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# Preparation of Papers for IEEE JOURNAL OF TRANSLATIONAL ENGINEERING in HEALTH AND MEDICINE

First A. Author, Second B. Author, Jr., and Third C. Author, *Member, IEEE*

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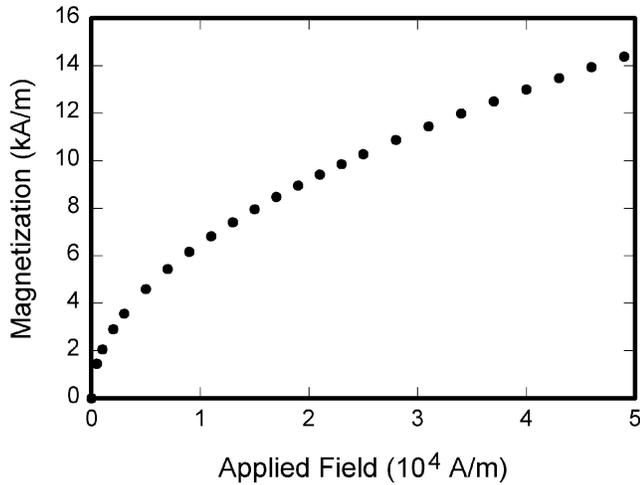


Fig. 1. Magnetization as a function of applied field. Note that “Fig.” is abbreviated. There is a period after the figure number, followed by two spaces. It is good practice to explain the significance of the figure in the caption.

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The SI unit for magnetic field strength *H* is A/m. However, if you wish to use units of T, either refer to magnetic flux density *B* or magnetic field strength symbolized as  $\mu_0 H$ . Use the center dot to separate compound units, e.g., “A·m<sup>2</sup>.”

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TABLE I  
UNITS FOR MAGNETIC PROPERTIES

Symbol	Quantity	Conversion from Gaussian and CGS EMU to SI <sup>a</sup>
$\Phi$	magnetic flux	1 Mx $\rightarrow$ 10 <sup>-8</sup> Wb = 10 <sup>-8</sup> V·s
$B$	magnetic flux density, magnetic induction	1 G $\rightarrow$ 10 <sup>-4</sup> T = 10 <sup>-4</sup> Wb/m <sup>2</sup>
$H$	magnetic field strength	1 Oe $\rightarrow$ 10 <sup>3</sup> /(4 $\pi$ ) A/m
$m$	magnetic moment	1 erg/G = 1 emu $\rightarrow$ 10 <sup>-3</sup> A·m <sup>2</sup> = 10 <sup>-3</sup> J/T
$M$	magnetization	1 erg/(G·cm <sup>3</sup> ) = 1 emu/cm <sup>3</sup> $\rightarrow$ 10 <sup>3</sup> A/m
$4\pi M$	magnetization	1 G $\rightarrow$ 10 <sup>3</sup> /(4 $\pi$ ) A/m
$\sigma$	specific magnetization	1 erg/(G·g) = 1 emu/g $\rightarrow$ 1 A·m <sup>2</sup> /kg
$j$	magnetic dipole moment	1 erg/G = 1 emu $\rightarrow$ 4 $\pi$ × 10 <sup>-10</sup> Wb·m
$J$	magnetic polarization	1 erg/(G·cm <sup>3</sup> ) = 1 emu/cm <sup>3</sup> $\rightarrow$ 4 $\pi$ × 10 <sup>-4</sup> T
$\chi, \kappa$	susceptibility	1 $\rightarrow$ 4 $\pi$
$\chi_\rho$	mass susceptibility	1 cm <sup>3</sup> /g $\rightarrow$ 4 $\pi$ × 10 <sup>-3</sup> m <sup>3</sup> /kg
$\mu$	permeability	1 $\rightarrow$ 4 $\pi$ × 10 <sup>-7</sup> H/m = 4 $\pi$ × 10 <sup>-7</sup> Wb/(A·m)
$\mu_r$	relative permeability	$\mu \rightarrow \mu_r$
$w, W$	energy density	1 erg/cm <sup>3</sup> $\rightarrow$ 10 <sup>-1</sup> J/m <sup>3</sup>
$N, D$	demagnetizing factor	1 $\rightarrow$ 1/(4 $\pi$ )

Vertical lines are optional in tables. Statements that serve as captions for the entire table do not need footnote letters.

<sup>a</sup>Gaussian units are the same as cgs emu for magnetostatics; Mx = maxwell, G = gauss, Oe = oersted; Wb = weber, V = volt, s = second, T = tesla, m = meter, A = ampere, J = joule, kg = kilogram, H = henry.



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)  $\times$  1000” because the reader would not know whether the top axis label in Fig. 1 meant 16000 A/m or 0.016 A/m. Figure labels should be legible, approximately 8 to 12 point type.

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

Use a zero before decimal points: “0.25,” not “.25.” Use “cm<sup>3</sup>,” not “cc.” Indicate sample dimensions as “0.1 cm  $\times$  0.2 cm,” not “0.1  $\times$  0.2 cm<sup>2</sup>.” The abbreviation for “seconds” is “s,” not “sec.” Do not mix complete spellings and abbreviations of units: use “Wb/m<sup>2</sup>” or “webers per square meter,” not “webers/m<sup>2</sup>.” When expressing a range of values, write “7 to 9” or “7-9,” not “7~9.”

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## IX. CONCLUSION

Please include a brief summary of the possible clinical implications of your work in the conclusion section. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. Consider elaborating on the translational importance of the work or suggest applications and extensions.

## APPENDIX

Appendices, if needed, appear before the acknowledgment.

## ACKNOWLEDGMENT

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**First A. Author** (M’76–SM’81–F’87) and the other authors may include biographies at the end of regular papers. Biographies are often not included in conference-related papers. This author became a Member (M) of IEEE in 1976, a Senior Member (SM) in 1981, and a Fellow (F) in 1987. The first paragraph



may contain a place and/or date of birth (list place, then date). Next, the author's educational background is listed. The degrees should be listed with type of degree in what field, which institution, city, state, and country, and year degree was earned. The author's major field of study should be lower-cased.

The second paragraph uses the pronoun of the person (he or she) and not the author's last name. It lists military and work experience, including summer and fellowship jobs. Job titles are capitalized. The current job must have a location; previous positions may be listed without one. Information concerning previous publications may be included. Try not to list more than three books or published articles. The format for listing publishers of a book within the biography is: title of book (city, state: publisher name, year) similar to a reference. Current and previous research interests end the paragraph.

The third paragraph begins with the author's title and last name (e.g., Dr. Smith, Prof. Jones, Mr. Kajor, Ms. Hunter). List any memberships in professional societies other than the IEEE. Finally, list any awards and work for IEEE committees and publications. If a photograph is provided, the biography will be indented around it. The photograph is placed at the top left of the biography. Personal hobbies will be deleted from the biography.

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## IEEE JOURNAL ARTICLE 2

**SUBJECT: LIFESCIENCE|PHYSICIS**

**TITLE: PREPARATION OF PAPERS FOR IEEE TRANSACTIONS ON MAGNETICS**

**FILE NAME: IEEE TRANSACTIONS ON MAGNETICS TEMPLATE**

# Preparation of Papers for IEEE TRANSACTIONS ON MAGNETICS (Revised May 2015)

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These instructions give you guidelines for preparing papers for IEEE TRANSACTIONS ON MAGNETICS. Use this document as a template if you are using Microsoft *Word*. Otherwise, use this document just for helpful information, and prepare your paper using any word processor or LaTeX (the general IEEE LaTeX template is available at [www.ieee.org/publications\\_standards/publications/authors/author\\_templates.html](http://www.ieee.org/publications_standards/publications/authors/author_templates.html)). This *Word* template is useful for estimating the length of an article but it is optional. The electronic file of your paper will be formatted further at IEEE. Paper titles should be written in uppercase and lowercase letters. Avoid writing long formulas with subscripts in the title; short formulas that identify the elements are fine (e.g., "Nd-Fe-B"). Do not begin a title with the word "On." Avoid starting a title with articles like "The." Full names of authors are much preferred but initials may be used instead. Chinese, Japanese, and Korean authors are encouraged to include their names in native characters in parentheses after their Romanized names. More information may be found at [www.ieee.org/publications\\_standards/publications/authors/auth\\_names\\_native\\_lang.pdf](http://www.ieee.org/publications_standards/publications/authors/auth_names_native_lang.pdf). Department names are optional in the affiliations. Do not give street addresses in the affiliations (except for authors with no institutional affiliation). Define all symbols used in the abstract, and again in the text. Do not cite references in the abstract.



*Index Terms*—About four key words or phrases in alphabetical order, separated by commas.

## X. INTRODUCTION

THIS DOCUMENT is a Microsoft *Word* template for IEEE TRANSACTIONS ON MAGNETICS. Use of this document as a template is optional. If you are reading a paper version of this document, please download the electronic file, TRANSMAG2015.DOC, from [www.ieee.org/publications\\_standards/publications/authors/author\\_templates.html](http://www.ieee.org/publications_standards/publications/authors/author_templates.html) so you can use it to prepare your manuscript. If you would prefer to use LaTeX, download IEEE's LaTeX style and sample files from the same Web page. Use those LaTeX files for formatting, but please follow the instructions in TRANSMAG2015.DOC (or TRANSMAG2015.PDF).

Authors may prepare their papers for review using any word processor, one or two columns, single or double spaced. Please follow the writing style specified in this document.

When you open TRANSMAG2015.DOC, select "Print Layout" from the "View" menu in the menu bar (View > Print Layout). Then type over sections of TRANSMAG2015.DOC or cut and paste from another document and then use markup styles (Home > Styles). For example, the style at this point in the document is "Text"). Highlight a section that you want to designate with a certain style; then select the appropriate name on the style menu. The style will adjust your fonts and line spacing. Use italics for emphasis; do not underline.

To insert images in *Word*, position the cursor at the insertion point and either use Insert > Picture or copy the image to the Windows clipboard and then Home > Paste. IEEE will do the final formatting of your paper, so do not worry about precisely positioning figures and tables. In fact, they are best placed at the end of the paper, with the proper insertion points indicated in the text.

If you have a question about formatting your paper, or a suggestion on improving these instructions, please contact [r.goldfarb@ieee.org](mailto:r.goldfarb@ieee.org).

## XI. PROCEDURE FOR PAPER SUBMISSION

### A. ScholarOne® Manuscripts

Authors of regular and conference-related papers should prepare their papers for review using Microsoft *Word* and this template or LaTeX and the files contained in IEEEtran.zip. If your paper is submitted in conjunction with a conference, please observe any page limits specified by the conference. **Do not change the font sizes or line spacing to squeeze more text into a limited number of pages. Leave some white space around your figures.** Conference-related papers follow the same review procedures as regular papers.

Regular and conference-related papers must be submitted electronically to IEEE's on-line manuscript submission and peer-review system, *ScholarOne® Manuscripts*. Regular papers should be submitted at [mc.manuscriptcentral.com/transmag-ieee](http://mc.manuscriptcentral.com/transmag-ieee); for conference-related papers, go to [mc.manuscriptcentral.com/magconf-ieee](http://mc.manuscriptcentral.com/magconf-ieee). You should first check if you have an existing account. If there is none, please create a new account. (Your log-in information is the same on both sites.) After logging in, go to your Author Center and click on the link, "Click here to submit a new manuscript."

Along with other information, you will be asked to select the type of submission from a pull-down list. If you are submitting a conference-related paper, choose the type appropriate for your conference. You will also be asked to select the subject of your article. Additionally, conference authors are asked for the conference paper number. Using the format specific to your conference, enter this number in the text box and also in the header at the top of this document.

There are 7 stages (screens) to the submission process; you must complete all 7 for a complete submission. At the end of each stage you must click "Save and Continue"; simply uploading files is not sufficient. After step 7 you should see a confirmation that the submission is complete. You should also receive an e-mail confirmation. For inquiries regarding the submission of your paper on *ScholarOne® Manuscripts*, please contact [oprs-support@ieee.org](mailto:oprs-support@ieee.org) or call +1 732 465 5861.

*ScholarOne® Manuscripts* will accept files for review in the following formats: DOC, DOCX, RTF, PS, or PDF. PDF is preferred at the review stage. If you used LaTeX to prepare your document, you must generate a PDF or PS file to upload to *ScholarOne® Manuscripts*. Whatever format you upload, your figures should be embedded in the file, usually at the end.

You will be asked to file an electronic copyright form during the submission process. (Authors are responsible for obtaining any security clearances.)

### B. Final Submission

After your paper is accepted, you will be asked to upload final files to *ScholarOne® Manuscripts*. These will include your DOC, DOCX, RTF, or LaTeX document *source* file with embedded figures; an *additional* PS or PDF file; and *separate*, individual figure files. These individual files may be in any of the following formats: TIF (preferred), PDF (preferred), JPG, GIF, EPS, DOC or DOCX (Microsoft *Word*, especially good for tables), or PPT (Microsoft *PowerPoint*, commonly used to make figures). If you own Adobe *Acrobat*, please convert your DOC or DOCX tables and PPT figures to PDF (or click on "Create



Adobe PDF Online” at [www.adobe.com](http://www.adobe.com)). Figure and table files should be named following this convention: FIG1.TIF, FIG2.PPT, FIG3.PDF, etc. See more about figure preparation in Section III below.

Also upload a file with complete contact information for all authors. Include full mailing addresses, telephone numbers, fax numbers, and e-mail addresses. Designate the author who submitted the manuscript on *ScholarOne® Manuscripts* as the “corresponding author.” This is the only author to whom proofs of the paper will be sent. You will have the option to designate your article as “open access” in perpetuity if you agree to pay the IEEE open access fee.

### C. Publication

About 1 week after your final files are submitted, your paper will appear in preprint form on IEEE Xplore® ([ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=20](http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=20)) under “Early Access,” which will represent official publication.

PDF page proofs will be sent by e-mail to the corresponding author in 6 to 8 weeks. After you approve page proofs, the final version of your article will be published on Xplore®.

Conference-related papers will all be published in a single issue of IEEE TRANSACTIONS ON MAGNETICS devoted to the conference. If you return page proofs late, your paper will appear in a later issue, identified as a conference-related paper.

## XII. ADVANCED INFORMATION ON CREATION OF ELECTRONIC IMAGE FILES

Most authors will be able to prepare images in one of the allowed formats listed above. This section provides optional, additional information on preparing PS, EPS, and TIFF files. No matter how you convert your images, it is a good idea to print the files to make sure nothing was lost in the process.

For more information on graphics files, please go to [www.ieee.org/publications\\_standards/publications/authors/authors\\_journals.html](http://www.ieee.org/publications_standards/publications/authors/authors_journals.html) and click on the link “Using Microsoft Products or PDFs to Submit Graphics.”

### A. IEEE Graphics Checker

*Graphics Checker* is part of the IEEE’s “Author Digital Toolbox,” a collection of tools for authors at [www.ieee.org/publications\\_standards/publications/authors/authors\\_journals.html](http://www.ieee.org/publications_standards/publications/authors/authors_journals.html). The direct link for *Graphics Checker* is [graphicsqc.ieee.org](http://graphicsqc.ieee.org). You can upload image files in batches of up to 10 to be analyzed and compared to IEEE’s requirements for metadata, file size, file type, file naming, resolution parameters, and color format. You will receive a detailed report on the usability of each image analyzed. The report will include an explanation of any error found, along with, when possible, application-specific tips on how to fix the image. (You may ignore warnings that the author’s name is not part of the file name.) For more information, contact the IEEE Graphics Help Desk at [graphics@ieee.org](mailto:graphics@ieee.org). You will receive an e-mail response and sometimes a request for a sample graphic for IEEE to check.

### B. Scanning Images to PS and EPS

If you have a scanner, a quick way to prepare figure files is to print your figures on paper exactly as you want them to appear, scan them, and then save them to a file in PostScript (PS) or Encapsulated PostScript (EPS) formats. Use a separate file for each image. File names should be of the form FIG1.PS or FIG2.EPS.

### C. Scanning Images to TIFF

Using a scanner as above, you may save the images in TIFF format. The following specifications are the minimum requirements for TIFF images; you may use higher resolution. As a rule, if your image file size is below 500 kB, your TIFF image probably does not have enough resolution.

High-contrast line figures and tables should be prepared with at least 600 dpi resolution and saved with no compression, 1 bit per pixel (monochrome), with file names of the form FIG3.TIF. To obtain a 3.45 inch figure (one column width) at 600 dpi, the figure requires a horizontal size of 2070 pixels.

Photographs and grayscale figures should be prepared with at least 220 dpi resolution and saved with no compression, 8 bits per pixel (grayscale). To obtain a 3.45 inch figure (one column width) at 220 dpi, the figure should have a horizontal size of 759 pixels.

Color figures should be prepared with at least 400 dpi resolution and saved with no compression, 8 bits per pixel (palette or 256 color). To obtain a 3.45 inch figure (one column width) at 400 dpi, the figure should have a horizontal size of 1380 pixels.

### D. Printing images to PS Files

You may create PostScript figures by “printing” them to files. First, download a PostScript printer driver from [www.adobe.com/support/downloads/product.jsp?product=\\_pdrv&platform=win](http://www.adobe.com/support/downloads/product.jsp?product=_pdrv&platform=win) (Windows) or [www.adobe.com/support/downloads/product.jsp?product=44&platform=Macintosh](http://www.adobe.com/support/downloads/product.jsp?product=44&platform=Macintosh) (Macintosh) and also install the “PPD Files: Adobe” printer definition.



In *Word*, paste your figure into a new document. Print to a file using the PostScript printer driver. File names should be of the form FIG5.PS. Use “Open Type” fonts when creating your figures, if possible: Times Roman, Helvetica, Helvetica Narrow, Courier, Symbol, Palatino, Avant Garde, Bookman, Zapf Chancery, Zapf Dingbats, and New Century Schoolbook.

#### E. Converting PDF to TIFF

Experienced computer users can convert figures and tables from their original format to TIFF. Some useful image converters are Adobe *Photoshop*, Corel *Draw*, Microsoft *Photo Editor* (part of Office 97 through Office XP), *Picture Manager* (Office 2003, 2007, 2010), and *Photo Gallery* (Office 2013). A free, versatile program for image manipulation and format conversion is GIMP, available from [www.gimp.org](http://www.gimp.org).

From Microsoft Office applications, such as *PowerPoint*, you may print or save as PDF. You may then convert a figure in the PDF file to TIFF with Adobe *Acrobat* or *Reader*: View > Zoom to a large magnification (e.g., 1600%). Use the Snapshot Tool to select the figure and copy it to the Windows clipboard. Open Microsoft *Photo Editor*, Edit > Paste as New Image, crop, and adjust resolution as above. (If using *Picture Manager*, use Picture > Crop, Picture > Resize, File > Export.)

Note that the obvious way to convert *PowerPoint* PPT to TIFF (File > Save As > Save as type TIFF) gives poor results.

Alternatively, you may open the PDF in *Photoshop* or GIMP. Set the resolution to open at 1200 dpi. In GIMP, use “Export As” and save in TIFF format with no compression.

#### F. Saving Files in TIFF

Most graphing programs allow you to save graphs in TIFF; however, you often have no control over compression or number of bits per pixel. You should open these image files in a program such as Microsoft *Photo Editor* and re-save them using no compression, either 1 or 8 bits, and either 600 or 220 dpi resolution (File > Properties; Image > Resize). See Section III.C for an explanation of number of bits and resolution.

#### G. Using Print Screen

If your graphing program cannot export to TIFF, you can use the Print Screen function. Set your monitor to its highest resolution. Adjust the magnification so that you can view the entire image on the screen. (In *PowerPoint*, you may use Slide Show to get a full-screen image.) Move the cursor so it is out of the way. Press “Print Screen” on your keyboard; this copies the screen image to the Windows clipboard. Open Microsoft *Photo Editor* and click Edit > Paste as New Image. Crop the image (click Select button; select the part you want, then Image > Crop). Adjust the properties of the image (File > Properties) to get a width of 3.45 inches. Save the file (File > Save As) in TIFF with no compression (click “More” button). Similar functionality is available in GIMP and *Photoshop*.

### XIII. UNITS

Use either SI (MKS) or CGS as primary units. (SI units are strongly encouraged.) English units may be used as secondary units (in parentheses). This applies to papers in data storage. For example, write “15 Gbit/cm<sup>2</sup> (100 Gbit/in<sup>2</sup>).” An exception is when English units are used as identifiers in trade, such as “3½ in disk drive.” Avoid combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity in an equation.

The SI unit for magnetic field strength  $H$  is A/m. However, if you wish to use units of T, either refer to magnetic flux density  $B$  or magnetic field strength symbolized as  $\mu_0 H$ . Use the center dot to separate compound units, e.g., “A·m<sup>2</sup>.”

### XIV. HELPFUL HINTS

#### A. Editing Service

IEEE has partnered with SPi Publisher Services to offer pre-submission professional editing services to IEEE authors. SPi copyeditors and typesetters more than 1 million pages per year for over 600 journals. Authors who would like assistance with English grammar and usage prior to submitting their manuscripts for review or during the review process can go to [www.prof-editing.com/ieee](http://www.prof-editing.com/ieee) to submit a manuscript for copyediting. A link is provided on the Manuscript Central Web site. SPi copyeditors will edit for grammar, usage, organization, and clarity. Authors can use the service, at their own expense, as often as desired. Cost estimates are available on-line, typically about \$100 for a four-page article. Edited manuscripts are generally returned to the authors within two weeks of submission.

#### B. Figures and Tables

Because IEEE will do the final formatting of your paper, you do not need to position figures and tables at the tops and



bottoms of columns. In fact, all figures, figure captions, and tables can be at the end of the paper. Please mark in the text where the figures and tables are supposed to appear. Large figures and tables may span both columns. Place figure captions below the figures; place table captions above the tables. If your figure has two parts, for example, include the labels “(a)” and “(b)” as part of the artwork. Please verify that figures and tables that you mention in the text actually exist. Please do not include captions as part of the figures. Do not put captions in “text boxes” linked to the figures. Do not put borders around the outside of your figures. Use the abbreviation “Fig.” even at the beginning of a sentence. Do not abbreviate “Table.” Tables are numbered with Arabic numerals.

**TABLE 1 HERE** (Note white space above and below.)

### C. Color Figures

There is no charge for color figures for the *electronic* (IEEE Xplore®) version of a paper. However, if any figures must be in color for the *print* version of the paper, the cost is about \$1300, depending on the number of figures and their placement. You will be billed directly by IEEE. When you send the final version of their paper, you should indicate very clearly if you want color in the *print* version. In the absence of such instructions, color will be used only for the *electronic* version. In that case, please be certain that the black-and-white *print* version is understandable without the color information. If you want reprints of your color article, the reprint order should be submitted promptly. There is an additional charge of \$81 per 100 for color reprints.

Figure axis labels are often a source of confusion. Use words rather than symbols. As an example, write the quantity “Magnetization,” or “Magnetization,  $M$ ,” not just “ $M$ .” However, if there is not enough room on the axis to specify the quantity, write just the symbol “ $M$ ,” but define it in the figure caption.

IEEE allows two ways to designate units in graphs and tables: (1) Put units in parentheses. As in Fig. 1, for example, write “Magnetization (A/m)” or “Magnetization,  $M$  ( $A \cdot m^{-1}$ )” (but not just “A/m”). (2) Label axes with a ratio of symbols and units. For example, write “Magnetization,  $M/(A \cdot m^{-1})$ ” or “Temperature,  $T/K$ ” (but not “Temperature/K”).

Multipliers can be especially confusing. Write “Magnetization (kA/m)” or “Magnetization ( $10^3$  A/m).” Do not write “Magnetization (A/m)  $\times$  1000” because the reader would not know whether the top axis label in Fig. 1 meant 16000 A/m or 0.016 A/m. Figure labels should be legible, approximately 8 to 10 point type when reduced to journal column width.

**FIG. 1 HERE** (Note white space above and below.)

### D. References

Number citations consecutively in square brackets [1]. The sentence punctuation follows the brackets [2]. Multiple references [2], [3] are each numbered with separate brackets [1]-[3]. When citing a section in a book, please give the relevant page numbers [2]. In sentences, refer simply to the reference number, as in [3]. Do not use “Ref. [3]” or “reference [3]” except at the beginning of a sentence: “Reference [3] shows ... .” Unfortunately the IEEE document translator cannot handle automatic endnotes in *Word*; therefore, type the reference list at the end of the paper using the “References” style.

Number footnotes separately in superscripts (Insert > Footnote).<sup>3</sup> Place the actual footnote at the bottom of the column in which it is cited; do not put footnotes in the reference list (endnotes). Use letters for table footnotes (see Table I).

Note that IEEE referencing style is quite different from that used by most physics journals. Give all authors’ names; do not use “*et al.*” unless there are six authors or more. Use a space after authors’ initials. Papers that have not been published should be cited as “unpublished” [4]. Papers that have been submitted for publication should be cited as “submitted for publication” [5]. (Since the paper may not be accepted, it is best to not specify the journal.) Papers that have been accepted for publication but not yet assigned to an issue should be cited as “to be published” [6]. Please give affiliations and addresses for private communications [7].

Capitalize only the first word in a paper title, except for proper nouns and element symbols. If you are preparing a conference-related paper and are short of space, you may omit paper titles. However, paper titles are helpful to your readers and

<sup>3</sup>It is recommended that footnotes be avoided (except for the unnumbered footnote with the receipt date on the first page). Instead, try to integrate the footnote information into the text.



are strongly recommended. For papers published in translation journals, please give the English citation first, followed by the original foreign-language citation [8].

### E. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have already been defined in the abstract. Abbreviations such as IEEE, SI, ac, and dc do not have to be defined. Abbreviations that incorporate periods should not have spaces: write “C.N.R.S.,” not “C. N. R. S.” Do not use abbreviations in the title unless they are unavoidable (for example, “IEEE” in the title of this article).

### F. Equations

If you are using *Word*, use either the Microsoft Equation Editor or the *MathType* add-on ([www.dessci.com/en/products/mathtype](http://www.dessci.com/en/products/mathtype)) for equations in your paper (Insert > Equation). Fit the equation into one column by breaking it as you wish it to appear when typeset. You may find it convenient to create a new “equation” for each section of the equation.

Number equations consecutively with equation numbers in parentheses in the vicinity of the equation, as in (1). To make your equations more compact, you may use the solidus ( / ), the exp function, or appropriate exponents. Use parentheses to avoid ambiguities in denominators. Punctuate equations when they are part of a sentence, as in

$$\int_0^{r_2} F(r, \varphi) dr d\varphi = [\sigma r_2 / (2\mu_0)] \quad (1)$$

$$\cdot \int_0^\infty \exp(-\lambda |z_j - z_i|) \lambda^{-1} J_1(\lambda r_2) J_0(\lambda r_1) d\lambda .$$

Be sure that the symbols in your equation have been defined before the equation appears or immediately following. Italicize symbols (*T* might refer to temperature, but *T* is the unit tesla). Refer to “(1),” not “Eq. (1)” or “equation (1),” except at the beginning of a sentence: “Equation (1) is ... .”

Please confine equations to one column width and break equations at appropriate algebraic symbols.

### G. Other Recommendations

Use one space after periods and colons. Hyphenate complex modifiers: “zero-field-cooled magnetization.” However, do not hyphenate numbers and units: “10 nm thick film,” not “10-nm-thick film.” Avoid dangling participles, such as, “Using (1), the potential was calculated.” [It is not clear who or what used (1).] Write instead, “The potential was calculated by using (1),” or “Using (1), we calculated the potential.”

Use a zero before decimal points: “0.25,” not “.25.” Use “cm<sup>3</sup>,” not “cc.” Indicate sample dimensions as “0.1 cm × 0.2 cm,” not “0.1 × 0.2 cm<sup>2</sup>.” The abbreviation for “seconds” is “s,” not “sec.” Do not mix complete spellings and abbreviations of units: use “Wb/m<sup>2</sup>” or “webers per square meter,” not “webers/m<sup>2</sup>.” 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 the parentheses.) In American English, periods and commas are 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 (use the singular if you are the only author) and use the active voice (“I observed that ...” or “We observed that ...” instead of “It was observed that ...”). Better still, omit statements of observation and just report what you measured: “The susceptibility decreased with temperature” instead of “We observed that the susceptibility decreased with temperature.” Similarly, avoid “We found that ... .”

Remember to check spelling. If you are not fluent in English, please get a colleague to proofread your paper.

## XV. SOME COMMON MISTAKES

The word “data” is plural, not singular. The subscript for the permeability of vacuum  $\mu_0$  is zero, not a lowercase letter “o.” The term for residual magnetization is “remanence”; the adjective is “remanent”; do not write “remnance” or “remnant.” Use the word “micrometer” instead of “micron.” 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.”

Because “times” refers to multiplication, do not use the form “*n* times smaller”; instead, write “1/*n* times as large” or similar.



For example, instead of “10 times smaller,” write “one tenth the size” or “0.1 times as large.” Do not use “times more”; instead, write “times as much.” For example, “2 times more” could be interpreted as “3 times as much.”

When compositions are not specified, separate chemical symbols by hyphens; for example, “NiMn” indicates the intermetallic compound  $\text{Ni}_{0.5}\text{Mn}_{0.5}$  whereas “Ni-Mn” indicates an alloy of some composition  $\text{Ni}_x\text{Mn}_{1-x}$ .

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,” 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 Latin abbreviation “et al.” The abbreviation “i.e.” means “that is,” and the abbreviation “e.g.” means “for example.”

An excellent style manual and source of information for science writers is [9]. A general *IEEE Style Manual* is available at [www.ieee.org/publications\\_standards/publications/authors/authors\\_journals.html](http://www.ieee.org/publications_standards/publications/authors/authors_journals.html). (The style for IEEE TRANSACTIONS ON MAGNETICS differs in some respects.)

## XVI. EDITORIAL POLICY

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## APPENDIX

Appendixes, if needed, appear before the acknowledgment.

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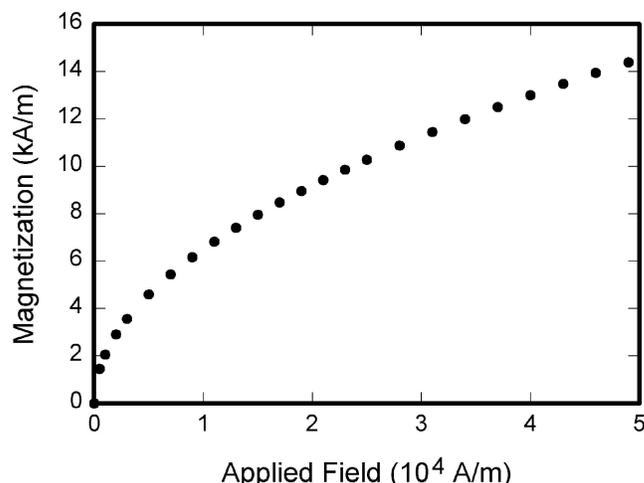


Fig. 1. Magnetization as a function of applied field. Note that “Fig.” is abbreviated. There is a period after the figure number, followed by two spaces. It is good practice to explain the significance of the figure in the caption.

TABLE I

UNITS FOR MAGNETIC PROPERTIES (SHORT TITLE HERE)

Symbol	Quantity	Conversion from Gaussian and CGS EMU to SI <sup>a</sup>
$\Phi$	magnetic flux	1 Mx $\rightarrow$ $10^{-8}$ Wb = $10^{-8}$ V·s
$B$	magnetic flux density, magnetic induction	1 G $\rightarrow$ $10^{-4}$ T = $10^{-4}$ Wb/m <sup>2</sup>
$H$	magnetic field strength	1 Oe $\rightarrow$ $10^3/(4\pi)$ A/m
$m$	magnetic moment	1 erg/G = 1 emu $\rightarrow$ $10^{-3}$ A·m <sup>2</sup> = $10^{-3}$ J/T
$M$	magnetization	1 erg/(G·cm <sup>3</sup> ) = 1 emu/cm <sup>3</sup> $\rightarrow$ $10^3$ A/m
$4\pi M$	magnetization	1 G $\rightarrow$ $10^3/(4\pi)$ A/m
$\sigma$	specific magnetization	1 erg/(G·g) = 1 emu/g $\rightarrow$ 1 A·m <sup>2</sup> /kg
$j$	magnetic dipole moment	1 erg/G = 1 emu $\rightarrow$ $4\pi \times 10^{-10}$ Wb·m
$J$	magnetic polarization	1 erg/(G·cm <sup>3</sup> ) = 1 emu/cm <sup>3</sup> $\rightarrow$ $4\pi \times 10^{-4}$ T
$\chi, \kappa$	susceptibility	1 $\rightarrow$ $4\pi$
$\chi_p$	mass susceptibility	1 cm <sup>3</sup> /g $\rightarrow$ $4\pi \times 10^{-3}$ m <sup>3</sup> /kg
$\mu$	permeability	1 $\rightarrow$ $4\pi \times 10^{-7}$ H/m = $4\pi \times 10^{-7}$ Wb/(A·m)
$\mu_r$	relative permeability	$\mu \rightarrow \mu_r$
$w, W$	energy density	1 erg/cm <sup>3</sup> $\rightarrow$ $10^{-1}$ J/m <sup>3</sup>
$N, D$	demagnetizing factor	1 $\rightarrow$ $1/(4\pi)$

No vertical lines in table. Statements that serve as captions for the entire table do not need footnote letters. A longer description of the table would go here.

<sup>a</sup>Gaussian units are the same as cgs emu for magnetostatics; Mx = maxwell, G = gauss, Oe = oersted; Wb = weber, V = volt, s = second, T = tesla, m = meter, A = ampere, J = joule, kg = kilogram, H = henry.

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TABLE 1 HERE

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FIG. 1 HERE

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In the reference list, give all authors’ names; do not use “et al.” Use a space after authors’ initials. Papers that have not been published should be cited as “unpublished” [Gilbert 1956]. Papers that have been submitted for publication should be cited as “submitted for publication” [Arnold 2016]. (Since the paper may not be accepted, it is best to not specify the journal.) Papers that have been accepted for publication but not yet assigned to an issue should be cited as “to be published” [Demokritov 2016]. Please give affiliations and addresses for private communications [Kaufman 2004].

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Adequacy of references is one of the many factors considered by the reviewers. However, you should not include gratuitous or irrelevant references to *Magnetics Letters*. Do not excessively cite your own prior publications.

Number footnotes separately in superscripts (References > Insert Footnote). Place the actual footnote at the bottom of the column in which it is cited; do not put footnotes in the reference

list (endnotes). Use letters for table footnotes (see Table 1).<sup>4</sup>

#### E. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have already been defined in the abstract. Abbreviations such as “IEEE,” “SI,” “ac,” and “dc” do not have to be defined. Abbreviations that incorporate periods should not have spaces: write “C.N.R.S.,” not “C. N. R. S.” Do not use abbreviations in the title unless they are unavoidable (for example, “IEEE” in the title of this article).

#### F. Equations

If you are using Word, use either the Microsoft Equation Editor or the MathType add-on ([www.dessci.com/en/products/mathtype](http://www.dessci.com/en/products/mathtype)) for equations in your paper (Insert > Equation). Fit the equation into one column by breaking it as you wish it to appear when typeset. You may find it convenient to create a new “equation” for each section of the equation.

Number equations consecutively with equation numbers in parentheses in the vicinity of the equation, as in (1). To make your equations more compact, you may use the solidus (/), the exp function, or appropriate exponents. Use parentheses to avoid ambiguities in denominators. Punctuate equations when they are part of a sentence, as in

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

The font for symbols should be similar to Times Roman. Use the “Symbol” style. Be sure that the symbols in your equation have been defined either before the equation appears or immediately following. Italicize symbols ( $T$  might refer to temperature, but  $T$  is the unit tesla). Refer to “(1),” not “Eq. (1)” or “equation (1),” except at the beginning of a sentence: “Equation (1) is ...”

Please confine equations to one column width and break equations at appropriate algebraic symbols.

#### G. Other Recommendations

Use one space after periods and colons. Hyphenate complex modifiers: “zero-field-cooled magnetization.” However, do not hyphenate numbers and units: “10 nm thick film,” not “10-nm-thick film.” Avoid dangling participles, such as, “Using (1), the potential was calculated.” [It is not clear who or what used (1).] Write instead, “The potential was calculated by using (1),” or “Using (1), we calculated the potential.”

Use a zero before decimal points: “0.25,” not “.25.” Use “cm<sup>3</sup>,” not “cc.” Indicate sample dimensions as “0.1 cm  $\times$  0.2 cm,” not “0.1  $\times$  0.2 cm<sup>2</sup>.” The abbreviation for “seconds” is “s,” not “sec.” Do not mix complete spellings and abbreviations of units: use “Wb/m<sup>2</sup>” or “webers per square meter,” not “webers/m<sup>2</sup>.” When

<sup>4</sup> Try to avoid footnotes (except for the unnumbered footnote with the e-mail address of the corresponding author on the first page). Instead, try to integrate the footnote information into the text.



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 the parentheses.) In American English, periods and commas are 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 (use the singular if you are the only author) and use the active voice (“I observed that ...” or “We observed that ...” instead of “It was observed that ...”). Better still, omit statements of observation and just report what you measured: “The susceptibility decreased with temperature” instead of “We observed that the susceptibility decreased with temperature.” Similarly, avoid “We found that ...”

Remember to check spelling. If you are not fluent in English, please get a colleague to proofread your paper.

#### XXIV. SOME COMMON MISTAKES

The word “data” is plural, not singular. The subscript for the permeability of vacuum  $\mu_0$  is zero, not a lowercase letter “o.” The term for residual magnetization is “remanence”; the adjective is “remanent”; do not write “remnance” or “remnant.” Use the word “micrometer” instead of “micron.” 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.”

Because “times” refers to multiplication, do not use the form “ $n$  times smaller”; instead, write “ $1/n$  times as large” or similar. For example, instead of “10 times smaller,” write “one tenth the size” or “0.1 times as large.” Do not use “times more”; instead, write “times as much.” For example, “2 times more” could be interpreted as “3 times as much.”

When compositions are not specified, separate chemical symbols by hyphens; for example, “NiMn” indicates the intermetallic compound  $\text{Ni}_{0.5}\text{Mn}_{0.5}$  whereas “Ni-Mn” indicates an alloy of some composition  $\text{Ni}_x\text{Mn}_{1-x}$ .

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,” 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 Latin abbreviation “et al.” The abbreviation “i.e.” means “that is,” and the abbreviation “e.g.” means “for example.”

An excellent style manual and source of information for science writers is Young [1989]. A general IEEE style guide, *Information for Authors*, is available at [www.ieee.org/publications\\_standards/publications/authors/authors](http://www.ieee.org/publications_standards/publications/authors/authors)

[journals.html](http://journals.html). (The style for *Magnetics Letters* differs in many respects.)

#### XXV. EDITORIAL POLICY

Do not submit a reworked version of a paper you have submitted or published elsewhere, including conference papers. Do not submit “preliminary” data or results. The submitting author is responsible for obtaining agreement of all coauthors and any consent required from sponsors before submitting a paper. *Magnetics Letters* strongly discourages courtesy authorship.

It is the obligation of the authors to cite relevant prior work. If you copy sentences, paragraphs, figures, or tables from another paper, even if it is your own paper, you must cite that paper at the corresponding point in your manuscript. IEEE’s plagiarism (and excessive duplication) guidelines are described in detail at. All articles submitted for review are screened for plagiarism.

At least two favorable reviews are required for a paper to be accepted for publication. In the event of an unfavorable review, it is at the discretion of the editor whether to seek additional reviews. The editors additionally make a determination of suitability, which is different from a judgment of whether a paper is sound or flawed. The editors consider whether a paper contributes significant new material, is within the scope of the journal, or is more suited to another journal. Undecipherable English is a valid reason for rejection.

#### XXVI. PUBLICATION PRINCIPLES

*Magnetics Letters* is a rapid-publication, primarily electronic, peer-reviewed, archival journal dedicated exclusively to magnetics articles of substantial current interest.

Authors should consider the following points:

1. Technical papers submitted for publication must advance the state of knowledge and must cite relevant prior work.
2. Authors must convince both peer reviewers and the editors of the scientific and technical merit of a paper; the standards of proof are higher when extraordinary or unexpected results are reported.
3. Because replication is required for scientific progress, papers submitted for publication must provide sufficient information to allow readers to perform similar experiments or calculations and use the reported results. Although not everything need be disclosed, a paper must contain new, useable, and fully described information. For example, a specimen’s chemical composition need not be reported if the main purpose of a paper is to introduce a new measurement technique. Authors should expect to be challenged by reviewers if the results are not supported by adequate data and critical details.
4. Papers that describe ongoing work or announce the latest technical achievement, which are suitable for presentation at a professional conference, may not be appropriate for publication in *Magnetics Letters*.

#### XXVII. CONCLUSION

A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the



abstract in the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

## ACKNOWLEDGMENT

Only the Acknowledgment and References may extend to a fifth page. The preferred spelling of the word “acknowledgment” in American English is without an “e” after the “g.” Use the singular heading even if you have many acknowledgments. Avoid expressions such as “One of us (S.B.A.) would like to thank ...” Instead, write “S.B.A. thanks ...” This work was supported in part by the U.S. Department of Commerce under Grant BS123456 (sponsor and financial support acknowledgment goes here; spell out the full name of the sponsor).

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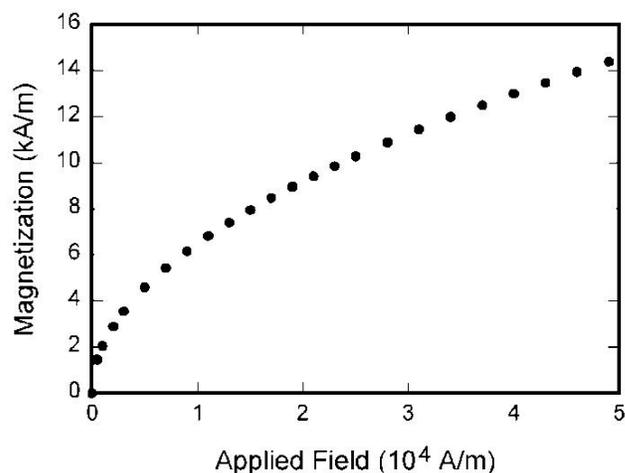


Fig. 1. Magnetization as a function of applied field. Note that “Fig.” is abbreviated. It is good practice to explain the significance of the figure in the caption.

Table 1. Units for magnetic properties (table caption).

Symbol	Quantity <sup>a</sup>	Conversion from Gaussian and cgs emu to SI <sup>b</sup>
$\Phi$	magnetic flux	1 Mx $\rightarrow 10^{-8}$ Wb = $10^{-8}$ V·s
$B$	magnetic flux density, magnetic induction	1 G $\rightarrow 10^{-4}$ T = $10^{-4}$ Wb/m <sup>2</sup>
$H$	magnetic field strength	1 Oe $\rightarrow 10^3/(4\pi)$ A/m
$m$	magnetic moment	1 erg/G = 1 emu $\rightarrow 10^{-3}$ A·m <sup>2</sup> = $10^{-3}$ J/T
$M$	magnetization	1 erg/(G·cm <sup>3</sup> ) = 1 emu/cm <sup>3</sup> $\rightarrow 10^3$ A/m
$4\pi M$	magnetization	1 G $\rightarrow 10^3/(4\pi)$ A/m
$\sigma$	specific magnetization	1 erg/(G·g) = 1 emu/g $\rightarrow 1$ A·m <sup>2</sup> /kg
$j$	magnetic dipole moment	1 erg/G = 1 emu $\rightarrow 4\pi \times 10^{-10}$ Wb·m
$J$	magnetic polarization	1 erg/(G·cm <sup>3</sup> ) = 1 emu/cm <sup>3</sup> $\rightarrow 4\pi \times 10^{-4}$ T
$\chi, \kappa$	susceptibility	1 $\rightarrow 4\pi$
$\chi_\rho$	specific susceptibility	1 cm <sup>3</sup> /g $\rightarrow 4\pi \times 10^{-3}$ m <sup>3</sup> /kg
$\mu$	permeability	1 $\rightarrow 4\pi \times 10^{-7}$ H/m = $4\pi \times 10^{-7}$ Wb/(A·m)
$\mu_r$	relative permeability	$\mu \rightarrow \mu_r$
$w, W$	energy density	1 erg/cm <sup>3</sup> $\rightarrow 10^{-1}$ J/m <sup>3</sup>
$N, D$	demagnetizing factor	1 $\rightarrow 1/(4\pi)$

<sup>a</sup> No vertical lines in table.

<sup>b</sup> Gaussian units are the same as cgs emu for magnetostatics; Mx = maxwell, G = gauss, Oe = oersted; Wb = weber, V = volt, s = second T = tesla, m = meter, A = ampere, J = joule, kg = kilogram, H = henry.



Preparation of Papers for IEEE TRANSACTIONS and JOURNALS (December 2013)

First A. Author, *Fellow, IEEE*, Second B. Author, and Third C. Author, Jr., *Member, IEEE*

love

#### IEEE JOURNAL ARTICLE 4

#### TITLE: PREPARATION OF PAPERS FOR IEEE TRANSACTIONS AND JOURNALS (DECEMBER 2013)

#### FILE NAME: TEMPLATES FOR TRANSACTIONS JOURNALS

**Abstract**—These instructions give you guidelines for preparing papers for IEEE Transactions and Journals. Use this document as a template if you are using Microsoft *Word* 6.0 or later. Otherwise, use this document as an instruction set. The electronic file of your paper will be formatted further at IEEE. Paper titles should be written in uppercase and lowercase letters, not all uppercase. Avoid writing long formulas with subscripts in the title; short formulas that identify the elements are fine (e.g., "Nd-Fe-B"). Do not write "(Invited)" in the title. Full names of authors are preferred in the author field, but are not required. Put a space between authors' initials. Define all symbols used in the abstract. Do not cite references in the abstract. Do not delete the blank line immediately above the abstract; it sets the footnote at the bottom of this column.

**Index Terms**—Enter key words or phrases in alphabetical order, separated by commas. For a list of suggested keywords,

This paragraph of the first footnote will contain the date on which you submitted your paper for review. It will also contain support information, including sponsor and financial support acknowledgment. For example, "This work was supported in part by the U.S. Department of Commerce under Grant BS123456".

The next few paragraphs should contain the authors' current affiliations, including current address and e-mail. For example, F. A. Author is with the National Institute of Standards and Technology, Boulder, CO 80305 USA (e-mail: author@boulder.nist.gov).

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T. C. Author is with the Electrical Engineering Department, University of Colorado, Boulder, CO 80309 USA, on leave from the National Research Institute for Metals, Tsukuba, Japan (e-mail: author@nrim.go.jp).



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## 1. INTRODUCTION

THIS document is a template for Microsoft *Word* versions 6.0 or later. If you are reading a paper or PDF version of this document, please download the electronic file, TRANS-JOUR.DOC, from the IEEE Web site at <http://www.ieee.org/web/publications/authors/transjnl/index.html> so you can use it to prepare your manuscript. If you would prefer to use LATEX, download IEEE's LATEX style and sample files from the same Web page. Use these LATEX files for formatting, but please follow the instructions in TRANS-JOUR.DOC or TRANS-JOUR.PDF.

If your paper is intended for a conference, please contact your conference editor concerning acceptable word processor formats for your particular conference.

## 2. GUIDELINES FOR MANUSCRIPT PREPARATION

When you open TRANS-JOUR.DOC, select "Page Layout" from the "View" menu in the menu bar (View | Page Layout), (these instructions assume MS 6.0. Some versions may have alternate ways to access the same functionalities noted here). Then, type over sections of TRANS-JOUR.DOC or cut and paste from another document and use markup styles. The pull-down style menu is at the left of the Formatting Toolbar at the top of your *Word* window (for example, the style at this point in the document is "Text").

Highlight a section that you want to designate with a certain style, then select the appropriate name on the style menu. The style will adjust your fonts and line spacing. Do not change the font sizes or line spacing to squeeze more text into a limited number of pages. Use italics for emphasis; do not underline. To insert images in *Word*, position the cursor at the insertion point and either use Insert | Picture | From File or copy the image to the Windows clipboard and then Edit | Paste Special | Picture (with "float over text" unchecked). IEEE will do the final formatting of your paper. If your paper is intended for a conference, please observe the conference page limits.

### a. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have already been defined in the abstract. Abbreviations such as IEEE, SI, ac, and dc do not have to be defined. Abbreviations that incorporate periods should not have spaces: write "C.N.R.S.," not "C. N. R. S." Do not use abbreviations in the title unless they are unavoidable (for example, "IEEE" in the title of this article).

### b. Other Recommendations

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

Use a zero before decimal points: "0.25," not ".25." Use "cm<sup>3</sup>," not "cc." Indicate sample dimensions as "0.1 cm × 0.2 cm," not "0.1 × 0.2 cm<sup>2</sup>." The abbreviation for "seconds" is "s," not "sec." Use "Wb/m<sup>2</sup>" or "webers per square meter," not "webers/m<sup>2</sup>." 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 the parentheses.) In American English, periods and commas are 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 get a native English-speaking colleague to carefully proofread your paper.

### c. How to Create a PostScript File

First, download a PostScript printer driver from <http://www.adobe.com/support/downloads/pdrvwin.htm> (for Windows) or from <http://www.adobe.com/support/downloads/pdrvmac.htm> (for Macintosh) and install the "Generic PostScript Printer" definition. In *Word*, paste your figure into a new document. Print to a file using the PostScript printer driver. File names should be of the form "fig5.ps." Use Open Type fonts when creating your figures, if possible. A listing of the acceptable fonts are as follows: Open Type Fonts: Times Roman, Helvetica, Helvetica Narrow, Courier, Symbol, Palatino, Avant Garde, Bookman, Zapf Chancery, Zapf Dingbats, and New Century Schoolbook.

## 3. MATH

If you are using *Word*, use either the Microsoft Equation Editor or the *MathType* add-on (<http://www.mathtype.com>) for equations in your paper (Insert | Object | Create New | Microsoft Equation or MathType Equation). "Float over text" should *not* be selected.

### a. Equations

Number equations consecutively with equation numbers in parentheses flush with the right margin, as in (1). First use the equation editor to create the equation. Then select the "Equation" markup style. Press the tab key and write the equation number in parentheses. To make your equations more compact, you may use the solidus (/), the exp function, or appropriate exponents. Use parentheses to avoid ambiguities in denominators. Punctuate equations when they are part of a sentence, as in

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

Be sure that the symbols in your equation have been defined before the equation appears or immediately following. Italicize symbols (*T* might refer to temperature, but *T* is the unit tesla). Refer to "(1)," not "Eq. (1)" or "equation (1)," except at the beginning of a sentence: "Equation (1) is ..."

## 4. UNITS

Use either SI (MKS) or CGS as primary units. (SI units are strongly encouraged.) English units may be used as secondary units (in parentheses). This applies to papers in data storage. For example, write "15 Gb/cm<sup>2</sup> (100 Gb/in<sup>2</sup>)." An exception is when English units are used as identifiers in trade, such as "3½-in disk drive." Avoid combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity in an equation.

The SI unit for magnetic field strength *H* is A/m. However, if you wish to use units of T, either refer to magnetic flux density *B* or magnetic field strength symbolized as  $\mu_0 H$ . Use the center dot to separate compound units, e.g., "A·m<sup>2</sup>."

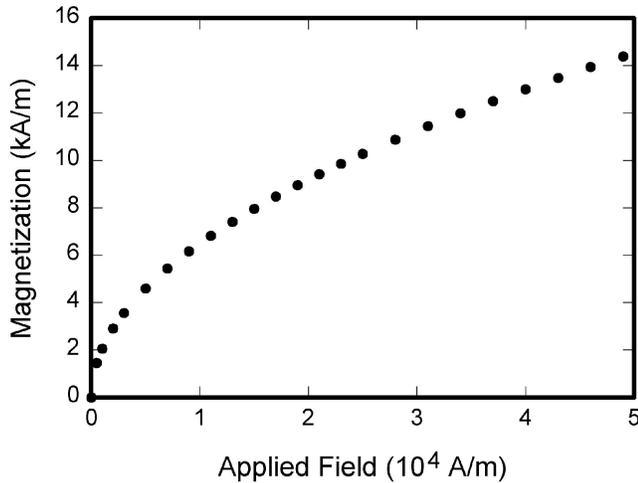


Fig. 1. Magnetization as a function of applied field. Note that “Fig.” is abbreviated. There is a period after the figure number, followed by two spaces. It is good practice to explain the significance of the figure in the caption.

5. SOME COMMON MISTAKES

The word “data” is plural, not singular. The subscript for the permeability of vacuum  $\mu_0$  is zero, not a lowercase letter “o.” The term for residual magnetization is “remanence”; the adjective is “remanent”; do not write “remnance” or “remnant.” Use the word “micrometer” instead of “micron.” 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 Latin abbreviation “et al.” (it is also italicized). The abbreviation “i.e.,” means “that is,” and the abbreviation “e.g.,” means “for example” (these abbreviations are not italicized).

A general IEEE styleguide is available at <http://www.ieee.org/web/publications/authors/transjnl/index.html>

6. GUIDELINES FOR GRAPHICS PREPARATION AND SUBMISSION

a. Types of Graphics

The following list outlines the different types of graphics published in IEEE journals. They are categorized based on their construction, and use of color / shades of gray:

TABLE I  
UNITS FOR MAGNETIC PROPERTIES

Symbol	Quantity	Conversion from Gaussian and CGS EMU to SI <sup>a</sup>
$\Phi$	magnetic flux	1 Mx $\rightarrow 10^{-8}$ Wb = $10^{-8}$ V·s
$B$	magnetic flux density, magnetic induction	1 G $\rightarrow 10^{-4}$ T = $10^{-4}$ Wb/m <sup>2</sup>
$H$	magnetic field strength	1 Oe $\rightarrow 10^3/(4\pi)$ A/m
$m$	magnetic moment	1 erg/G = 1 emu $\rightarrow 10^{-3}$ A·m <sup>2</sup> = $10^{-3}$ J/T
$M$	magnetization	1 erg/(G·cm <sup>3</sup> ) = 1 emu/cm <sup>3</sup> $\rightarrow 10^3$ A/m
$4\pi M$	magnetization	1 G $\rightarrow 10^3/(4\pi)$ A/m
$\sigma$	specific magnetization	1 erg/(G·g) = 1 emu/g $\rightarrow 1$ A·m <sup>2</sup> /kg
$j$	magnetic dipole moment	1 erg/G = 1 emu $\rightarrow 4\pi \times 10^{-10}$ Wb·m
$J$	magnetic polarization	1 erg/(G·cm <sup>3</sup> ) = 1 emu/cm <sup>3</sup> $\rightarrow 4\pi \times 10^{-4}$ T
$\chi, \kappa$	susceptibility	1 $\rightarrow 4\pi$
$\chi_\rho$	mass susceptibility	1 cm <sup>3</sup> /g $\rightarrow 4\pi \times 10^{-3}$ m <sup>3</sup> /kg
$\mu$	permeability	1 $\rightarrow 4\pi \times 10^{-7}$ H/m = $4\pi \times 10^{-7}$ Wb/(A·m)
$\mu_r$	relative permeability	$\mu \rightarrow \mu_r$
$w, W$	energy density	1 erg/cm <sup>3</sup> $\rightarrow 10^{-1}$ J/m <sup>3</sup>
$N, D$	demagnetizing factor	1 $\rightarrow 1/(4\pi)$

Vertical lines are optional in tables. Statements that serve as captions for the entire table do not need footnote letters.

<sup>a</sup>Gaussian units are the same as cg emu for magnetostatics; Mx = maxwell, G = gauss, Oe = oersted; Wb = weber, V = volt, s = second, T = tesla, m = meter, A = ampere, J = joule, kg = kilogram, H = henry.

i. Color/Grayscale figures

Figures that are meant to appear in color, or shades of black/gray. Such figures may include photographs, illustrations, multicolor graphs, and flowcharts.

ii. Lineart figures

Figures that are composed of only black lines and shapes. These figures should have no shades or half-tones of gray. Only black and white.

iii. Author photos

Head and shoulders shots of authors which appear at the end of our papers.

iv. Tables

Data charts which are typically black and white, but sometimes include color.

b. Multipart figures

Figures compiled of more than one sub-figure presented side-by-side, or stacked. If a multipart figure is made up of multiple figure types (one part is lineart, and another is grayscale or color) the figure should meet the stricter guidelines.

c. File Formats For Graphics

Format and save your graphics using a suitable graphics processing program that will allow you to create the images as PostScript (PS), Encapsulated PostScript (.EPS), Tagged Image File Format (.TIFF), Portable Document Format (.PDF), or Portable Network Graphics (.PNG) sizes them, and adjusts the resolution settings. If you created your source files in one of the following programs you will be able to submit the graphics without converting to a PS, EPS, TIFF, PDF, or PNG file: Microsoft Word, Microsoft



PowerPoint, or Microsoft Excel. Though it is not required, it is recommended that these files be saved in PDF format rather than DOC, XLS, or PPT. Doing so will protect your figures from common font and arrow stroke issues that occur when working on the files across multiple platforms. When submitting your final paper, your graphics should all be submitted individually in one of these formats along with the manuscript.

#### d. Sizing of Graphics

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APPENDIX

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J. H. Davis and J. R. Cogdell, "Calibration program for the 16-foot antenna." *Elect. Eng. Res. Lab., Univ. Texas, Austin, Tech. Memo. NGL-006-69-3*, Nov. 15, 1987.

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E. P. Wigner, "Theory of traveling-wave optical laser," *Phys. Rev.*, vol. 134, pp. A635-A646, Dec. 1965.  
E. H. Miller, "A note on reflector arrays," *IEEE Trans. Antennas Propagat.*, to be published.

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**Second B. Author** was born in Greenwich Village, New York City, in 1977. He received the B.S. and M.S. degrees in aerospace engineering from the University of Virginia, Charlottesville, in 2001 and the Ph.D. degree in mechanical engineering from Drexel University, Philadelphia, PA, in 2008.



From 2001 to 2004, he was a Research Assistant with the Princeton Plasma Physics Laboratory. Since 2009, he has been an Assistant Professor with the Mechanical Engineering Department, Texas A&M University, College Station. He is the author of three books, more than 150 articles, and more than 70 inventions. His research interests include high-pressure and high-density nonthermal plasma discharge processes and applications, microscale plasma discharges, discharges in liquids, spectroscopic diagnostics, plasma propulsion, and innovation



plasma applications. He is an Associate Editor of the journal *Earth, Moon, Planets*, and holds two patents.

Mr. Author was a recipient of the International Association of Geomagnetism and Aeronomy Young Scientist Award for Excellence in 2008, the IEEE Electromagnetic Compatibility Society Best Symposium Paper Award in 2011, and the American Geophysical Union Outstanding Student Paper Award in Fall 2005.

**Third C. Author, Jr. (M'87)** received the B.S. degree in mechanical engineering from National Chung Cheng University, Chiayi, Taiwan, in 2004 and the M.S. degree in mechanical engineering from National Tsing Hua University, Hsinchu, Taiwan, in 2006. He is currently pursuing the Ph.D. degree in mechanical engineering at Texas A&M University, College Station.

From 2008 to 2009, he was a Research Assistant with the Institute of Physics, Academia Sinica, Taipei, Taiwan. His research interest includes the development of surface processing and biological/medical treatment techniques using nonthermal atmospheric pressure plasmas, fundamental study of plasma sources, and fabrication of micro- or nanostructured surfaces.

Mr. Author's awards and honors include the Frew Fellowship (Australian Academy of Science), the I. I. Rabi Prize (APS), the European Frequency and Time Forum Award, the Carl Zeiss Research Award, the William F. Meggers Award and the Adolph Lomb Medal (OSA).