks and incorporated in the text itself. Every quote must be accompanied by a reference to the source in a footnote or in the Bibliography.

Printed material that is copyrighted must not be quoted without permission of the one who holds the copyright. Permissions must be recorded in the Acknowledgment.

Footnotes

A footnote may serve one of several purposes: it may be a form of bibliographic reference to other authorities; it may be a quote or brief textual item which comments on the thesis author's statements; it may refer to material found elsewhere in the thesis. Any footnote should be brief; long discussions should be incorporated directly in the text. In many fields, footnotes are restricted to literature references or are almost never used.

Position. The last line of the last footnote on each page must be on the last line which is the standard one inch from the bottom edge of the page. Double-space between footnotes, and single-space within a single footnote. Footnotes are separated from the text by a horizontal line one and one-half inches long beginning at the left margin and single-spaced below the last line of text or double-spaced above the top line of the footnote if the page is not full of text. The footnote should be indented the standard five spaces from the left margin. If many individual footnotes are long, or if single superscripts contain several references to the same topic, then separate references in the footnote should be treated as paragraphs, indented five spaces, and single-spaced from margin to margin. The system must be consistently applied throughout the thesis.

Footnote Citation in the Text. This should always be superscript Arabic numerals one-half space above the line of text. (Do not confuse footnotes with literature citations in the Bibliography). In most theses, numbers should begin with number one and proceed consecutively through the entire thesis. Footnotes never use the 1.1, 1.2, 1.3 etc. system. If only a very few footnotes are scattered throughout the text, then asterisks or other standard symbols may be used. Each citation in a footnote must appear on the page containing the citation number in the text.

References. Bibliographic references in footnotes should follow the form and style used in the Bibliography (see the Bibliography in Chapter VII of this Manual). When footnotes are extensive, subsequent footnotes referring to previously cited footnotes can be simplified by using abbreviations. The Latin words are underlined, followed by a comma, and then the page on which the reference is found. If the word is an abbreviation, it is immediately followed by a period before the comma. If only one page is cited, then "p." is used; if several successive pages, "pp." is required. Ibid. means ibidem.

Examples:

¹Adamson, K., “New Design of Diesel Engines in Europe,” Diesel Eng. Appl., Vol. 10, No. 3, pp. 14-20, 1992.

²Ibid., p. 22. (referring to Adamson citation)

³Winkler, H., and G. L. Bowman, Probability Theory, 2nd ed., William Power and Sons, Inc., New York, p. 122, 1995.

⁴Ibid., p. 94. (now referring to Winkler and Bowman)

An example of a text page is given on the following page.

CHAPTER IV

THE LEAST MEDIAN OF SQUARES ESTIMATION

The main problem in a fuzzy LAV state estimator is to determine the residual bounds for objective functions. Similar to other LAV estimators, the fuzzy LAV estimator is sensitive to the value of the initial vector [Shah92].

4.1 Fuzzy Modeling for State Estimation

If we define r_i as the residual moduli measurement i and r_i^{\max} as the largest allowable residual value for this measurement [Zim87], then the relationship between r_i and its membership function is represented by a linear function as

$$L_i = 1 - \frac{r_i}{r_i^{\max}} \quad (4-4)$$

Equation (4-4) can be represented in terms of the membership function as

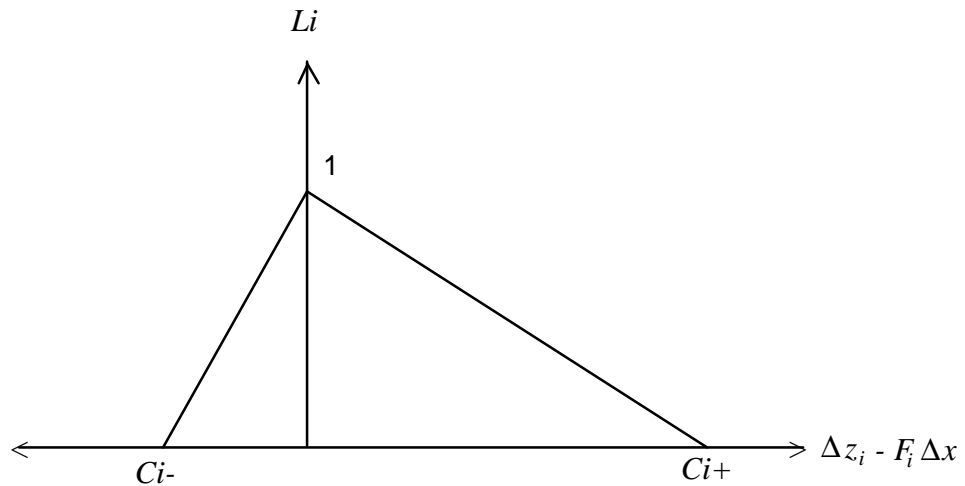


Figure 4.1 Asymmetrical Membership Function of the i^{th} Residual

CHAPTER IV

TABLES

To some extent the height and width of the table will govern where and how it is presented. A small table of less than two-thirds of the vertical page length should be inserted in the text between paragraphs (or at the top of next page) as soon as possible after it is mentioned. Tables up to a full page, either vertical or horizontal, should be inserted on the next numbered page following the page on which they are first cited in the text. Usually tables longer than one page, those containing raw data or those not cited in the text are placed in the Appendix. Tables may also be removed from the text and placed on consecutive pages as one of the last chapters before the Appendix and so identified in the Table of Contents. Tables must not be enclosed in boxes. Tables must be typed and must be on the same kind of paper as the text. In the text, a table should always be referred to by number, for example: "...is shown in Table 26", not "...in the next table".

Titles

All tables should be numbered with Arabic numerals consecutively throughout the entire thesis. Students are also allowed to use decimal points for numbering tables (i.e., Table 5.12, which refers to the twelfth table in Chapter 5). Each table title must be placed at the top of the table beginning with the word "Table" followed by the number, followed by a period and the title of the table. The title of the table must be identical with the title shown in the List of Tables in the preliminaries. Only the first letters of principal words are capitalized. If the full table title is shorter than the width of the page, then it should be centered. If the title is longer than one line, then the word "Table" should be flush with the left margin of the table and the carry-over lines should be single-spaced and indented two spaces to begin under the letter "b" in "Table." No title may extend beyond either the left or right margin of the table or beyond the margins for written text (1 1/2 inches at the bound edge and 1 inch for the other three sides).

A double space should be below the last line of the title followed by a double underline above the heading. A single line separates the headings from the body of the table, and a single line the full width of the table separates the bottom of the table from the legend or footnotes below. If the table is small and on the same page with text, then it must be separated from the text by two double spaces (both above and below it).

Headings and Columns

All headings must be typed either horizontally or vertically as will best suit the headings, but the arrangement should be consistent within a table and from table to table or comparable data. If a wide table uses the page turned ninety degrees, then the headings must be right side up as viewed by the reader from the long loose side edge. However, the

page number on a page that has been turned for a long table remains right side up in the upper right corner in the normal reading position just like numbers on all other text pages.

Only the first word in a heading is capitalized. The units of the identical items in a column (such as feet, cm, gm) must be included in the heading. The data must be understandable from the table alone, although they are interpreted in the text. Uncommon abbreviations in headings should be avoided if possible, but if used, they must be typed to be read in full from the right hand side of the table, or as footnote. The items should be spaced for easy reading. However, single-spacing is desirable for long columns of data. Ditto marks are never used to separate identical items of the same rank. Items should be centered in the area below the headings and must be aligned with right-most digit in each column, except if the numbers contain decimal points or dashes, then the decimal points or the dashes must be aligned regardless of the digits or letters on either side of the period or dashes.

Decimal numbers less than 1.0 should be preceded by a zero (e.g., 0.72 not .72). Decimal numbers should not include more digits than the methods of measurement allow; only the last digit can be subject to error. Note the difference between 2, 2.0 and 2.000000 depending on the accuracy of the measurement.

An example of a table is given as follows:

Table 5.2. Total Residuals for Tested Cases

Case	$\Sigma r_i $ (Fuzzy)	$\Sigma r_i $ (LMS)*
1	9.84	11.11
2	6.94	9.87
3	6.96	9.02
4	failed	failed
5	6.09	8.26
6	24.89	43.02
7	23.37	31.89
8	19.69	27.41
9	23.02	failed
10	22.62	failed
11	21.67	failed
12	22.03	failed

* LMS: Least median of squares

Large Tables

Including large tables which exceed the 6" x 9" area of the permissible text are discouraged. If it is necessary to include large tables in a thesis, one may type the large table on oversized paper and have it photo-reduced to 6" x 9" and mounted on standard thesis paper similar to a photograph. Another method is to use standard typing and continue a large table on successive normal pages. Such pages should begin with the title "Table" followed by the table number, a period and the word (continued) in parentheses, centered over the table. All top and side headings must be repeated on each continued page in the same spacing as on the initial page. A page of a continued table should not have a line at the bottom until the last page of the table is finished.

Alternately the original table, typed on horizontally oversized paper equivalent to the quality of standard thesis paper, may be bound directly in the thesis providing the following items are adhered to. The standard margins must be retained even on the oversized unfolded page: 1 1/2" left margin, 1" on the other three sides. The page number remains in the upper right corner of the folded-open page. Oversized and folded photographic paper is not acceptable in a thesis.

The large page must be laid out and folded to fit the standard page requirements with these precautions. Since the right edge of a thesis is trimmed off in the binding process, the right edge fold of an oversized page must be at least 1/2" from the edge of the normally bound pages (i.e., beginning at the left edge, the first fold must be 8" from the edge). If the table (including margins) is longer than 14 1/2", then a second fold is required at 14 1/2" to avoid catching the folded edge in the binding. No oversized page should exceed 21 1/2" in width.

Long vertical tables are not to be placed on long folded pages; they must be treated as continued tables on consecutive pages.

Footnotes to Tables

Footnotes to tables should be avoided if possible, but if used, they must be indicated by symbols (e.g., *, #, +) rather than numbers to avoid confusion with the tabular data numbers. The symbol should be placed after the first item to which it refers as the table is read from left to right and from top to bottom. Footnotes are placed two spaces below the solid line at the bottom of a table, with the symbol indented five spaces from the left edge of the table and followed immediately in the next space with the first capital letter of the footnote. Footnotes longer than the width of the table should be single-spaced and carry over to the left edge of the table like a paragraph. Subsequent footnotes for a given table are double-spaced below the first footnote in a similar manner. (See the earlier section on footnotes in the text).

Footnotes should be short notes. Extensive descriptions of the experimental methods or equipment used to obtain tabular data should be in the text, not in footnotes. In multiple

tables of similar data, the symbols should be the same for the same footnotes in each respective table.

Computer Printout and Other Machine Data

The quality of printout and paper used by many computers and printers may be acceptable in a thesis. If, however, pages are oversized, have improper margins or poor quality ink intensity, it can be assumed that they will be viewed as unacceptable. The original must be clean and printed in black, or photocopied for mounting similar to photographs (see next chapter). The Thesis Examiner (in consultation with the Dean of the Graduate College) will be the sole judge to the acceptability of the product of such processes. Please consult the Examiner in advance.

CHAPTER V

FIGURES

Figures include all types of illustrative materials such as drawings, curves, graphs, charts, maps or photographs. A figure should not be used just to repeat data in a table or in the text. Students may use figures in the text and include the raw data in tabular form in the Appendix. All figures must be numbered with consecutive Arabic numerals throughout the thesis. Students are also allowed to use decimal points for numbering figures (i.e., Figure 5.12, which refers to the twelfth figure in Chapter 5). A small figure may be inserted in the text between paragraphs shortly after it is mentioned and separated from the text by two double spaces both above and below the figure. Full page figures should be inserted on the next numbered page following the page on which they are first cited in the text. In some theses, figures may be removed from the text and placed on consecutive pages as one of the last chapters before the Appendix and so identified in the Table of Contents. A figure is always referred to by number, e.g., Figure 35. In the text the word figure must be written out, but when used parenthetically, the reference may be abbreviated to: (See Fig. 35). All figures must be kept within the standard margins for text material (1 1/2 inch margin on the bound and 1 inch for the other three sides).

Paper

Color graphs or color photographs are not allowed in doctoral theses. All figures must be produced on the same kind of paper, however, the choice of paper for figures will vary with the manner in which the copies will be made, in the following order of preference:

1. The ideal situation would be to have all original drawings on the same paper as the rest of the thesis.
2. The next preference would be to make originals and photocopy them on thesis paper equivalent to a perfect original drawing. A perfect original may be drawn on a high rag content, unwatermarked, heavy tracing paper such as Keuffel & Esser "Albanene" 100% rag tracing paper (#10-5351 or #10-9351), or paper of similar quality.
3. The original may otherwise be mounted as a photograph on thesis paper (see the next section concerning photographs).

Titles and Arrangement

Each figure title must be placed a double space below the bottom of the figure beginning with the word "Figure" followed by the number, followed by a period and the title of the figure, all with initial capital letters of major words. The title on the figure page

must be identical to the title shown in the List of Figures in the preliminaries. If the full figure title is shorter than the width of the figure, then it must be centered. If the title is longer than one line, then the word "Figure" must be flush with the left margin of the figure, and carry over lines should be single spaced and indented two spaces to begin under the letter "g" in "Figure." No title may extend beyond either the left or right margin of the table or beyond the margins for written text. Titles of similar figures should be consistent in terminology and grammatical form.

A figure may be placed on the page so that it is read in the normal position with the page vertical or with the page turned ninety degrees so that it is read from the long side opposite the binding. In either case, the title is at the bottom of the page as read. The page number remains upright in the upper right corner of the vertical page even when the page is turned for a long figure.

Labels, Lettering and Spacing

Labels or ordinates and abscissas should be placed parallel to the appropriate coordinate in the direction of that coordinate away from the intersection (from the lower left corner). Lettering on figures should be expertly and neatly done. Figures should not be enclosed in boxes; lines on the top and right side should be avoided. The lines should be drawn with black ink and coordinate axes should be heavier than other lines. Excess grid lines or crowded intervals on the axes must be avoided. The inner data must not exceed the maximum interval shown on either axis. The name of the trait represented by the axis should be short, centered and include units in which the trait is measured.

The lines in a figure should be clearly labeled and identified. Colored inks are never allowed in doctoral theses: different lines must be shown by different kinds of black lines made with dots or dashes. Not more than four or five lines should be shown on the same figure. Bars in bar graphs should all be the same width with various degrees of stippling to indicate the various types of data being shown. Single figures with few labels are the easiest to comprehend.

Photographs

Color photographs will not be accepted in doctoral theses. A photograph plus its labels, title, legend and footnotes may never exceed the standard 6" x 9" text area. The page number should always be typed on the mounting page rather than on the photograph. Photographs must be mounted in such a manner that the mounting paper is not wrinkled, the edges and corners must all be securely fastened to the page and the photo paper must be light-weight and flexible so that it will bend as pages are turned. The methods of mounting in order of preference are: 1) The dry mounting tissue process is the most satisfactory. 2) The rubber cement mounting process is allowable. Place rubber cement on the photo and on the mounting page and allow it to dry. Then apply another coat of cement and attach the photograph. A single application of rubber cement often leaves part of the mount loosely attached. Water-based cements (Elmers Glue) are unsatisfactory.

Legends and Footnotes to Figures

When a legend is required, such information should be brief, placed after the title of the figures and ended with a period, so long as it does not violate the standard margins. Footnotes to a figure should follow the directions given for Footnotes to a Table found earlier in this Manual. As a last resort, if the legend is too long to be included on the same page with the figure, then the entire legend should be centered on the numbered page following the figure, and designated as: Legend for Figure 34 (Followed by the legend with the carry-over lines single spaced and indented two spaces). No other text material can appear on such a legend carry-over page.

An example of a figure is given as follows,

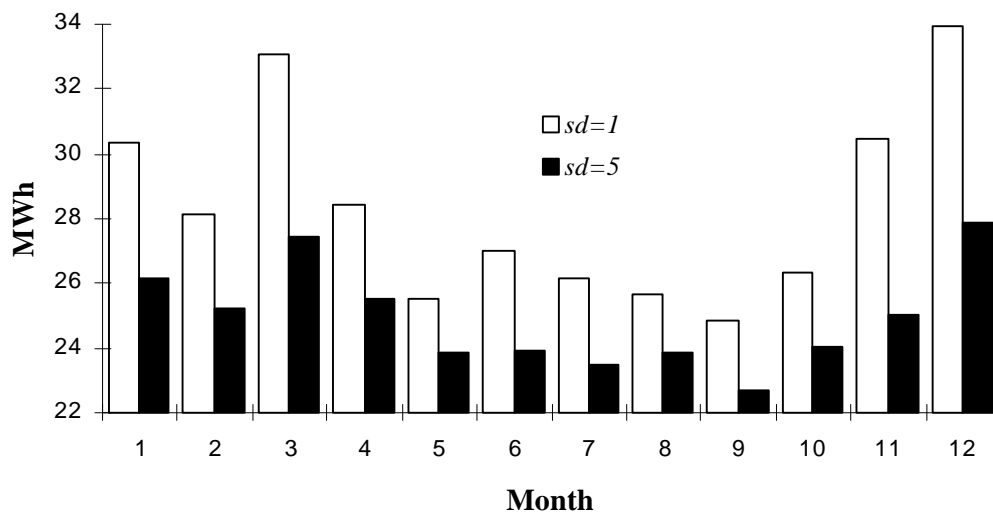


Figure 1. Effect of Battery Capacity on EENS of PV

CHAPTER VI

APPENDIX

An appendix is optional but should be used to present material that is supplementary, but not vital, to the understanding or interpretation of the main thesis. Included here is raw tabular data from which figures in the text were drawn, methods or preliminary preparations, pilot study results or data which might be useful to someone else, questionnaires, letters, copies of forms, proofs of propositions or theorems, descriptions of complex equipment and photographs of displays.

An appendix is introduced with a half-title page (i.e., no chapter number) containing only the page number in the upper right corner and the word "APPENDIX" in capital letters, centered on about the thirteenth double space from the top of the page. If various types of appendix material are included, the sections must be denoted in all capital letters APPENDIX A, APPENDIX B, etc., on each half-title page. Appendix material is not usually assigned a title, but if one section is titled, then all must be, and the titles should be included in the Table of Contents. The standard margins apply to appendices. The presentation should be consistent with the manner of presentation of the text. Complex appendices should be short, single-spaced and condensed to show information content, not to present interpretations or conclusions. Figures are rarely included in an appendix.

Departmental Regulations

Individual departments may include statements regarding their departmental regulations on the preparation of the graduate thesis manuscripts. Such statements may be included in the Appendix. The departmental regulations cannot conflict with the regulations of the IIT Thesis Manual.

CHAPTER VII

BIBLIOGRAPHY

There must be only one bibliography in a thesis. The bibliography must include all references cited in footnotes, text and appendix and should not include uncited references or references unseen by the student unless the work is clearly identified in that way. A bibliography citation identifies the whole work and not just a specific part of an article. (A footnote designates the specific part or page of the whole work listed in the Bibliography). It may be helpful to review the section on footnotes which appears in Chapter III of this Manual.

A reference consists of three main parts: the author's name, the title of the reference and details of publication including the publisher's name and address for a book. In all cases the name of the author should precede the title of the reference. A reference must be complete. Abbreviations such as et al. and ibid. are never used in a bibliography. Each author's name should be retyped in each reference. Ditto marks are never used and a long dash to indicate repetition of an author's name is not permitted.

The Bibliography should begin with the word "BIBLIOGRAPHY" centered on the top of the page followed by a triple space above the first reference. The reference number or author's last name should begin at the left margin 1 1/2" from the edge of the paper. Carry over lines are single-spaced and indented five spaces. If numbered references are used, the periods or parentheses following the numbers should be aligned in the same vertical column, followed by two spaces before the author's last name. Reference citations are separated by double spaces. If the Bibliography is continued on a second page, the division must be between entries; the heading must not be repeated on the second page.

Authors' first names are rarely used unless required to distinguish them from other authors with the same last name and first name initial. If first names are used, they should be used for all authors in that entry. Although some technical journals allow incomplete references, IIT requires complete bibliographic citations: each entry must give the titles of articles in full, the volume and number as well as inclusive page numbers. Titles of books, journals and documents must be underlined. Inclusive pages of chapters or sections from books are to be provided. Abbreviation of the names of journals must be uniform and follow the accepted abbreviations in the student's field. Abbreviations are never permissible in the titles of books or articles. If brackets are used to represent references in the text, then brackets must also be used in the Bibliography. The very first time in Chapter I that the first reference is cited, a footnote should be added on that page. Consider the following example:

We adopt the method presented in [1]* to calculate our results.

* Corresponding to references in the Bibliography

In general, bibliographic references may be cited in the text in several different styles (but all alike in any one thesis). We offer the following styles:

1. References are numbered in alphabetical order in the Bibliography, and referred to by number in the text. This style will cause major problems if references are added during the preparation of the manuscript.
2. A reference with the authors' last names and year will appear in the text as (Smith and Patterson, 1994) and will be listed in alphabetical order in the Bibliography as

Smith, M.P., and Patterson, W.A., Numerical Methods in Large Scale Systems, John Waters and Sons, 3rd ed., pp. 390-431, 1994.

3. An abbreviated last name of the first author and the year of publication may appear in the text. For example, [Joh94] as an entry in the text will appear in the Bibliography as

[Joh94] Johnson, J.K., Labudda, P.C., and Wolf, C.F., "Fuzzy Methods Applied to Electric Power Systems," IEEE Trans. on Power Systems, Vol. 10, No. 5, pp. 34-46, May 1994.

In addition,

- The entries in the Bibliography must be listed in chronological order for multiple entries with the same authors. For example, [Smith78] and [Smith86] in the text are listed in the Bibliography as

[Smith78] Smith, H. W., and Basa, K., 1978...

[Smith86] Smith, H. W., and Basa, K., 1986...

- For the same first author, entries must be listed alphabetically by the second author's last name. For example, [Smith 92] and [Smith 88] in the text are listed in the Bibliography as

[Smith88] Smith, H. W., and Ambrosini, R., 1988...

[Smith92] Smith, H. W., and Basa, K., 1992...

- When a work lacks facts of publication, date or page numbers, you must use: n.p. (for no publisher or no place of publication given), n.d. (for no date of publication), and n.pag. (for no pagination given).
- If you refer to the material by one author who is referring to another source, you should indicate the publication in which you found the material as well as the original source. Such a reference would appear in the text as Jones²³ and then as footnote

²³ William Jones, Lectures on Thesis Preparation, p. 210, as cited by G. C. Coulton, Documentation, Pelican Books, Boston, p. 266, 1957.

In such a case, only Coulton will appear in the Bibliography entry.

- Ordinarily, the Bibliography should not be divided into sections; occasionally subsections containing specialized documents may be used such as "Documentary References," "Legal References" and "Non-print Media."

A set of examples for the Bibliography is given on the following page.

BIBLIOGRAPHY

- [Ada83] Adam, S., Holten, L., and Gjerde, O., "Design of the Measurement System for State Estimation in the Norwegian High-Voltage Transmission Network," IEEE Transactions on Power Apparatus and Systems, Vol. PAS 102, No.12, pp. 3769-3777, Dec. 1983.
- [Abb88a] Abbasy, N., and Mokhtari, S., "Optimal Set of Measurements for Estimation of System States in Large-Scale Networks," Electric Networks and Systems, Vol. 15, pp. 311-332, June 1988.
- [Abb88b] Abbasy, N., and Shah, A., "An Overview of Control Systems Static State Estimation," Proceedings of the 4th International Conference on Advanced Science and Technology, pp. 286-296, Chicago, IL, March, 1988.
- [Abu90] Abuk, Z., "Bad Data Identification Method for Linear State Estimation," IEEE Transactions on Energy Systems, Vol. 8, No. 3, pp. 894-901, Aug. 1990.
- [Abu91] Abuk, Z., and Anderson, M.K., "A Fast Algorithm for the Weighted Least Absolute Value State Estimation," IEEE Transactions on Control Systems, Vol. 46, No. 1, pp. 1-8, Feb. 1991.
- [Bie77] Bieronan, G.J., Factorization Methods for Discrete Sequential Estimation, Academic Press, New York, 1977.
- [Cle89] Clements, K.A., Davis, P.W., and Frey, K.D., "An Efficient Algorithm for Computing the Weighted Least Absolute Value Estimate in Power System Static State Estimation," Proceedings of IFAC Symp. on Power System and Power Plant Control, Seoul, Korea, pp. 371-374, June 1989.
- [Deb72] Deb, K.S., Larsen, P.E., and Haju, L.P., "On-Line Sequential State Estimation in Electric Energy Systems," Presented at the 4th PSCC, Grenoble, France, Paper #3.3/7, May 1972.
- [Zim87] Zimmermann, H.J., Fuzzy Sets, Decision, and Expert Systems, Kluwer, Boston, 1987.

CHAPTER VIII

SUMMARY OF REQUIRED ITEMS

The following list contains those items which must follow the instructions in this Manual:

1. Title page and page ii.
2. The original copy for the library must have an original signature of the adviser(s).
3. Table of Contents page.
4. All chapters must be double spaced.
5. Proper margins on all pages (1.5 inches on the left and one inch on the other three sides).
6. Clear, black, clean copies on acceptable quality bond paper.
7. Consistency in style and format.
8. Pagination and page number locations (0.5 inch below the top of the page and one inch from the right edge).
9. Titles of tables are always at the top of the table; titles of figures are always at the bottom of the figure. Only the first letters of principal words are capitalized.
10. All illustrations are called figures.
11. Paragraphs are indented five spaces. A period in a sentence is followed by two spaces.
12. Section headings are separated from the text by double spaces both above and below them.
13. Second order sub-sections are indented five spaces with text following on the same line. Third order sub-sections are indented ten spaces, etc.
14. Complete references are required and found in the Bibliography located at the very end of the manuscript.