

Preparation of Papers for AIAA Technical Conferences

First A. Author* and Second B. Author*

Business or Academic Affiliation, City, Province, Zipcode, Country

Third C. Author[†]

Another Business or Academic Affiliation, City, Province, Zipcode, Country

These instructions give you guidelines for preparing papers for AIAA Technical Conferences. Use this document as a guide if you are using L^AT_EX 2_ε. Otherwise, use this document as an instruction set. Should this submission be for a non-electronic meeting, the electronic file of your paper will be formatted further at AIAA. Define all symbols used in the abstract. Do not cite references in the abstract. The footnote on the first page should list the Job Title and AIAA Member Grade for each author.

I. Introduction

THIS document is a L^AT_EX template. If you are reading a hardcopy or PDF version of this document, please download the L^AT_EX macros and sample files from www.ctan.org so you can use it to prepare your manuscript. The `aiaa-tc` class uses Computer Modern (CM) fonts, which are part of any standard T_EX installation. Use the L^AT_EX files for formatting purposes, but please see `author_guide.pdf` for specific layout instructions. Authors will first need to save the AIAA files to their working directory or install them into their T_EX distribution.

II. Procedure for Paper Submission

All manuscripts are to be submitted electronically via the AIAA submission tool at www.aiaa.org/author. Select the “Submit a Paper to an AIAA Conference” link, then click the “Edit Old” button. When you submitted your abstract for review, you should have received a tracking number for your paper. Use this tracking number, along with the last name of the corresponding author, to gain access to the AIAA Author Status Page. This site will allow you to track your paper’s status, update submission data, select a copyright statement, and upload your manuscript.

Before you can upload your manuscript, you will need to select a copyright statement to appear on your paper. This can be achieved by clicking the “Copyright Information” link on the Author Status Page. Be sure to read the instructions and specific statements carefully before selecting a statement for your manuscript.

Once you have selected a copyright statement, you can use the “Upload Manuscript” feature of the Author Status Page to upload your paper. All accepted authors will be notified by AIAA of the relevant submission deadlines. In addition, the deadlines for every conference can be found under the conference title on the Author Status Page.

As with the submission of your abstract, be sure the name of the file you upload for processing is short and simple (i.e., “`mnc12345.tex`”) with no spaces, tildes, symbols, or other unusual characters. If the file being uploaded is in L^AT_EX, the document must be based on `article.cls` (this AIAA class is based on this class). Failure to meet these requirements could result in a processing error that would require you to re-upload your manuscript.^a If you encounter difficulties with the upload and/or conversion of your manuscript, please contact AIAA Papers Tech Support for assistance at paper.tech_support@aiaa.org.

*Job Title, Department, Address, and AIAA Member Grade.

[†]Job Title, Department, Address, and AIAA Member Grade.

^aIf you are uploading a PDF or postscript file, please do not include foreign (i.e., non-Roman alphabet) fonts.

III. General Guidelines

The following section outlines general (non-formatting) guidelines to follow, drawn from the original AIAA Manuscript Preparation Kit. These guidelines are applicable to all authors (except as noted), and include information on the policies and practices relevant to the publication of your manuscript.

A. Publication by AIAA

Your manuscript cannot be published by AIAA if:

1. It has been published previously or
2. An appropriate copyright statement has not yet been selected.

B. Paper Review and Visa Considerations

It is the responsibility of the author to obtain any required government or company reviews for their papers in advance of publication. Start early to determine if the reviews are required; this process can take several weeks.

If you plan to attend an AIAA technical conference or professional development course held in the United States and you require a visa for travel, it is incumbent upon you to apply for a visa with the U.S. embassy (consular division) or consulate with ample time for processing. To avoid bureaucratic problems, AIAA strongly suggests that you submit your formal application to U.S. authorities a minimum of 120 days in advance of the date of anticipated travel.

Prospective conference and course attendees requiring a visa to travel to the United States should first contact AIAA to request an official letter of invitation. This letter and a copy of the conference call for papers should be presented along with the required documentation to the U.S. consular officials as part of the formal application process. AIAA cannot directly intervene with the U.S. Department of State, consular offices, or embassies on behalf of individuals applying for visas. A letter of invitation can be requested at www.aiaa.org/visa-info/ or you may contact AIAA Customer Service at custserv@aiaa.org for more information.

C. Tracking Number vs Paper Number

Your paper was assigned a tracking number at the time you submitted your abstract. That number plus the corresponding author's last name is used to access the AIAA Author Status Page. This number is also useful when contacting AIAA technical support regarding submission difficulties. The tracking number is not the final AIAA paper number. Once the abstract is accepted and assigned to the program, an AIAA paper number is created. The paper number, which appears in the format AIAA-YEAR-NNNN, will be used to refer to your paper in the program and in any publication format. Do not include a paper number anywhere on your paper, as this number will be stamped automatically in the top right corner of your paper at the time of processing.

D. Copyright

Before AIAA can print or publish any paper, the copyright information must be completed on the AIAA Web site. Failure to complete the form correctly could result in your paper not being published. The following fields must be completed:

1. Clearance Statement
2. Non-Infringement Statement
3. Publication Status Statement
4. Copyright Assignment Statement

For the Copyright Assignment Statement, select either A, B, C, or D. Be sure to read the copyright statements carefully. If you are not sure which copyright statement to use, contact your legal department; AIAA cannot help you determine which statement to use. A hardcopy of the form is found in the Author Kit for your reference. As you will be completing this form online, you do not need to fill out the hard-copy form. Please do not upload the copyright form with your paper, and do not include a copyright statement anywhere on your paper. The correct statement will be stamped automatically at the time of processing.

E. Submission Deadlines

1. Meetings with Electronic Proceedings

Manuscripts will be accepted for upload to the system from the receipt of the acceptance letter to the beginning of the conference. You will be notified of the specific manuscript submission deadline in your acceptance letter, and the deadline will also be listed on the Author Status Page for your paper. We ask that authors not upload a draft version of their manuscript with the intent to upload a final version later. *PLEASE upload only the final version of your manuscript.*

On-line conference proceedings will be made accessible to attendees who have registered for the "full conference" option two weeks prior to the conference. Please keep that date in mind when preparing and uploading the final manuscript.

To ensure conference quality, session chairs will enforce a "no paper, no podium" rule. This policy states that if your manuscript is not uploaded to the Web site prior to your presentation, you will not be allowed to present the paper at the conference. There are times when the organizers at the conference request an earlier deadline than the beginning of the conference. If such a situation arises, you will be notified in your Author Acceptance Letter.

2. Loose Papers Meetings

The manuscript submission deadline for loose papers meetings is generally six to eight weeks in advance of the event; you will be notified of the specific deadline in your acceptance letter, and the date will also appear on the Author Status Page for your paper. Papers uploaded before the deadline will be reproduced and shipped to the conference by AIAA at no charge.

Authors who miss the electronic submission deadline will be expected to hand-carry 100 copies of their paper to the meeting, and must still upload their final manuscript to the AIAA Web site before the start of the conference for their paper to be published. A general No paper, no podium rule is in effect for all AIAA conferences. If your paper is not submitted to AIAA prior to your presentation, you will not be allowed to present. If you miss the initial deadline, contact your session chair or the conference Technical Chair for further instructions.

F. Color Illustrations

Papers published electronically (online or on CD-ROMs) will be reproduced in color automatically. If your paper is submitted to a loose papers meeting (as specified in the author acceptance letter), color printing can be arranged for an additional charge. Please contact the technical papers specialist for details at bettyg@aiaa.org.

IV. Detailed Formatting Instructions

A. Document Text

The default font for AIAA papers written in L^AT_EX is 10-point Computer Modern (CM).

B. Title, Authors' Names, and Affiliations

The title of your paper should be coded as `\title{Paper Title}`, with capital and lower-case letters, and centered at the top of the page. The names of the authors, business or academic affiliation, city, and state/province should follow on separate lines below the title. The names of authors with the same affiliation can be listed on the same line above their collective affiliation information. The authors' names,

contact information, and affiliation is coded within L^AT_EX’s standard `\author` using `tabular` environment conventions and the `\thanks` and `\and` commands. The affiliation line for each author includes the author’s city, state, and zip/postal code (or city, province, zip/postal code and country, as appropriate). The contact information for each author is given by the `\thanks` command and should include job title, department name, street address/mail stop, and the AIAA member grade. If this information is the same for two or more authors, the subsequent authors should use the `\thanksibid{}` command which requires the number of the duplicate author contact information. Author names are centered, and affiliations are centered and in italic type. The title is created by the `\maketitle` command. For example,

```
\documentclass{aiaa-tc}
\title{Paper Title}
\author{%
  Bil Kleb\thanks{Aerospace Engineer, Aerothermodynamics Branch,
    Mail Stop 408a, Lifetime AIAA member.}
  and Bill Wood\thanksibid{1}\
  {\itseries NASA Langley Research Center, Hampton, Virginia, 23681}
  \and% issues a \end{tabular} followed by a \begin{tabular}{c}
  Someone Else\thanks{Job title, department name, street
    address/mailstop, AIAA member grade.}\
  {\itseries Business or Academic Affiliation, City, State, Zipcode}
}
\begin{document}
\maketitle
```

C. Headings

AIAA Technical Conferences style defines 3 levels of section headings:

Level 1 heading (`\section`): bold, larger font, centered, and numbered with Roman numerals.

Level 2 heading (`\subsection`): bold, flush left, and numbered with capital letters. No opening paragraph indentation.

Level 3 heading (`\subsubsection`): italic, flush left, and numbered with Arabic numbers (e.g., 1, 2, 3). No opening paragraph indentation.

D. Abstract

The abstract should appear at the beginning of your paper. It should be one paragraph long (not an introduction) and complete in itself (no reference numbers). It should indicate subjects dealt with in the paper and state the objectives of the investigation. Newly observed facts and conclusions of the experiment or argument discussed in the paper must be stated in summary form; readers should not have to read the paper to understand the abstract.

E. Footnotes and References

Footnotes, where they appear, should be placed above the 1-inch margin at the bottom of the page. To insert footnotes, use `\footnote{}` as normal. Footnotes are formatted automatically in `aiaa.cls`, but if another medium is used, they should appear in as superscript lower case letters. When adding notes to tables, e.g., as accommodated by the `threeparttable` package, the symbols are down by hand and should be in the sequence, *, †, ‡, §, ¶, ||, **, ††, and so forth. This sequence should beginning anew with each table.

List and number all bibliographical references at the end of the paper. Corresponding superscript numbers are used to cite references in the text using the `\cite{}` command,¹ unless the citation is an integral part of the sentence (e.g., “It is shown in Ref. 2 that... [.]”) or follows a mathematical expression: “ $A_2 + B = C$ (Ref. 3).” For this case, the command, `\citen{}` is used. Multiple citations are sorted and punctuated automatically through the `aiaa-tc`’s use of the `overcite`. Separate reference numbers are shown with commas^{1,2,4} and ranges are separated by an en-dash.^{1,2,3} Reference citations in the text should be in numerical order, which is assured by using BIB_TE_X.

In the reference list, give all authors’ names; do not use “et al.” unless there are six authors or more. Papers that have not been published should be cited as “unpublished”; papers that have been submitted

or accepted for publication should be cited as “submitted for publication.” Private communications and personal Web sites should appear as footnotes rather than in the reference list.

References should be cited according to the standard publication reference style. (For examples, see the “References” section of this template.) This is facilitated by the BibT_EX database and a style file, `aiiaa.bst`. As a rule, all words are capitalized except for articles, conjunctions, and prepositions of four letters or fewer. Names and locations of publishers should be listed; month and year should be included for reports and papers. For papers published in translation journals, please give the English citation first, followed by the original foreign language citation.

F. Images, Figures, and Tables

All artwork, captions, figures, graphs, and tables will be reproduced exactly as submitted. Be sure to position any figures, tables, graphs, or pictures as you want them printed. AIAA is not responsible for incorporating your figures, tables, etc.^b

Place figure captions below all figures; place table titles above the tables.^c If your figure has multiple parts, include the labels “a),” “b),” and so on, below each subfigure and above the figure caption. This can be accomplished with the `subfigure` package. Please verify that the figures and tables you mention in the text actually exist by using L^AT_EX’s `\label` and `\ref` mechanisms and verifying that there are no undefined references during typesetting.

When citing a figure in the text, use “figure” as “Fig., often used to refer to graphics, is an ugly abbreviation and is not worth the two spaces saved.”¹¹ Do not abbreviate “table” either. Each different type of illustration (i.e., figures, tables, or images) should be numbered sequentially with relation to other illustrations of the same type.

Figure axis labels are often a source of confusion. Use words rather than symbols. As in the example to the right, write the quantity “Magnetization” rather than just “M.” Do not enclose units in parenthesis, but rather separate them from the preceding text by commas. Do not label axes only with units. As in figure 1, for example, write “Magnetization, A/m” or “Magnetization, A m-1,” not just “A/m.” Do not label axes with a ratio of quantities and units. For example, write “Temperature, K,” not “Temperature/K.”

Multipliers can be especially confusing. Write “Magnetization, kA/m” or “Magnetization, 103 A/m.” Do not write “Magnetization (A/m) × 1000” because the reader would not then know whether the top axis label in figure 1 meant 16000 A/m or 0.016 A/m. Figure labels must be legible, approximately 8–12 point type. Use of the `psfrag` package can facilitate this, but it makes generating a PDF version of your paper difficult.

Figures and tables are referred to as ‘Floats’ in L^AT_EX, reflecting their floating nature. They are typically numbered whether or not they have a caption and they are floated to the first available position near the first reference to that figure/table within the text. This is accomplished by placing the figure/table environment after their first reference. The environment can even be placed mid-sentence as long as L^AT_EX’s comment character, `%`, is used properly to prevent a paragraph break or extra spaces. By default, floats are placed at the top of the first available page, the bottom of the page, or one a page consisting entirely of floats.

An example of coding a standard `{figure}` is given below:

```
\begin{figure}
\includegraphics{magetic_field}
```

^bCompany logos and identification numbers are not permitted on your illustrations.

^cPlease do not include captions as part of the figure image itself.

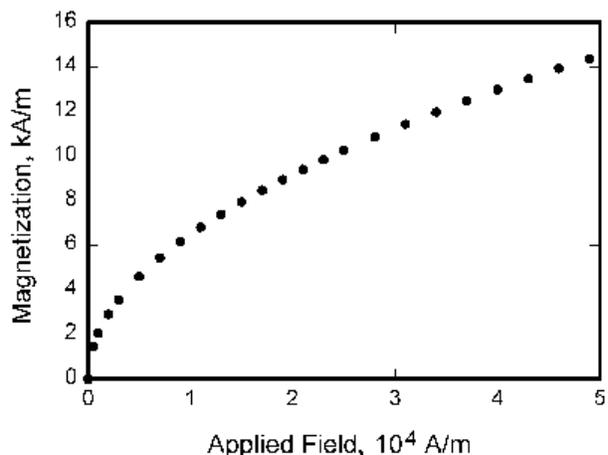


Figure 1. Magnetization as a function of applied field, which has borders so thick that they overwhelm the data and for some reason the ordinate label is rotated 90 degrees to make it difficult to read. This figure also demonstrates the dangers of using a bitmap as opposed to a vector image.

```

\caption{Magnetization as a function of applied field, which has
borders so thick that they overwhelm from the data.}
\label{f:magnetic_field}
\end{figure}

```

Table 1. This is an example of a threeparttable which uses the dcolumn package to allow for columns to be aligned on decimal points.

First head*	Second head	Third head	$V_M(r)$
center	doctor	0.2	10.55
tab	dentist	0.15	33.12
worse	man [†]	10.58	45.10
better	home	43.9	12.34

* This is a table footnote, which to span multiple lines, has been greatly extended in length contrary to reason.

[†] A much shorter table footnote.

Tables with footnotes, such as table 1, can be coded using the threeparttable package as follows:

```

\begin{table}
\begin{center}
\begin{threeparttable}
\caption{This is an example of table caption.}
\label{t:wordtable}
\begin{tabular}{ccdd}
First head\note{a} & & & \\
Second head\note{b} & & & \\
\multicolumn{1}{c}{Third head} & & & \\
\multicolumn{1}{c}{\mathit{V}_M(r)} & & & \\
\hline
Left & Word entries & 0.2 & 10.55 \\
Left & Word entries & 0.15 & 33.12 \\
Left & Word entries & 10.58 & 45.10 \\
Left & Word entries & 43.9 & 12.34 \\
\end{tabular}
\begin{tablenotes}
\item[a] This is a table footnote, which to span multiple lines, has
been greatly extended in length contrary to reason.
\item[b] A much shorter table footnote.
\end{tablenotes}
\end{threeparttable}
\end{center}
\end{table}

```

G. Equations, Numbers, Symbols, and Abbreviations

Equations are centered and numbered consecutively, with equation numbers in parentheses flush right, as in Eq. 1.

$$\int_0^{r_2} F(r, \varphi) dr d\varphi = [\sigma r_2 / (2\mu_0)] \cdot \int_0^\infty \exp(-\rho |z_j - z_i|) \lambda^{-1} \quad (1)$$

Equation 1 is coded as below:

```

\begin{equation}
\label{e:function}
\int_0^{r_2} F(r, \varphi) dr d\varphi =
\left[ \frac{\sigma r_2}{2\mu_0} \right] \cdot
\int_0^\infty \exp(-\rho |z_j - z_i|) \lambda^{-1}
\end{equation}

```

A sample equation is included below, formatted using the preceding instructions. To make your equation more compact, you can use the solidus (/), the exp function, or appropriate exponents. Use parentheses to avoid ambiguities in denominators.

$$\mathbf{J}_i \cdot \Delta \mathbf{x}_{i+1} = -f_i \quad (2)$$

$$F = m\alpha \tag{3}$$

The `fleqnarray` environment is used to display a sequence of equations or inequalities. It is very much like a three-column `array` environment, with consecutive rows separated by `\\` and consecutive items within a row separated by an `&`.

$$\begin{aligned} \sum_{i \in H} p^0 \cdot w^{0i} &= \sum_i M^i(p^0) = \sum_i \left[p^0 \cdot r^i + \sum_j \alpha^{ij} (p^0 \cdot y^{0j}) \right] \\ &= p^0 \cdot \sum_i r^i + p^0 \cdot \sum_i \sum_j \alpha^{ij} \end{aligned} \tag{4}$$

An equation number is placed on every line unless that line has a `\nonumber` command.

Be sure that the symbols in your equation are defined before the equation appears, or immediately following. In this case the `nomencl` package is used to automatically generate the nomenclature section.

Italicize symbols (*T* might refer to temperature, but **T** is the unit Tesla). Refer to “Eq. (1),” not “(1)” or “equation (1)” except at the beginning of a sentence: “Equation (1) is phat.” Equations can be labeled other than “Eq.” should they represent inequalities, matrices, or boundary conditions. If what is represented is really more than one equation, the abbreviation “Eqs.” can be used.

Define abbreviations and acronyms the first time they are used in the text, even after they have already been defined in the abstract. Very common abbreviations such as AIAA, SI, ac, and dc do not have to be defined. Abbreviations that incorporate periods should not have spaces: write “P.R.,” not “P. R.” Delete periods between initials if the abbreviation has three or more initials; e.g., U.N. but ESA. Do not use abbreviations in the title unless they are unavoidable (for instance, “AIAA” in the title of this article).

H. General Grammar and Preferred Usage

Use only one space after periods or colons. Hyphenate complex modifiers: “zero-field-cooled magnetization.” Avoid dangling participles, such as, “Using Eq. (1), the potential was calculated.” [It is not clear who or what used Eq. (1).] Write instead “The potential was calculated using Eq. (1),” or “Using Eq. (1), we calculated the potential.”

Use a zero before decimal points: “0.25,” not “.25.” Use “cm³,” not “cc.” Indicate sample dimensions as “0.1 cm × 0.2 cm,” not “0.1 × 0.2 cm².” The preferred abbreviation for “seconds” is “s,” not “sec.” Do not mix complete spellings and abbreviations of units: use “Wb/m²” or “webers per square meter,” not “webers/m².” When expressing a range of values, write “7 to 9” or “7–9,” not “7 9.”

A parenthetical statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within parenthesis.) In American English, periods and commas are placed within quotation marks, like “this period.” Other punctuation is “outside”! Avoid contractions; for example, write “do not” instead of “don’t.” The serial comma is preferred: “A, B, and C” instead of “A, B and C.”

If you wish, you may write in the first person singular or plural and use the active voice (“I observed that...” or “We observed that...” instead of “It was observed that”). Remember to check spelling. If your native language is not English, please ask a native English-speaking colleague to proofread your paper.

The word “data” is plural, not singular (i.e., “data are,” not “data is”). The subscript for the permeability of vacuum μ_0 is zero, not a lowercase letter “oo.” The term for residual magnetization is “remanence”; the adjective is “remanent”; do not write “remnance” or “remnant.” The word “micrometer” is preferred over “micron” when spelling out this unit of measure. A graph within a graph is an “inset,” not an “insert.” The word “alternatively” is preferred to the word “alternately” (unless you really mean something that alternates). Use the word “whereas” instead of “while” (unless you are referring to simultaneous events). Do not use the word “essentially” to mean “approximately” or “effectively.” Do not use the word “issue” as a euphemism for “problem.” When compositions are not specified, separate chemical symbols by en-dashes; for example, “NiMn” indicates the intermetallic compound Ni_{0.5}Mn_{0.5} whereas “Ni–Mn” indicates an alloy of some composition Ni_{*x*}Mn_{1–*x*}.

Be aware of the different meanings of the homophones “affect” (usually a verb) and “effect” (usually a noun), “complement” and “compliment,” “discreet” and “discrete,” “principal” (e.g., “principal investigator”) and “principle” (e.g., “principle of measurement”). Do not confuse “imply” and “infer.”

Prefixes such as “non,” “sub,” “micro,” “multi,” and “ultra” are not independent words; they should be joined to the words they modify, usually without a hyphen. There is no period after the “et” in the abbreviation “et al.” The abbreviation “i.e.,” means “that is,” and the abbreviation “e.g.,” means “for example” (these abbreviations are not italicized). An excellent source of more detailed style and formatting instructions can be found in the AIAA style guide, *AIAA Style* (available from AIAA upon request).

V. Conclusion

A conclusion section is not required, though it is preferred. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.^d

Appendix

An appendix, if needed, should appear before the acknowledgments. Use the ‘starred’ version of the `\section` commands to avoid section numbering.

Acknowledgments

The preferred spelling of the word “acknowledgment” in American English is without the “e” after the “g.” Avoid expressions such as “One of us (S.B.A.) would like to thank. . . [.]” Instead, write “F. A. Author thanks. . . [.]” Sponsor and financial support acknowledgments are also to be listed in the acknowledgments section.

References

- ¹Sutton, K., “Air Radiation Revisited,” *Thermal Design of Aeroassisted Orbital Transfer Vehicles*, edited by H. F. Nelson, Vol. 96, AIAA, New York, 1985, pp. 419–441.
- ²Miner, E. W. and Lewis, C. H., “Hypersonic Ionizing Air Viscous Shock-Layer Flows over Nonanalytic Blunt Bodies,” Nasa cr-2250, May 1975.
- ³Wirin, W. B., “Space Debris 1989,” *Proceedings of the Thrity-Second Colloquium on the Law of Outer Space*, AIAA, Wahington, DC, 1990, pp. 184–196.
- ⁴Turner, M. J., Martin, H. C., and Leible, R. C., “Further Development and Applications of Stiffness Methods,” *Matrix Methods of Structural Analysis*, Vol. 1, Macmillan, New York, 1st ed., 1964, pp. 203–266.
- ⁵Bhutta, B. A. and Lewis, C. H., “Large-Angle-of-Attack Vicous Hypersonic Flows over Complex Lifting Configurations,” *Journal of Spacecraft and Rockets*, Vol. 27, No. 2, 1990, pp. 194–204, also AIAA Paper 89–0269, Jan. 1989.
- ⁶Blottner, F. G., “Prediction of Electron Density in the Boundary Layer of Entry Vehicles with Ablation,” *The Entry Plasma Sheath and Its Effects*, Vol. 1, Oct. 1970, pp. 219–240.
- ⁷Bhutta, B. A. and Lewis, C. H., “PNS Predictions of External/Internal Hypersonic Flows for NASP Propulsion Applications,” Vra-tr-90-01, VRA, Inc., Blacksburg, VA, June 1990.
- ⁸Bhutta, B. A. and Lewis, C. H., “Aerothermodynamic Performance of 3-D and Bent-Nose RVs Hypersonic Conditions,” Aiaa paper 90-3068, Aug. 1990.
- ⁹Anon., “Equations, Tables, and Charts for Compressible Flow,” Naca rept. 1135, 1953.
- ¹⁰Moss, J. N., private communication, NASA Langley Research Center, Hampton, VA, June 1990.
- ¹¹Tufte, E. R., *The Visual Display of Quantitative Information*, Graphics Press, 1983.
- ¹²Thoman, D. C., *Numerical Solutions of Time Dependent Two Dimensional Flow of a Viscous, Incompressible Fluid Over Stationary and Rotating Cylinders*, Ph.D. thesis, University of Notre Dame, Indiana, Aug. 1966.

^dThe conclusion section is the last section of the paper that should be numbered. The appendix (if present), acknowledgment, and references should be listed without numbers.