



Manuscript Style and Format

AIAA Journals

Please be sure that your revised manuscript conforms with the following instructions, or publication may be delayed. If in doubt, refer to recent issues of any of the AIAA journals for examples of correct format.

Length

AIAA manuscript lengths are based on the number of words in the manuscript, including the abstract, equations, tables, and references. Extra allowance also must be made for figures, particularly when they are numerous. Regardless of its original length, your revised manuscript should be as short as you can reasonably make it while preserving clarity and essential content. Normal limits are as follows:

- a) Full-Length Paper: approximately 10,000–12,000 words.
- b) Technical or Engineering Note: approximately 2500 words.
- c) Technical Comment or Readers' Forum item: approximately 1200 words.
- d) Survey Paper: approximately 18,000–20,000 words.

Please be sure that your manuscript is within the appropriate limit unless a slightly greater length is specifically authorized in the technical editor's instructions to you. If your paper is equation-heavy, 10% should be added to your word count unless the equations are very liberally spaced.

Format and Style

a) General: The entire manuscript, including abstract, nomenclature, footnotes, references, and figure captions, must be 12-point type, DOUBLE SPACED (not 1 1/2 spacing), with 1-in. margins. Please omit section numbers before headings unless you refer frequently to different sections. Make the headings short but informative (specific). Please be sure that each sentence is clear, concise, and unambiguous, and that paragraphs are of reasonable length (neither too short nor too long).

b) Title, Author's Name, Affiliation (also DOUBLE SPACED): The title should appear in upper- and lower-case letters. It must not exceed 12 words and should not include acronyms or abbreviations. A good title usually is six to eight words and is informative. The author's name should follow. Co-authors' names should be on one line if they all have the same affiliation. If they have different affiliations, position each name on a separate line with the author's affiliation below it. Each affiliation line should contain the author's company or institution and city, state, and ZIP code; foreign authors should include country name and mail code (see also item g). Listed authors should be limited to those who have made significant contributions to the paper; others may be thanked in the Acknowledgments section (see item f).

c) Abstract: A Full-Length Paper must have a summary-type abstract of 100 to 200 (maximum) words. Acronyms and abbreviations should not be used. The abstract indicates the objectives of the investigation, the major techniques employed, and the major new results and conclusions, as specifically as space permits. It should not include numerical references. Survey Papers, Notes, Comments, and Readers' Forum items *do not* have abstracts.

d) Nomenclature: Insert between Abstract and Introduction. List the symbols *in alphabetical order* within each of the following

groups: English group first, then Greek, subscripts, and superscripts. Numbers and other symbols should be listed last. A complete nomenclature at the beginning of the paper is preferable to definitions scattered throughout the text. Do not do both. Acronyms should be defined in the text, not in the nomenclature.

e) Introduction: An Introduction that states the purpose of the work and its significance relative to the prior literature is required.

f) Acknowledgments: All acknowledgments should appear in a separate paragraph at the end of the manuscript, preceding the References. Do not use nicknames in this section; full first names or initials are acceptable. Formal titles (Dr., Professor, etc.) are not included.

g) Footnotes: Please limit the use of footnotes—put explanatory material into the text, if possible. If footnotes must be used, position them double spaced at the bottom of the page on which they occur. Use the symbols *, †, ‡, §, ¶, **, ††, etc., rather than numbers. Each author's job title, department, division, complete street address, e-mail address (optional), and AIAA membership grade (if he or she is a member) should be given in a footnote on the first page.

References

All references must be numbered and cited (in numerical order) in the text. Classified or export-restricted references, personal/private communications, and personal Web sites are not permitted. References **MUST** appear DOUBLE SPACED at the end of the manuscript. Please see the Reference Format instructions for proper format and punctuation.

Tables

Plan tables to fit the column width of the journals (3 1/4 in.) or, if necessary, the page width (7 in.). Avoid a format that requires setting the table sideways. Use letters a, b, c (not numerals) to identify table footnotes. Each table must have an Arabic number and a caption (definitive title) at the top. Each table must be cited in the text in numerical order. Do not use border lines or vertical rules between columns, but do use a double rule above and below the main body of the table and a single rule under column headings; see examples in AIAA journals.

Figures

Publication of many manuscripts is delayed because of poor figures, usually because the lettering is inadequate. **ALL LETTERING MUST BE SIZED SO THAT IT WILL BE AT LEAST 8 POINTS HIGH WHEN THE FIGURE IS REDUCED TO COLUMN WIDTH (3 1/4 in.);** avoid variations in lettering size. All lines and graph points must be distinct (not too fine or faint). Coarse background grids for graphs are acceptable. Artwork must not exceed 8 1/2 × 11 in.

Figures should appear within the text, close to where they are cited. Please eliminate all waste space from figures and between the parts of multipart figures. Any figure that must be printed larger than 3 1/4 in. wide by 3 1/2 in. high will count against the maximum word count for your manuscript. You will save valuable

space if a group of similar figures can be presented compactly as one multipart figure by employing common (shared) scales or perhaps multiple scales or overlapping scales. Use judgment to avoid an excessively cluttered appearance, however.

Each figure must have a caption, typically of 3 to 12 words, centered beneath the figure. All figures must be cited in the text in numerical order.

Be sure there are no typographical errors in your line art. Correcting or replacing figures can be costly and time-consuming.

Color illustrations will be printed if they are deemed essential to the interpretation of the data. The costs associated with printing color illustrations must be paid by the author, however. An estimate will be sent at the time of acceptance.

Mathematics

a) Symbology: Keep equations simple, and avoid unusual characters or symbols. AIAA will match symbols used as closely as possible; consult the Journals Department or recent issues of the journals if you have questions about AIAA's composition capabilities. To expedite the editorial and composition process, authors are asked to comply with the following:

- 1) Avoid using under-barred symbols.
- 2) Avoid using multiple dot accents (in excess of two).
- 3) Distinguish between the letter l (ell) and the number 1 (one), and the letter o and zero (0), as well as any other characters that may be misinterpreted.
- 4) In the case of barred variables, it is conventional to use a bar accent ($\bar{}$) for a single variable and a continuous rule ($\overline{}$) for several variables.

b) Nomenclature: A nomenclature list is recommended. If one is used, it must contain all the symbology used in the manuscript, and the definitions should not be repeated in the text. In all cases, identify the symbols used if they are not widely recognized in the profession. Define acronyms in the text, not in the nomenclature.

c) Subscripts and Superscripts: Avoid symbols with layers of subscripts or superscripts. It is better to use several symbols in a subscript rather than several layers, if this type of identification is required (for example, X_{A1} rather than X_{A_1}). The same applies to superscripts. In any case, more than a two-layered sub- or superscript should not be used.

d) Vectors: When there is a distinction to be made between vector and scalar quantities, use boldface type for the vector quantities rather than bars or arrows above the symbol. Boldface type is available for Roman, italic, and Greek typefaces.

e) Italic vs Roman Characters: Use italic type for all variables and constants, with the following exceptions. Set in Roman type: sin, cos, tan, ..., and all similar trigonometric and hyperbolic functions: log for base 10 logarithms; qualities such as min, max, opt, ..., etc.; "d" for derivative; acronyms such as "AIC" for aerodynamics influence coefficients. The "ln" for natural logarithm will be set in script.

Note: When exponential notation is used, the form e^{xyz} is preferred. Use the form $\exp[x2 + (y - 1) - 3 + Z]$ when the exponents of the natural base are unusually long or complicated, i.e., containing fractions, integrals, or sigma summations.

f) Derivatives: A derivative of a quantity can be indicated by either an overdot or prime. The X' is preferred and is available up to the fourth derivative. Single and double overdots are available also.

g) Accents: The seven common mathematical accents can be placed above any italic, Roman, or Greek letter automatically. Accents should not be stacked one over the other. These accents also can be used over German and script letters, but this application is not recommended.

h) Fractions: To keep equations as compact as possible, small fractions are usually "broken down" in solidus (/) form. This is especially true if the equation does not contain integrals or summations. However, do not mix built-up fractions and fractions with a solidus. Fractions with long numerators or denominators (five or more characters) should be left as built-up fractions for readability.

i) Radicals: Radical signs of arbitrary length are available for use over variables (with or without a superscript) and simple fractions. When a radical is needed over an accented or barred variable, a variable with layered superscripts, or a complex fraction (where the numerator or denominator contains a fraction, integral, or sigma summation), the exponential notation $()^{1/2}$ should be used.

j) Multiple-Line Equations: Long equations are broken apart and continued for several lines. The point at which such equations should be broken is best determined by the author so that the breaks fit conveniently with the concept being expressed. A rule of thumb on the amount that will fit on one line in the printed journal is 40 symbols that take horizontal space, counting all regular characters, sub- and superscripts, parentheses, plus and minus signs, etc.

Example:

$$Xa + Yab = a(z^0_2 - 2)2$$

is 15 symbols (0_2 counts as one symbol). Integral and summation signs each count as three symbols. Authors should keep lines of equations 40 symbols wide to ensure that they "break" logically on the printed page. AIAA style requires that the second line of a "broken" equation start with the connective math sign, i.e.,

$$\begin{array}{ccc} A = x + Y(1 - Z) & & A = x + Y(1 - Z) + \\ + \tan(c + d) & \text{NOT} & \tan(c + d) \end{array}$$

Number each equation consecutively in parentheses to the right of the equation or to the right of the *last line* of a "broken" equation. Groups of equations that the author wants to identify with one equation number preferably should be individually numbered 1a, 1b, 1c, etc. The exception is a matrix where the equation number is on the right of the midpoint of the matrix.

k) Matrices: Center matrices vertically about the "main line" or midpoint of each matrix, and separate each row in a matrix with a blank line.