Sample manuscript for *Physics of Fluids*[a)]

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This is an abstract. It gives the reader an overview of the manuscript. In this sample article we provide instructions on how to prepare and submit your paper to *Physics of Fluids*, a journal published by the American Institute of Physics (AIP). The AIP staff appreciates your effort to adhere to this style when preparing your manuscript.

I. THE MANUSCRIPT

Use this "sample manuscript" as a guide for preparing your article. This will ensure that your submission will be in the required format for peer review and publication. Please read the following manuscript preparation instructions carefully and in their entirety. The manuscript must be in good scientific American English; this is your responsibility. All files MUST be submitted through our online electronic submission system at http://pof.peerx-press.org.

A. Manuscript preparation

Initially upload a single, complete manuscript file with figures and tables, and their captions, embedded in text. The preferred file type is PDF, but a Word document (a 2003 or earlier version please; do not submit a 2007 .docx Word file) or REVTeX/LaTeX files (with the exception of TCILaTeX) are accepted. We prefer PDFs initially for the review process. We only need the .doc or .tex file if the paper is accepted.

Articles must be prepared as either a Microsoft Word .doc file (a 2003 or earlier version please; do not submit a 2007 .docx Word file) or a REVTeX/LaTeX file (with the exception of TCILaTeX). Note that the TeX file must be

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[a)] This is an example of a footnote to the title if the paper was part of a conference: Contributed paper, published as part of the Proceedings of the 17th International Conference on Physics, Anytown, State, May 2010.

[b)] This is an example of a footnote to an author's name: Author to whom correspondence should be addressed. Electronic mail: author@somewhere.org.

[c)] This research was performed while C. Author was at Anywhere National Laboratory, City, State, Postal code, Country.

self-contained, which means no separate style files or BIBTEX files can be used. We encourage you to use the *Physics of Fluids* style file available from the AIP web site at http://www.aip.org/pubservs/compuscript.html. The entire manuscript should be set up for 21.6 × 28 cm (8-1/2 × 11 in. or A4) pages with 2.54 cm (1 in.) margins. Format the manuscript in a 12 point size font, and in a 1.5 or double-spaced, single-column format. The manuscript must begin with a title, names of all authors and their affiliations, and an abstract, followed by the body of the paper (include tables and figures, if any), appendices, if any, and the reference section. Consecutively number all tables (I, II, III, etc.) and figures (1, 2, 3, etc), including those in any appendix. Tables and figures **must** be embedded in the text. Figure captions must be included in the manuscript. Number all pages consecutively, beginning with 1.

B. Manuscript submission

All files MUST be submitted through the online system: http://pof.peerx-press.org. Each version of the manuscript (the original and subsequent revisions) should be submitted with its own complete set of files: a cover letter (indicating the title, authors, and contact information) and a complete article file (see Sec. I A). Separate figure files will be required if the paper is accepted (see Sec. X). **Do not** upload separate figure files until you are requested to do so. When submitting a Letter, the cover letter must also include the justification for accelerated publication. When uploading a revised manuscript, also include a cover letter indicating the changes that have been made and a separate point-by-point response to each referee; do not combine these three documents.

II. MANUSCRIPT LENGTH

There is no length limit for regular articles. The length limit for Letters is four typeset journal pages. Comments and Responses should be held to two typeset journal pages. Errata are limited to one journal page. You can estimate the number of pages by counting three standard manuscript text pages as one typeset page, and four single figures at one column width as one typeset page.

III. TITLE

The title should be as concise as possible but informative enough to facilitate information retrieval. Only the most common acronyms and abbreviations are allowed in the title.

IV. ABSTRACT

Abstracts are required for regular articles and Letters. Comments, Responses, and Errata do not need abstracts. The abstract should contain fewer than 500 words. It must be self-contained, and function both as an index (giving all subjects, major and minor, about which new information is given), and as a concise summary (giving the

conclusions and all results of general interest in the article). The abstract must be one paragraph and *must not contain displayed mathematical equations or tabular material*. Each machine and computer code mentioned in the abstract should be given a general reference. Use the complete citation, not just the reference number, when citing references in the abstract. AIP journals do not require PACs numbers.

V. AUTHORS' NAMES AND ADDRESSES

Authors' names should preferably be written in a standard form for all publications to facilitate indexing and to avoid ambiguities. Include the names and postal addresses of all institutions, followed by city, state, zip code, and USA if in the United States or by postal code, city, and country if not in the U.S. Please provide complete address(es). See the byline of this sample article for examples.

Authors with Chinese, Japanese, or Korean names may choose to have their names published in their own languages alongside the English versions of their names in the author list of their publications. For Chinese, authors may use either Simplified or Traditional characters. Chinese, Japanese, or Korean characters must be included within the author list of the manuscript when submitting or resubmitting. If this capability is used, the manuscript must be prepared using Microsoft Word or the CJK LaTeX package. Specific guidelines for each authoring tool are given at http://www.aip.org/pubservs/cjk_instructions.html.

VI. FOOTNOTES

Footnotes are generally unacceptable in AIP journals, with the exception of footnotes to the title or authors. All other information should be included in the reference section. Use a), b), c), etc., for footnotes to the title or authors. The following list shows some examples:

[a)]Contributed paper, published as part of the Proceedings of the 17th International Conference on Physics, Anytown, State, May, 2010. (footnote to title)

[b)]Author to whom correspondence should be addressed. Electronic mail: author@somewhere.org.

[c)]This research was performed while C. Author was at Anywhere National Laboratory, City, State, Postal code, Country.

VII. HEADINGS

Headings are mandatory in regular articles, but are not used in Letters, Comments, Responses, or Errata. Maintain a consistent heading style within the article. The following list shows the four different levels and the style for each heading:

I. PRINCIPAL HEADING

A. First subheading

1. Second subheading

a. Third subheading

VIII. EQUATIONS

Equations should be punctuated and aligned to bring out their structure and numbered on the right in parentheses. Mathematical operation signs indicating continuity of the expression should be placed at the left of the second and succeeding lines. Use (×) rather than a centered dot for multiplication, except for scalar products of vectors. Use a solidus (/) instead of built-up fractions in running text, and in display wherever clarity would not be jeopardized. Use "exp" for complicated exponents.

$$I_D\ \theta\ = \frac{a}{2} + \sum_{n+1}^{2} \cos 2n\theta + \sin 2n\theta\ . \tag{1}$$

$$B_i = \begin{pmatrix} 1 & 2 & \cdots & N \\ B_i\ 1 & B_i\ 2 & \cdots & B_i\ N \end{pmatrix}, \tag{2}$$

$$\begin{aligned} \left\langle \Phi_1 \middle| \hat{H} \middle| \Phi_2 \right\rangle &= \left\langle \Phi_1 \middle| \hat{V}_{IJ} \middle| \Phi_2 \right\rangle \\ &= \int d\mathbf{r}_1 \int d\mathbf{r}_2 \frac{\rho_J^{eg}(\mathbf{r}_1)\rho_I^{eg}(\mathbf{r}_2)}{r_{12}} \equiv V_{\text{Coul}}\ , \end{aligned} \tag{3}$$

$$c \left(r \right) = \exp\left(\frac{-E_d}{k_B T} \right). \tag{4}$$

If use of Word 2007 is unavoidable, back-save from the ".docx" to the ".doc" format. However, please note that you must use MathType or the Equation Editor 3.0 and **not** Microsoft Math Editor. When equations built with Microsoft's Editor are back-saved, they are converted to low-resolution graphics and are not usable.

Equation numbering

Equations are numbered consecutively through the entire paper as simply (1), (2), (3).... In appendices, the numbering starts over as (A1), (A2), (A3). If there is more than one appendix, use (A1), (A2), etc. for equations in Appendix A and (B1), (B2), etc., for equations in Appendix B.

When a numbered equation has more than one part and that (those) part(s) consecutively follow, then they are indicated as follows:

(21)
(22a)
(22b)
(22c)

If, however, they do not follow consecutively, primes are used:

(21)
(22a)
(22b)
(21')
(21")

IX. ACRONYMS AND NOTATION

Acronyms, except for the most common (such as 2D, rms, or ac) must be spelled out when they first appear both in the abstract and again in the text. Spell out machine names, except for those not considered acronyms (such as ITER or DIII-D). Try to avoid the excessive use of acronyms or specialized jargon.

Notation must be legible, clear, compact, and consistent with standard usage. Choose commonly used symbols from your discipline. All unusual symbols whose identity may not be obvious must be identified the first time they appear, and at all subsequent times when confusion might arise. Superscripts are normally set directly over subscripts; authors should note where readability or the meaning requires a special order.

X. FIGURES

Cite figures in text in numerical order of publication-ready illustrations. Once the paper has been accepted (but not until then) you will need to produce a separate file for each figure. It is vital that you prepare your illustrations so that they are legible when reduced. Figures 1–6 show examples of various types of production-ready illustrations: color, line art, halftone, and combination (line art and halftone). Table I gives (a) general guidelines for preparing your illustrations and (b) guidelines for the preparation of electronic files.

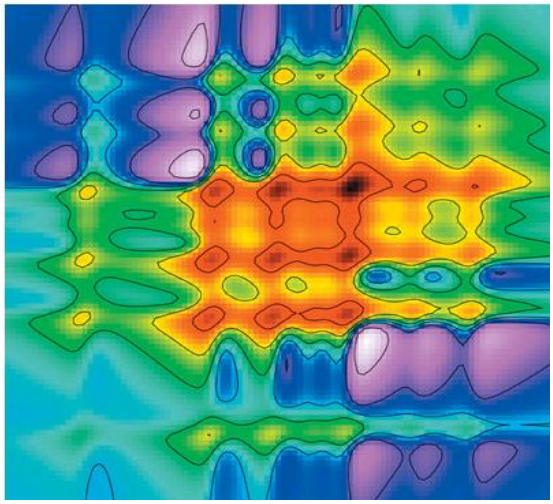

FIG. 1. (Color) This figure will appear in color in print and online. Figures should be created at 300 dpi and submitted at 300 dpi for the best presentation. Choose CMYK (cyan, magenta, yellow, black) for any figure that will appear in color in the print version. You may refer to colors by name in the caption and in the text when referring to this figure.

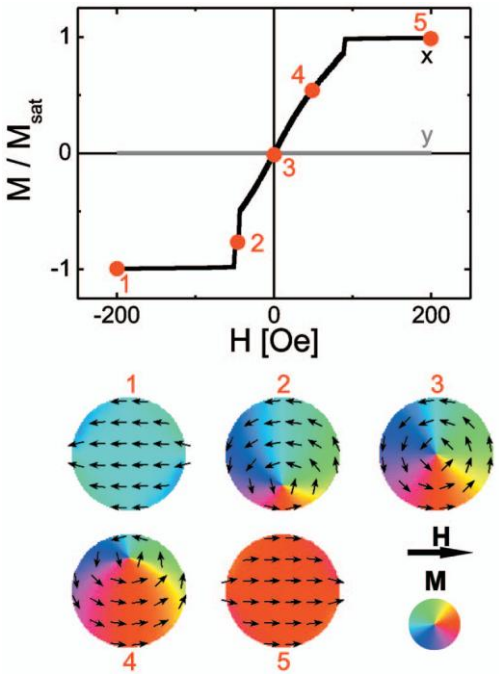

FIG. 2. (Color online) This figure will appear in color only in the online version only, not in the printed version. Figures should be created at 300 dpi and submitted at 300 dpi for the best presentation. Choose RGB (red, green, blue) for any figure that will appear in color only online. You may NOT use the names of colors alone in the caption or text when referring to this figure, but you may include them as parenthetical material: "the lightest area (yellow online) … the darkest area (blue online)."

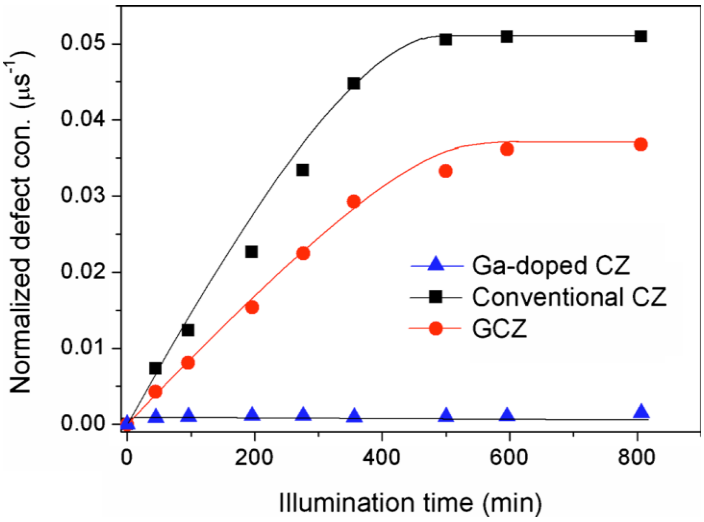

FIG. 3. This is a good example of information that is presented clearly. In the printed journal if this figure appears in black and white, the reader will be able to discern the "blue" triangles, the "red" circles, and the closed "black" squares. A description as well as the color is needed. If the caption simply discusses "the red and blue symbols," the reader of the print version would not understand because he/she would be seeing the figure without the color. **[Note: Mention of color alone is only allowed if the figure is printed in color in the journal.** The description could read: "triangle (blue online).]

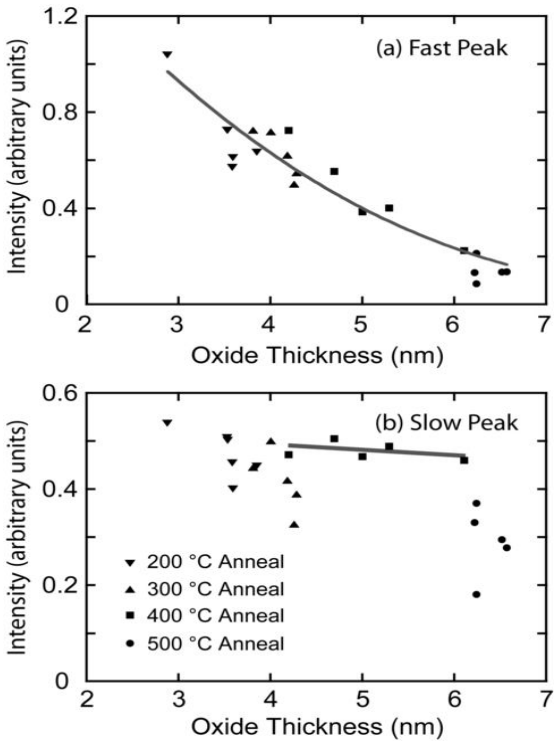

FIG. 4. This is an example of line art. Figures should be created at 600 dpi and submitted at 600 dpi for the best presentation. Save line art as black/white bitmap, not grayscale.

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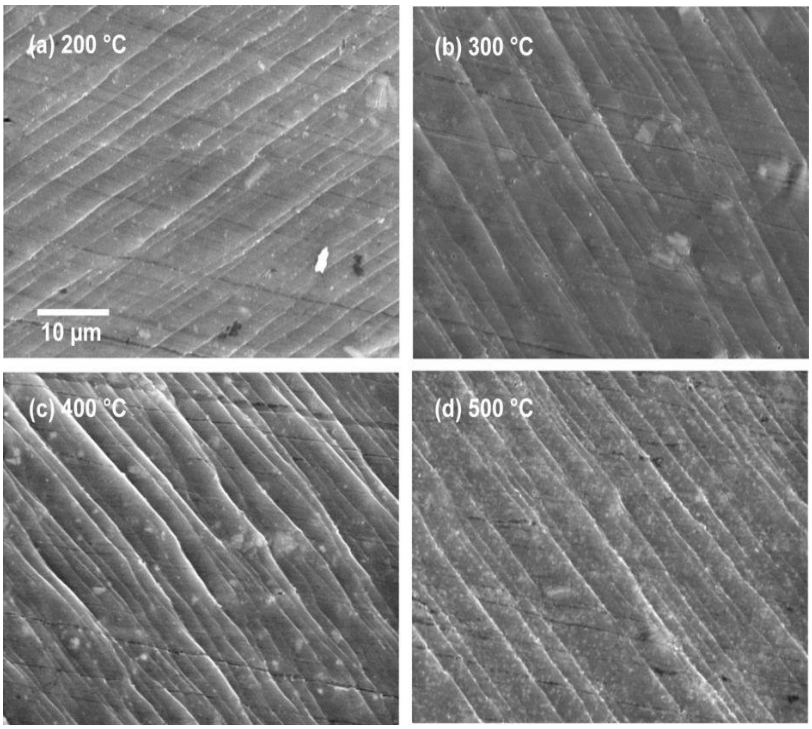

FIG. 5. This is an example of a halftone. Figures should be created at 300 dpi and submitted at 300 dpi for the best presentation.

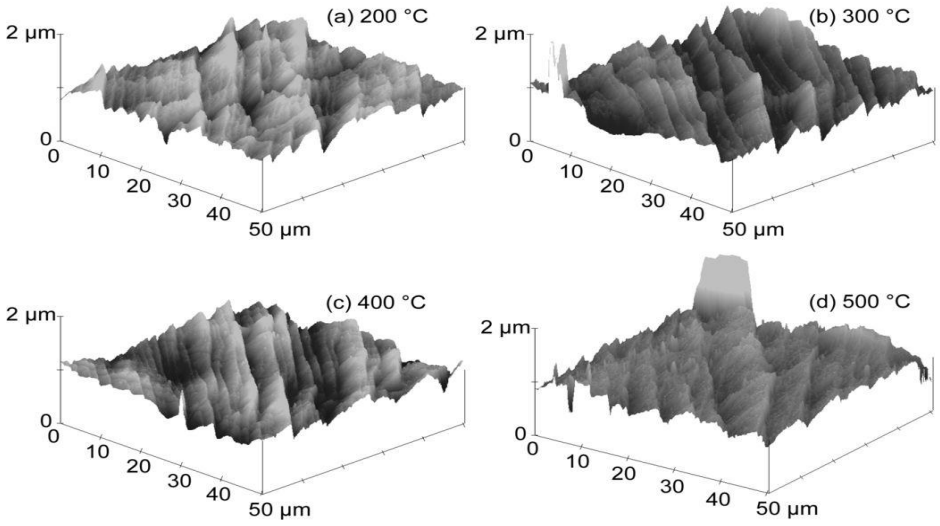

FIG. 6. This is an example of a combination figure (line art and halftone). Figures should be created at 600 dpi and submitted at 600 dpi for the best presentation. Note that figure parts are labeled as (a), (b), (c), etc, but are included as part of the same figure file. (See Table I.)

TABLE I. This table provides instructions on how to prepare figures.

(a) General guidelines for preparing illustrations

- Number figures in the order in which they appear in the text.
- Label all figure parts with (a), (b), etc. Each figure file should contain all parts of the figure. For example, if Fig.1 contains three parts [(a), (b), and (c)], then all parts should be combined in a single file for Fig. 1.
- Avoid any large disparity in size of lettering and labels used within one illustration.
- Prepare illustrations in the final published size, not oversized. The maximum published width for a one-column illustration is 8.5 cm (3-3/8 in.). The maximum width for a two-column figure is 17 cm (7.0 in.).
- In cases where reduction is required, avoid small open symbols that tend to fill in and avoid small lettering. Ensure that, in the final published illustration, there is a minimum of 8-point type size (2.8 mm high; 1/8 in. high) for lettering and 0.5-point width for lines.
- Ensure that lettering and lines are dark enough, and thick enough, to reproduce clearly. Remember that fine lines tend to disappear upon reduction.
- It is essential that authors embed figures and captions in the manuscript file. Embed the figures in the approximate position and size you think is appropriate. **In addition, separate figure files must be provided (see below for accepted file formats) along with the manuscript once the paper is accepted.**

(b) Guidelines for preparation of electronic graphics files

- Acceptable formats for figures: Portable Document Files (PDF), Encapsulated PostScript Files (EPS), PostScript, or Tagged Image File format (TIF). Microsoft Word (.doc or .docx) or JPEG (.jpg) files are **not** acceptable.
- More detailed information is given about figure preparation on the PHF website in the Information for Contributors tab.
- Settings: Set the graphic for 600 dpi resolution for line art, 300 dpi for halftones, and 600 dpi for combinations (line art + halftone).
- The maximum published width for a one-column illustration is 3-3/8 inch (8.5 cm). Each illustration should be prepared for 100% reproduction in order to avoid problems arising from large reductions in size.
- Save line art as black/white bitmap, not grayscale.
- Save halftones and combinations as grayscale, not black/white bitmap.
- Gray scale and color online figures are free of charge. Click here for publication charge information.
- Submit color files at 300 dpi in one of the accepted file formats: PDF, EPS, PS, or TIF. No other type of color illustration is acceptable. When selecting a file mode, for print choose CMYK (cyan, magenta, yellow, black) and for color online choose RGB (red, green, blue).
- All fonts must be embedded in the figure files.
- PDF files should be vector files.
- In the PDF illustration, resolution of any shaded or photographic images must be 600 pixels per inch (PPI).
- Within the PDF illustration, resolution of line art with no shading should be 1200 pixels per inch (PPI).
- Select "High Quality Print" when creating a PDF through the application's print command.
- The author is responsible for obtaining permissions to reuse previously published material. Full credit lines are needed for figures that are used with permission. A typical example of a full credit line is: From J. Brown, The Best Book in the World, 4th edition. Copyright ©2000 by Superior Publisher Inc. Reprinted with permission from [FULL CITATION}. Copyright [PUBLICATION YEAR], American Institute of Physics." Full citation format is as follows: Author names, journal title, Vol. #, Issue #, Page # (or CID#), Year of publication. If you need help acquiring permissions from another publisher, use this form [CLICK HERE]

XI. TABLES

Separate tables (numbered with Roman numerals in the order of their appearance in the text) should be used for all tabular material. Tables must be embedded in the article file, not uploaded like figure files. The structure should be clear. Use simple column headings and include units of measure. Table captions are positioned above the table and should be styled as "TABLE I. This is a table caption." A caption should make its table intelligible without reference to the text. Capitalize the first word in the table headings and subheadings. References within tables are designated by lowercase Roman letter superscripts and given at the end of the table. Unaltered computer output and notation should be uploaded as supplemental files. See Table II for an example of correct table styling.

TABLE II. Bond distances for alkene molecules (atomic units).

No. C[a]	*RI*,*I*+1[b]	*SRI*,*I*+1[c]	*RI*−1,*I*+*RI*,*I*+1	*SRI*−1,*I*+*RI*,*I*+1
2	2.5255	…	…	…
4	2.6175	0.123	5.306	…
6	2.6314	0.0999	5.3025	0.0112
8	2.6368	0.0876	5.3009	0.0111
10	2.6396	0.0795	5.2999	0.0106
14	2.6424	0.0689	5.2989	0.0096
18	2.6437	0.0623	5.2982	0.0088
22	2.6443	0.0573	5.2973	0.008
26	2.6448	0.0536	5.2968	0.0074

[a]C is the number of carbon atoms.

[b]*RI*,*I*+1 is the distance between two neighboring carbon atoms, while ‹*RI*,*I*+1› is the average of *RI*,*I*+1 for a given molecule.

[c]*SRI*,*I*+1 is the standard deviation of *RI*,*I*+1 within the given molecule.

XII. MULTIMEDIA SUBMISSIONS

Multimedia files can be included in the online version of published papers. All such files are peer reviewed. When published, these files can be viewed by clicking on a link from the figure caption, provided that the reader has a video player installed, such as Windows Media PlayerTM, Quick Time PlayerTM, or RealOne PlayerTM. Please see Information for Contributors on our website. Click on Multimedia. Please note this important information when preparing your manuscript:

- Treat all multimedia files as figures, numbered in sequence as they are referred to in text. (Multimedia files will **not** have a numbering scheme separate from the figures.) For each multimedia file, provide a figure, which is a

static representation of the multimedia file. Also provide an accompanying caption. At the end of the caption, include the phrase "(enhanced online)."

- All multimedia files must be cited in the text, referred to by their figure number.
- Note: If there's no associated figure, a multimedia file can also be stored as supplemental material, to be linked to from a reference (see Sec. XIII).

XIII. SUPPLEMENTAL MATERIAL

Text material that may not be of interest to all readers, such as long data tables, multimedia, and computer programs, may be deposited as supplementary materials. Information about depositing supplemental material may be found at the journal's Information for Contributors section on the website.

ACKNOWLEDGMENTS

Typically, standard acknowledgments include financial support and technical assistance, and may include dedications, memorials, and awards. Check with the Editorial Office for suitability of an acknowledgment if there is any question. To indicate the author, use initials. For example, "B.A. wishes to thank A. Waldron for technical assistance. C.A. wishes to thank Anytown University for use of its equipment." Note: the Acknowledgment section is not a numbered section.

APPENDIX

Appendices are placed after the acknowledgments section and before the list of references. Appendices must have a Level One heading as illustrated below. They do not follow the sequential heading numbering given in the rest of the paper. If there is only one appendix, then the heading is set as follows:

APPENDIX

If there is more than one appendix, the headings are set as:

APPENDIX A: DESCRIPTION
APPENDIX B: DESCRIPTION

Subheadings in an Appendix are labeled 1, 2, etc.

Remember that equations in appendices are numbered differently than those in the body of the text (see Sec. VIII).

REFERENCES

References must be numbered consecutively in order of first appearance in the text and should be listed at the end of the text material. Reference citations in the text are rendered in several ways. For example:

Wang *et al.*[1]

Hunter [2]

MOLPRO (Ref. 10)

The citation in the reference list must include the full list of authors. Do not list the first author followed by an abbreviation such as *et al*. See Table III for acceptable reference formats.

TABLE III. This table provides instructions on how to prepare references.

Journal citations: Include authors (see author rule above), title, volume number, beginning page number, and publication year:

[1]C.-H. Choi, K. J. A. Westin, and K. S. Breuer, "Apparent slip flows in hydrophilic and hydrophobic microchannel," Phys. Fluid**s 15,** 2897 (2003).

Articles accepted for publication in a journal (but not published yet): Must include the title of the article and "to be published" or "in press."

[2]X. Wang, Y. Zhu, and Z. Liu, "Experimental study of electroosmotic flow in a circular microchannel," Phys. Fluids **(**to be published**).**
or
[2]X. Wang, Y. Zhu, and Z. Liu, "Experimental study of electroosmotic flow in a circular microchannel," Phys. Fluids **(**in press**).**

When possible, these references should be updated in the galley proof. Articles "submitted to" a journal but not accepted yet are preprints and are not allowed.

Multiple citations are acceptable:

[3]R. P. Nunes, "An analytical model to determine equilibrium quatities of azimuthally symmetric and mismatched charged particle beams under linear focusing," J. Appl. Phys. **104**, 013302 (2008); "Simplified self-consistent model for emittance growth in charged beams with mismatched envelopes," Phys. Plasmas **14**, 023104 (2007).

(same authors, different journals)

or

[4]M. C. Jullien, M.-J. Tsang, M. Ching, L. Menetrier, C. Cohen, and P. Tabeling, "Droplet breakup in microfluidic T-junctions at small capillary numbers," Phys. Fluids **21**, 072001 (2009); D. M. De Menech, "Modeling of droplet breakup in a microfluidic T-shaped junction with a field-phase model," Phys. Rev. E **73**, 031505 (2006).

(two completely different references)

or

[5]J. A. Mullin and W. J. A. Dahm, "Dual-plane stereo particle image velocimetry measure-ments of velocity gradient tensor fields in turbulent shear flow I. Accuracy assessments," Phys. Fluids **18,** 035101 (2006); "Dualplane stereo particle image velocimetry measurements of velocity gradient tensor fields in turbulent shear flow II. Experimental results," *ibid.* **18**, 035102 (2006).

(same authors, same journal and volume number)

Books: List authors and editors. Must include publisher, city and year of publication, and the page numbers (unless the entire book is being cited).

[6]R. J. Hunter, *Zeta Potential in Colloid Science* (Academic, New York, 1981).

AIAA Papers: These reports are cited frequently in PHF. The usual format is: Authors' names, Paper Title, AIAA Paper No. (usual formats are 99-1111 or 2004-2222), year (corresponds to numbers on left side of paper number).

[7]M. S. Narayan and A. Banaszuk, "Experimental study of a novel active separation control approach," AIAA Paper No. 2003-0060, 2003.

Conference proceedings: Include the list of authors, the article title, title of the proceedings, full list of editors, the publisher (cannot be a laboratory or institution), city, and year of publication (or the words "in press"), and the page numbers.

[8] L. S. Tuckerman, "Steady-state solving via Stokes preconditioning: Recursion relations for elliptic operators," in *Proceedings of the 11th International Conference on Numerical Methods in Fluid Dynamics*, edited by D. L. Dwoyer, M. Y. Hussaini, and R. G. Voigt (Springer, New York, 1989), p. 573.

(Note: if the the conference proceedings have not been formally published in print and are not available to the general public, the reference is not acceptable. For example, proceedings only handed out to conference participants but not published elsewhere are not acceptable.)

Government publications: Format as for a book citation. Each must include the author(s), title of the publication, name of the publisher, city and year of publication, and page numbers (unless the entire publication is being cited).

[9]D. Nunes, *The Brillouin Effect* (U.S. Department of Energy, Washington, DC, 1992).

Laboratory report: May only be used if first deposited with a national depository such as the National Technical Information Service. (Check with the NTIS librarian at 703-605-6000.) Materials or reports in electronic form—codes, data tables, etc.---may be uploaded as supplemental material files (see Sec. XIII above). If the paper is on deposit with NTIS, use the following format:

[10]See National Technical Information Service Document No. DE132450 L. (R. Newchuck, SESAME Tables, LANL Rep. 23453, 1983). Copies may be ordered from the National Technical Information Service, Springfield, VA 22161.

Preprints and electronic postings: Preprints or eprints that have not been submitted to a journal for publication (i.e., are only posted on a preprint server) cannot be used as references. Only published references are allowed.

Personal communication: May *not* be one of the authors of the article. Must include the year in which the communication took place.

[11]A. Einstein (personal communication, 1954).

References as footnotes: Footnotes are not permitted within the main text. Each should be numbered and described in the reference list.

Software manuals: If published, use the book format; if not published, give the entire address for the software maker.

Thesis / dissertation: Include the author, title, degree, school, and year.

[12]S. K. Ghorayeb, "Etude des écoulements de convection thermosolutale en cavité rectangulaire," Ph.D. thesis, Université Paul Sabatier, 1997.

Patents: Include authors, title, patent no, and year.

[13]J. C. Vassilicos, R. E. E. Seoud, and D. J. Hurst, "Fluid flow modification apparatus," Patent No. WO/2007/113335, 2007.

Supplemental material:

[14]See supplementary material at http://dx.doi.org/10.1063/1.3055594 for all the force fields used in this work, presented in table format.

Web sites: Due to their perishable nature, web sites are not generally acceptable as references unless the site is maintained as an archival site. It is permitted to include web sites as adjuncts to acceptable references.

[15]See http://www.information.com/websites for more information about websites.