Mission Report for the 2025 LASC

Team <Team Name> - Mission <Mission Name> - #<ID>

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These instructions are based on the guidelines for preparing papers for AIAA Technical Papers. The Latin American Space Challenge is *NOT* an AIAA conference, therefore while this document is copied from the AIAA Journal Article Template/Style Guide, the footer is changed to "The Latin American Space Challenge". Submission procedures and required content of the LASC Mission Report are contained in the *LASC RCSM and SCSM*. Use this document as a template if you are using Microsoft Word 2001 or later for Windows, or Word X or later for Mac OS X. Otherwise, use this document as an instruction set. Define all symbols used in the abstract. Do not cite references in the abstract. The footnote on the first page should list each author's title. Advising Faculty should not be authors.

I. Nomenclature

A	=	amplitude of oscillation
a	=	cylinder diameter
C_p	=	pressure coefficient
Cx	=	force coefficient in the x direction
Cy	=	force coefficient in the y direction
c	=	chord
dt	=	time step
Fx	=	X component of the resultant pressure force acting on the vehicle
Fy	=	Y component of the resultant pressure force acting on the vehicle
f, g	=	generic functions
h	=	height
i	=	time index during navigation
j	=	waypoint index
K	=	trailing-edge (TE) nondimensional angular deflection rate

II. Introduction

This document is a template for Microsoft Word 2001 or later. use it to prepare your manuscript. Authors using Microsoft Word will first need to save this as a .dotx file in the "Templates" directory of their hard drive. To do so, simply open the Tech_Report_Template.dotx file and then click "File>Save As:" to save the template. [Note: Windows users will need to indicate "Save as Type>Document Template (*.dotx)" when asked in the dialogue box; Mac users should save the file in the "My Templates" directory.] To create a new document using this template, use the command "File>New>From Template" (Windows) or "File>Project Gallery>My Templates" (Mac). To create your formatted manuscript, type your own text over sections of the Template, or cut and paste from another document and then use the available markup styles. Note that special formatting such as subscripts, superscripts, and italics may be lost when you copy your text into the template. See Section V for more detailed formatting guidelines.

III. Procedure for the Latin American Space Challenge Mission Report Submission

On or before the date specified in the Integrated Master Schedule prior to the event, teams shall submit a single digital PDF copy of their Mission Report. Mission reports shall be no longer than 50 pages. If exceeding 50 Megabytes in size may need to be uploaded to a cloud server as long as the permissions allow the judges unrestricted access to the document.

IV. General Guidelines and Required Elements

The following section outlines general (non-formatting) guidelines to follow if desired. Mission Reports will contain all elements identified in the LASC RCSM or SCSM documents, which is available for download on the LASC website (https://www.lasc.space/documents). Missing or incomplete elements will result in loss of points. The following required items are provided for quick reference, and teams should consult the RCSM and SCSM for detailed guidance. Teams are permitted to add other technical elements at their discretion. No table of contents is required.

A. Report Body

1) Abstract
2) Introduction
3) System Architecture and Concept of Operations
4) Conclusion and Lessons Learned

B. Required Report Appendices

1) Weights, Measures, And Performance Data
2) Computational Simulation
3) Hazard Analysis
4) Risk Assessment
5) Engineering Drawings
6) Optional Appendix

C. List of References

References are required and must follow the format under "References" at the end of this document.

V.Detailed Formatting Instructions

The styles and formats for the AIAA Papers Template have been incorporated into the structure of this document. If you are using Microsoft Word 2001 or later, please use this template to prepare your manuscript. Regardless of which program you use to prepare your manuscript, please use the formatting instructions contained in this document as a guide.

If you are using this template.dotx file to prepare your manuscript, you can simply type your own text over sections of this document or cut and paste from another document and use the available markup styles. If you choose to cut and paste, select the text from your original Word document and choose Edit>Copy. (Do not select your title and author information, since the document spacing may be affected. It is a simple task to reenter your title and

author information in the template.) Open the template file. Place your cursor in the text area of the template and select Edit>Paste Special. When the Paste Special box opens, choose “unformatted text” or “keep source formatting.” Please note that special formatting (e.g., subscripts, superscripts, italics) may be lost when you copy your text into the template. Use italics for emphasis; do not underline. Use the “Print Layout” feature from the “View” menu bar (View>Print Layout) to see the most accurate representation of how your final paper will appear.

A. Document Text

The default font for the Project Technical Report is Times New Roman, 10-point size. In the electronic template, use the “Text” or “Normal” style from the pull-down menu to format all primary text for your manuscript. The first line of every paragraph should be indented, and all lines should be single-spaced. Default margins are 1” on all sides. In the electronic version of this template, all margins and other formatting is preset. There should be no additional lines between paragraphs.

> Extended quotes, such as this example, are to be used when material being cited is longer than a few sentences, or the standard quotation format is not practical. In this Word template, the appropriate style is “Extended Quote” from the drop-down menu. Extended quotes are to be in Times New Roman, 9-point font, indented 0.4” and full justified.

NOTE: If you are using the electronic template to format your manuscript, the required spacing and formatting will be applied automatically, simply by using the appropriate style designation from the pull-down menu.

B. Headings

The title of your paper should be typed in bold, 24-point type, 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. Author names are centered, and affiliations are centered and in italic type immediately below the author names. The affiliation line for each author is to include that author’s city, state, and zip/postal code (or city, province, zip/postal code and country, as appropriate). The first-page footnotes (lower left-hand side) contain the job title and department name, and street address/mail stop for each author. Author email addresses may be included also.

Major headings (“Heading 1” in the template style list) are bold 11-point font, centered, and numbered with Roman numerals.

Subheadings (“Heading 2” in the template style list) are bold, flush left, and numbered with capital letters.

Sub-Subheadings (“Heading 3” in the template style list) are italic, flush left, and numbered (1. 2. 3. etc.)

C. 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. The abstract should be bold, indented 3 picas (1/2”) on each side, and separated from the rest of the document by - blank lines above and below the abstract text.

D. Nomenclature

Papers with many symbols may benefit from a nomenclature list that defines all symbols with units, inserted between the abstract and the introduction. 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.

E. Footnotes and References

Footnotes, where they appear, should be placed above the 1" margin at the bottom of the page. To insert footnotes into the template, use the Insert>Footnote feature from the main menu as necessary. Numbered footnotes as formatted automatically in the template are acceptable, but superscript symbols are the preferred AIAA style, in the sequence, *, †, ‡, §, ¶, #, **. ††, ‡‡, §§, etc.

List and number all references at the end of the paper. Corresponding bracketed numbers are used to cite references in the text [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 multiple citations, separate reference numbers with commas [4, 5], or use a dash to show a range [6-8]. Reference citations in the text should be in numerical order.

In the reference list, give all authors' names; do not use "et al." unless there are more than 10 authors. 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 website 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). Never edit titles in references to conform to AIAA style of spellings, abbreviations, etc. 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.

Do not insert your tables and figures in text boxes. Figures should have no background, borders, or outlines. In the electronic template, use the "Figure" style from the pull-down formatting menu to type caption text. You may also insert the caption by going to the References menu and choosing Insert Caption. Make sure the label is "Fig.," and type your caption text in the box provided. Captions are bold with a single tab (no hyphen or other character) between the figure number and figure description.

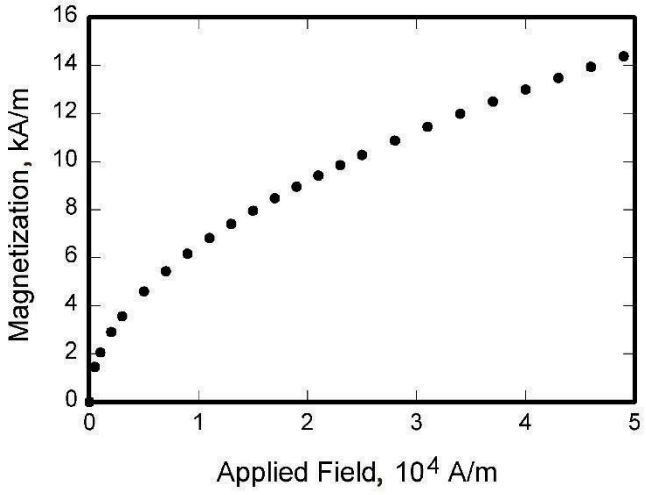

Fig. 1 Magnetization as a function of applied fields.

Place figure captions below all figures; place table titles above the tables. If your figure has multiple parts, include the labels "a)," "b)," etc. below and to the left of each part, above the figure caption. Please verify that the figures and tables you mention in the text actually exist. *Please do not include captions as part of the figures, and do not put captions in separate text boxes linked to the figures*. When citing a figure in the text, use the abbreviation "Fig." except at the beginning of a sentence. Do not abbreviate "Table." Number each different type of illustration (i.e., figures, tables, images) 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 Fig. 1, for example, write "Magnetization, kA/m" not just "kA/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, 10^3 A/m." Do not write "Magnetization (A/m) x 1000" because the reader would not then know whether the top axis label in Fig. 1 meant 16000 A/m or 0.016 A/m. Figure labels must be legible, and all text within figures should be uniform in style and size, no smaller than 8-point type.

G. Equations, Numbers, Symbols, and Abbreviations

Equations are centered and numbered consecutively, with equation numbers in parentheses flush right, as in Eq. (1). Insert a blank line above and below the equation. First use the equation editor to create the equation. If you are using Microsoft Word, use either the Microsoft Equation Editor or the MathType add-on (http://www.mathtype.com) for equations in your paper, use the function (Insert>Object>Create New>Microsoft Equation *or* MathType Equation) to insert it into the document. Please note that "Float over text" should *not* be selected. To insert the equation into the document:

1) Select the "Equation" style from the pull-down formatting menu and hit "tab" once.
2) Insert the equation, hit "tab" again,
3) Enter the equation number in parentheses.

A sample equation is included here, 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.

$$\int_0^{r_2} F(r,\varphi)\,dr\,d\varphi = [\sigma r_2/(2\mu_0)] \cdot \int_0^{\infty} \exp(-\lambda\,|z_j - z_i|)\,\lambda^{-1} J_1(\lambda r_2)\,J_0(\lambda r_i)\,d\lambda \tag{1}$$

Be sure that the symbols in your equation are defined before the equation appears, or immediately following. 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…" 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 "cm^2," not "cc." Indicate sample dimensions as "0.1 cm x 0.2 cm," not "0.1 x 0.2 cm^2." The preferred abbreviation for "seconds" is "s," not "sec." Do not mix complete spellings and abbreviations of units: use "Wb/m^2" or "webers per square meter," not "webers/m^2." 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 “o.” 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_xMn_{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).

VI. Conclusion

A conclusion section is required. 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. *Note that the 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.*

Appendix

Required appendices should appear before the acknowledgments.

Acknowledgments

An Acknowledgments section, if used, **immediately precedes** the References. Sponsorship information and funding data are included here. 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…”

References

The following pages are intended to provide examples of the different reference types. All references should be in 9-point font, with the first line flush left and reference numbers inserted in brackets. You are not required to indicate the type of reference; different types are shown here for illustrative purposes only. The DOI (digital object identifier) should be incorporated in every reference for which it is available (see Ref. 1 sample); for more information on DOIs, visit www.doi.org or www.crossref.org.

Periodicals

[1] Vatistas, G. H., Lin, S., and Kwok, C. K., “Reverse Flow Radius in Vortex Chambers,” *AIAA Journal*, Vol. 24, No. 11, 1986, pp. 1872, 1873.
doi: 10.2514/3.13046

[2] Alyanak, E. J., and Pendleton, E., “Aeroelastic Tailoring and Active Aeroelastic Wing Impact on a Lambda Wing Configuration,” Journal of Aircraft, published online 10 Nov. 2016.
doi: 10.2514/1.C033040

[3] Dornheim, M. A., “Planetary Flight Surge Faces Budget Realities,” *Aviation Week and Space Technology*, Vol. 145, No. 24, 9 Dec. 1996, pp. 44–46.

[4] Terster, W., “NASA Considers Switch to Delta 2,” *Space News*, Vol. 8, No. 2, 13–19 Jan. 1997, pp. 1, 18.

All of the preceding information is required. The journal issue number (“No. 11” in Ref. 1) is preferred, but the month (Nov.) can be substituted if the issue number is not available. Use the complete date for daily and weekly publications. Transactions follow the same style as other journals.

Books

[5] Peyret, R., and Taylor, T. D., *Computational Methods in Fluid Flow*, 2nd ed., Springer-Verlag, New York, 1983, Chaps. 7, 14.
[6] Oates, G. C. (ed.), *Aerothermodynamics of Gas Turbine and Rocket Propulsion*, AIAA Education Series, AIAA, New York, 1984, pp. 19, 136.
[7] Volpe, R., "Techniques for Collision Prevention, Impact Stability, and Force Control by Space Manipulators," *Teleoperation and Robotics in Space*, edited by S. B. Skaar and C. F. Ruoff, Progress in Astronautics and Aeronautics, AIAA, Washington, DC, 1994, pp. 175–212.

Publisher, place, and date of publication are required for all books. No state or country is required for major cities: New York, London, Moscow, etc. A differentiation must always be made between Cambridge, MA, and Cambridge, England, UK. Note that series titles are in Roman type.

Proceedings

[8] Thompson, C. M., "Spacecraft Thermal Control, Design, and Operation," *AIAA Guidance, Navigation, and Control Conference*, CP849, Vol. 1, AIAA, Washington, DC, 1989, pp. 103–115
[9] Chi, Y. (ed.), *Fluid Mechanics Proceedings*, NASA SP-255, 1993.
[10] Morris, J. D., "Convective Heat Transfer in Radially Rotating Ducts," *Proceedings of the Annual Heat Transfer Conference*, edited by B. Corbell, Vol. 1, Inst. of Mechanical Engineering, New York, 1992, pp. 227–234.

Reports, Theses, and Individual Papers

[11] Chapman, G. T., and Tobak, M., "Nonlinear Problems in Flight Dynamics," NASA TM-85940, 1984.
[12] Brandis, A. M., Johnston, C. O., and Cruden, B. A., "Nonequilibrium Radiation for Earth Entry," AIAA Paper 2016-3690, June 2016.
[13] Steger, J. L., Jr., Nietubicz, C. J., and Heavey, J. E., "A General Curvilinear Grid Generation Program for Projectile Configurations," U.S. Army Ballistic Research Lab., Rept. ARBRL-MR03142, Aberdeen Proving Ground, MD, Oct. 1981.
[14] Tseng, K., "Nonlinear Green's Function Method for Transonic Potential Flow," Ph.D. Dissertation, Aeronautics and Astronautics Dept., Boston Univ., Cambridge, MA, 1983.

Government agency reports do not require locations. For reports such as NASA TM-85940, neither insert nor delete dashes; leave them as provided. Place of publication *should* be given, although it is not mandatory, for military and company reports. Always include a city and state for universities. Papers need only the name of the sponsor; neither the sponsor's location nor the conference name and location is required. *Do not confuse proceedings references with conference papers*.

Electronic Publications

Regularly issued electronic journals and other publications are permitted as references. Include the DOI if provided; otherwise provide the full URL. Archived data sets also may be referenced as long as the material is openly accessible, and the repository is committed to archiving the data indefinitely. References to electronic data available only from personal websites or commercial, academic, or government ones where there is no commitment to archiving the data are not permitted in the reference list.

[15] Atkins, C. P., and Scantelbury, J. D., "The Activity Coefficient of Sodium Chloride in a Simulated Pore Solution Environment," *Journal of Corrosion Science and Engineering* [online journal], Vol. 1, No. 1, Paper 2, URL: http://www.cp/umist.ac.uk/JCSE/vol1/vol1.html [retrieved 13 April 1998].
[16] Vickers, A., "10-110 mm/hr Hypodermic Gravity Design A," *Rainfall Simulation Database* [online database], URL: http://www.geog.le.ac.uk/bgrg/lab.htm [retrieved 15 March 2006].

Break website addresses after punctuation, and do not hyphenate at line breaks.

Computer Software

[17] TAPP, Thermochemical and Physical Properties, Software Package, Ver. 1.0, E. S. Microware, Hamilton, OH, 1992.

Include a version number and the company name and location of software packages.

Patents

Patents appear infrequently. Be sure to include the patent number and date.

[18] Scherrer, R., Overholster, D., and Watson, K., Lockheed Corp., Burbank, CA, U.S. Patent Application for a "Vehicle," Docket No. P-01-1532, filed 11 Feb. 1979.

Private Communications and Websites

References to private communications and personal website addresses are not permitted. They may, however, be incorporated into the main text of a manuscript or may appear in footnotes.

Unpublished Papers and Books

Unpublished works can be used as references as long as they are being considered for publication or can be located by the reader (such as papers that are part of an archival collection). If a journal paper or a book is being considered for publication, choose the format that reflects the status of the work (depending upon whether it has been accepted for publication):

[19] Doe, J., "Title of Paper," *Name of Journal* (to be published).

[20] Doe, J., "Title of Chapter," *Name of Book*, edited by…, Publisher's name and location (to be published).

[21] Doe, J., "Title of Work," Name of Archive, Univ. (or organization), City, State, Year (unpublished).

Unpublished works in an archive *must* include the name of the archive and the name and location of the university or other organization where the archive is held. Also include any cataloging information that may be provided.