

*Guide to Typesetting PNAS  
Journal Articles in  
L<sup>A</sup>T<sub>E</sub>X Using*

**PNASone**

**and**

**PNAStwo**

---

**Amy Hendrickson  
T<sub>E</sub>Xnology Inc.**

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# CONTENTS

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■ Files in This Package	2
■ Sample Files	3
■ Template File	3
■ Starting Your Article	3
■ Set the documentclass	3
■ Optional Graphics Style File	4
■ optional Font Files	4
■ Modifying the PostScript Font Files, PNASoneF.sty and PNAStwoF.sty	5
■ Additional Optional Style Files	5
■ Using Other .sty Files	5
■ Entering your own macros	5
■ Before the title	6
■ Title Block	6
■ Enter Title	6
■ Enter Authors and Additional Commands	6
■ Nature of Contribution	8
■ Abstract, Keywords and Dropcap to Start Article Body	8
■ Sample Article Beginning	9
■ End of the Article	10
■ References in BibTeX	11
■ Figure and Table Captions	11
■ Making Tables	12
■ Suggestions for Article Submission	14
■ Math Advice	15
■ Index to This Documentation	17

# Guide to Using PNAS One and Two Column Journal Styles

Welcome to the use of PNASone and PNAStwo, the  $\text{\LaTeX}$  style files for typesetting articles to appear in the Proceedings of the National Academy of Sciences of the United States of America.

PNASone.cls produces one column articles, while PNAStwo.cls produces two column articles. Commands for the two styles are almost completely identical except that the results differ in the number of columns.

You will find that standard  $\text{\LaTeX}$  commands will work exactly as you expect them to when you use these styles. In addition, there are a few new commands written specifically for PNAS, which are explained in this document.

## Current Version

Please make sure that you have the current version of the style files and the documentation. If you are unsure if your version is current, please download new copies of the files from the PNAS Web site ([www.pnas.org](http://www.pnas.org)).

If you need assistance, contact [pnas@nas.edu](mailto:pnas@nas.edu). If you are encountering problems with a specific  $\text{\LaTeX}$  file, please attach the file to your message.

### Files in This Package

The following is a list of the files found in this package.

---

#### Basic style and font files

-----

PNASONE.CLS    Basic LaTeX macro file for one column articles (by request only)  
 PNASTWO.CLS    Basic LaTeX macro file for two column articles

PNASONEF.STY    PostScript font file for one column articles (by request only)  
 PNASTWOF.STY    PostScript font file for two column articles  
                   You will probably need to edit these  
                   files to enter the names of the PS fonts found  
                   on your system

#### Template and Sample files

-----

PNASTMPL.TEX    Template file, for authors to use in making their own  
                   article.

PNASONES.TEX    Sample files, demonstrating the use of  
 PNASTWOS.TEX    commands unique to this package.

PNASONES.PDF    PDF versions of the sample files.  
 PNASTWOS.PDF

#### Inserting .eps files (for illustration purposes only)

-----

graphics.zip    Graphics files, including graphicx.sty, used for  
                   inserting .eps files.

figsamp.eps    Figure sample file, to show the use of the graphicx.sty  
                   commands for inserting an .eps file

#### Documentation

-----

PNASdocs.tex    Documentation in LaTeX form. You may run LaTeX on this  
                   file and print it on your printer, or see it with your  
                   LaTeX preview program.

PNASdocs.pdf    Documentation in PDF form. Use Acrobat Reader to view it.

---

## Sample Files

The sample files are called PNASoneS.tex and PNAStwoS.tex. You can run L<sup>A</sup>T<sub>E</sub>X on either of these files and compare the code with the results. It has examples of all the commands that are unique to this package, as well as many other commands.

## Template File

The template file, PNAStmpl.tex, is provided to make it easier to enter the initial article commands in the correct order. It should be self-explanatory.

You are strongly urged to use this file as the basis of your formatted article. To do this you should

- copy PNAStmpl.tex to <yourfile>.tex,
- enter the text of your article and
- submit all article component files to PNAS online at [www.PNAScentral.org](http://www.PNAScentral.org).

## Starting Your Article

```
===== Sample Article Beginning =====
% Choose pnasone for one column; pnastwo for two column:
%\documentclass{pnasone}
%\documentclass{pnastwo}

%% OPTIONAL POSTSCRIPT FONT FILES

% Choose PNASoneF for one column; PNAStwoF for two column:
%\usepackage{PNASoneF}
%\usepackage{PNAStwoF}

%% ADDITIONAL OPTIONAL FILES
%% ie., Optional amsmath packages
\usepackage{amssymb,amsfonts,amsmath}
===== End Sample Article Beginning =====
```

## Set the documentclass

For one column articles: \documentclass{pnasone}  
 For two column articles: \documentclass{pnastwo}

## Optional Graphics Style File

Needed for inserting .eps files.

Type into the square brackets the name of the driver program that you are using. If you don't know, try dvips, which is the most common PC driver, or textures for the Mac. These are the options:

```
[dvips], [xdvi], [dvi pdf], [dvipsone], [dviwindo], [emtex], [dviwin],
[pctexps], [pctexwin], [pctexhp], [pctex32], [truetex], [tcidvi],
[oztex], [textures]
```

For example,

```
\usepackage[dvips]{graphicx}
```

Note that inclusion of .eps files is for your reference only; when submitting to PNAS, submit figures separately.

## Optional Font Files

For one-column: `\usepackage{PNASoneF}`

For two-column: `\usepackage{PNAStwoF}`

You may need to edit the PNASoneF.sty or PNAStwoF.sty PostScript font files to make the font names match those on your system. See next section for information on doing this.

You may also leave these commands commented out (recommended) and typeset your article using the default Computer Modern fonts. If accepted, your article will be retypeset at PNAS using PostScript fonts.

## Modifying the PostScript Font Files, PNASoneF.sty and PNAStwoF.sty

Most authors have at least some PostScript fonts on their system. The problem is that there are differing conventions for naming these fonts depending on the implementation of  $\TeX$ . To make use of the fonts available on your system, the files PNASoneF.sty and PNAStwoF.sty may be edited to use your font names.

Please look at the top of the PNASoneF.sty or PNAStwoF.sty file, where you will see the lines you need to modify.

As soon as you have discovered what PostScript names are on your system, you can make the appropriate substitutions. You can find font names in the TeXtures menu or, on other systems, by looking into the directory where the .tfm fonts are found (often in `c:\texmf\fonts\tfm`) and making your best guess as to what Times Roman, for example, is called.

The top of the PNASoneF.sty or PNAStwoF.sty file will look like this:

---

```
%% Change these definitions, if necessary ====>
%% Times-Roman
%-----
% (Berry font names)
\def\timesroman{ptmr}
\def\timesbold{ptmb}
\def\timesitalic{ptmri}
\def\timesbolditalic{ptmbi}

% (Y & Y font names)
%\def\timesroman{tir}
%\def\timesbold{tib}
%\def\timesitalic{tii}
etc...
%% <==== End of changes needed. Do not make changes below this point.
```

---

## Additional Optional Style Files

The AMS math style files are commonly used to gain access to useful features, like extended math fonts and math commands. You can bring in these style files by using:

```
%% Examples of some useful amsmath packages
\usepackage{amssymb,amsfonts,amsmath}
```

## Using Other .sty Files

Be cautioned that introducing style files beyond the PNAS and AMS ones is risky because some packages may conflict with the PNAS .cls file and may also change the appearance of the paper. If there is a package that performs some function that you feel you need, verify that it doesn't affect the appearance of the finished article and indicate this usage during online submission of your article.

## Entering your own macros

You should enter any of your own macros in a block before `\begin{document}`. Be careful that you haven't redefined any existing commands. For instance, an author redefined `\tt` which is used for font changes to typewriter type, thus disabling that command. We recommend you use the L<sup>A</sup>T<sub>E</sub>X form for making definitions (`\newcommand`), which will let you know if a command is already defined, whereas using the simple `\def` will simply use that definition from then on in the file without letting you know that you have redefined an existing command.

```
%% Optional Macro Files
%% \newcommand definition form is recommended
\newcommand{\mfrac}[2]{\frac{\displaystyle #1}{\displaystyle #2}}
\def\o{\omega}
```

## Before the Title

There are a few commands specific to PNAS inserted after `\begin{document}` and before the title. You may leave the `\coi` and `\track` commands with their default values as PNAS will collect this information during the online submission process. These are provided to aid you in assessing the length of your article.

If you wish to include abbreviations (or any other footnote that doesn't use a footnote marker), you may define these in the `\footcomment` command.

```
\conflictofinterest{Conflict of interest footnote placeholder}
```

```
\track{Insert 'This paper was submitted directly to
the PNAS office.' when applicable.}
```

```
\footcomment{Abbreviations: SAM, self-assembled monolayer;
OTS, octadecyltrichlorosilane}
```

## Title Block

Enter the commands for title and authors, use `\maketitle` to make the title block info print, start the article, with `\begin{article}` (Remember to put `\end{article}` before `\end{document}`)

```
\title{}
\author{} \affil{}{}
```

```
(optional)
\thanks
\contributor{}
```

```
\maketitle
```

```
\begin{article}
```

(Note: Grant acknowledgments should go before the bibliography, within `\begin{acknowledgments}...\end{acknowledgments}`)

## Enter Title

For the title, only capitalize the first letter:

```
\title{Almost sharp fronts for the surface quasi-geostrophic equation}
```

## Enter Authors and Additional Commands

When entering the author names, use the `\author` command; you can also use the `\affil{}{}`, `\thanks{}` and `\and` commands.



`\affil{<number>}{<Institution>}` Assign one number for each institution. The same number should be used for authors that are affiliated with the same institution, after the first time only the number is needed, ie, `\affil{number}{text}`, `\affil{number}{}`

`\thanks{}` will print at the bottom of the page. It should be used for the corresponding author:

`\thanks{To whom correspondence should be addressed. Email: <author email>}`

`\and` should be used before the last author.

(Note: % is used at the end of some lines to prevent extra space from appearing. An extra space is normally inserted with line endings.)

---

```

\author{%
<author name>%
(for corresponding author only, enter text like this:
\thanks{<To whom correspondence should be addressed. E-mail:
authoremail>}%

\affil{<number>}{<Institution>},

(before last author)
\and

<author>
\affil{<number>}{}
}

ie,
\author{Diego C\'ordoba\affil{1}{Consejo Superior de
Investigaciones Cient\'ificas c/ Serrano 123, 28006 Madrid, Spain},
Charles Fefferman\thanks{To whom correspondence should be addressed. E-mail:
cf@math.princeton.edu}%
\affil{2}{Princeton University Department of Mathematics,
Washington Road, Princeton, NJ 08544-1000}, \and
Jos\'e Luis Rodrigo\affil{2}{}{}}

```

.....

**Diego Córdoba<sup>\*</sup>, Charles Fefferman<sup>†</sup>, and José Luis Rodrigo<sup>‡</sup>**

<sup>\*</sup>Consejo Superior de Investigaciones Científicas c/ Serrano 123, 28006 Madrid, Spain, and<sup>†</sup>Princeton University Department of Mathematics, Washington Road, Princeton, NJ 08544-1000

---

<sup>†</sup>To whom correspondence should be addressed. E-mail: cf@math.princeton.edu  
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## Nature of Contribution

Set default to

---

```
\contributor{Submitted to Proceedings of the
National Academy of Sciences of the United States of America}
```

---

## Abstract, Keywords and Dropcap to Start Article Body

After the title block is completed and ended with `\maketitle`, the command `\begin{article}` should be used. (The end of the article should have the matching `\end{article}` command.)

The abstract will be entered in the `\begin{abstract}... \end{abstract}` environment.

Following the abstract, comes keywords. Enter a | between every term in the keywords environment. Then, the first letter of the article should be a ‘drop cap’ which is achieved by using the `\dropcap{}` command:

---

===== Sample Article Beginning =====

```
\documentclass{PNAStwo}
%\usepackage{PNASoneF}
\begin{document}
\title{}
\author{}
\maketitle
```

```
\begin{article}
\begin{abstract}
Abstract text here.
\end{abstract}
```

```
\keywords{monolayer | structure | x-ray reflectivity | molecular electronics}
```

```
\dropcap{I}n this article we study the evolution of ‘almost-sharp’ fronts
```

---

You’ll see the results of these commands on the next page.

## Sample Article Beginning

---

```

\documentclass{PNAStwo}
%\usepackage{PNASoneF}

\title{Almost sharp fronts for the surface\ quasi-geostrophic equation}
\author{Diego C\'ordoba\affil{1}{Consejo Superior de
Investigaciones Cient\'ificas c/ Serrano 123, 28006 Madrid, Spain},
Charles Fefferman\affil{2}{Princeton University Department of Mathematics,
Washington Road, Princeton, NJ 08544-1000}\thanks{To whom correspondence
should be addressed. E-mail: cf@math.princeton.edu},
and Jos\'e Luis Rodrigo\affil{2}{}}

\maketitle

\begin{article}
\begin{abstract}
We investigate the evolution of ‘‘almost-sharp’’
fronts for the surface quasi-geostrophic (QG) equation. ...
evolution to the evolution of sharp fronts.
\end{abstract}

\keywords{monolayer | structure | x-ray reflectivity | molecular electronics}

\dropcap{I}n this article we study the evolution of ‘‘almost-sharp’’ fronts
for the surface quasi-geostrophic equation. This 2-D active scalar
.....

```

# Almost sharp fronts for the surface quasi-geostrophic equation

Diego C\'ordoba<sup>\*</sup>, Charles Fefferman<sup>† †</sup> and Jos\'e Luis Rodrigo<sup>†</sup>

<sup>\*</sup>Consejo Superior de Investigaciones Cient\'ificas c/ Serrano 123, 28006 Madrid, Spain, and<sup>†</sup>Princeton University Department of Mathematics, Washington Road, Princeton, NJ 08544-1000

Submitted to Proceedings of the National Academy of Sciences of the United States of America

**We investigate the evolution of ‘‘almost-sharp’’ fronts for the surface quasi-geostrophic (QG) equation. This equation was originally introduced in the geophysical context to investigate the formation and evolution of fronts, i.e. discontinuities between masses of hot and cold air. These ‘‘almost-sharp’’ fronts are weak solutions of QG with large gradient. We relate their evolution to the evolution of sharp fronts.**

monolayer | structure | x-ray reflectivity | molecular electronics

**I**n this article we study the evolution of ‘‘almost-sharp’’ fronts for the surface quasi-geostrophic equation. This 2-D active scalar equation reads for the surface quasi-geostrophic equation.

---

<sup>†</sup>To whom correspondence should be addressed. E-mail: cf@math.princeton.edu  
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## End of the Article

After the body of the paper is entered, the article should end with an acknowledgments section, followed by the bibliography, which is followed by `\end{article}` and `\end{document}`.

---

```
-- text of paper here --

\begin{acknowledgments}
-- text of acknowledgments here, including grant info --
\end{acknowledgments}

\begin{bibliography}
\bibitem{<term>}Bibitem text

%ie,
%\bibitem{Ch} D. Chae, The quasi-geostrophic equation in the
%Triebel-Lizorkin spaces. {\it Nonlinearity} {\bf 16} $n^o$ 2
%(2003), 479-495.

\end{thebibliography}
\end{article}
\end{document}
```

---

## Acknowledgments

The acknowledgments section should go immediately before the bibliography. In this section you should list any grant information or other acknowledgment text:

---

```
\begin{acknowledgments}
This work was partially supported by
Spanish Ministry of Science and Technology Grant BFM2002-02042 (to D.C. and
J.L.R.) and by National Science Foundation Grant DMS-0245242 (to C.F.).
\end{acknowledgments}
```

.....

This work was partially supported by Spanish Ministry of Science and Technology Grant BFM2002-02042 (to D.C. and J.L.R.) and by National Science Foundation Grant DMS-0245242 (to C.F.).

---

## Making the Bibliography

The bibliography is done as in most  $\text{\LaTeX}$  styles, written in a bibliography section with each reference preceded by `\bibitem{<biblabe1>}`. The `\cite{<biblabe1>}` command should be used to reference the bibliography labels. The command `\thebibliography` is followed by the widest number that will appear in the bibliography, usually `{10}` unless there are more than 100 entries, in which case you should use `{100}`.

Here is an example:

---

As seen in reference \cite{beren}, we can definitely conclude ...

```
\begin{thebibliography}{10}
```

```
\bibitem{kilby}Kilby, J.S., (1976) {\it IEEE Trans. Electron Devices,}
{\bf 23} 648-656.
```

```
\bibitem{hamming}Hamming, R.W., (1962) in {\it Numerical Methods for Scientists and
Engineers}, (McGraw-Hill, New York), pp 39-61.
```

```
\bibitem{beren}Berenbaum, A., Colbry, B.W., Ditzel, D.R., Freeman, R.D., &
O'Connor, K.J., (1987) {\it Proc. Natl. Acad. Sci. USA} {\bf 88}, 10362-10366.
```

```
\end{thebibliography}
```

.....

As seen in reference [3], we can definitely conclude ...

1. Kilby, J.S., (1976) *IEEE Trans. Electron Devices*, **23** 648-656.

2. Hamming, R.W., (1962) in *Numerical Methods for Scientists and Engineers*,  
(McGraw-Hill, New York), pp 39-61.

3. Berenbaum, A., Colbry, B.W., Ditzel, D.R., Freeman, R.D., and O'Connor, K.J.,  
(1987) *Proc. Natl. Acad. Sci. USA* **88**, 10362-10366.

---

## References in BibTeX

PNAS does not support submission of supporting .tex files such as BibTeX. Instead all references must be included in the article .tex document. If you currently use BibTeX, your bibliography is formed because the command \bibliography{} brings the <filename>.bbl file into your .tex document. To conform to PNAS requirements, copy the reference listings from your .bbl file and add them to the article .tex file, using the bibliography environment described above. Alternatively, you can L<sup>A</sup>T<sub>E</sub>X your document and copy the references used in this particular article from the .aux output file.

## Figure and Table Captions

Figures and tables should be entered at the end of the document, after \end{article} and before \end{document}.

Figure and table captions are done as they ordinarily are in L<sup>A</sup>T<sub>E</sub>X.

The PNASone style and for one column figures in PNAStwo style will use

```
\begin{figure}...\end{figure}
```

PNAStwo style will use the star form for figures or tables that span both columns:

```
\begin{figure*}...\end{figure*} and \begin{table*}...\end{table*}
```

---

```

\begin{figure}
\vspace*{.05in}
\caption{This is a figure caption...}
\end{figure}

\begin{figure*}
\vspace*{.05in}
\caption{This is a figure caption for a figure that spans both columns...}
\end{figure*}

```

.....

**Fig. 1.** This is a figure caption. This is a figure caption. This is a figure caption.

**Fig. 2.** This is a figure caption for a figure that spans both columns. This is a figure caption for a figure that spans both columns. This is a figure caption for a figure that spans both columns.

---

Table captions start with the first word capitalized, all following words lowercase, no period at the end of the caption.

---

```

\begin{table}
\caption{Summary of correlations between ice cores and NAO indices}
(table here)
\end{table}

\begin{table*}
\caption{Table Caption for a Table That Spans Both Columns}
(table here)
\end{table*}

```

.....

**Table 1.** Summary of Correlations Between Ice Cores and NAO Indices

**Table 2.** Table Caption for a Table That Spans Both Columns Table Caption for a Table That Spans Both Columns Table Caption for a Table That Spans Both Columns

---

## Making Tables

- The use of vertical lines within tables is not allowed.
- Use the command `\hline` underneath the column headers, and at the bottom of the table.
- Make your table span the full column width. If a single column table, span the width of the single column, or span the width of the page if the table is two column width, if it is possible to do so without having an unreasonable amount of space between columns.

This is the command that makes the table fill the full column or page width:

```
\begin{tabular*}{\hsize}{@{\extracolsep{\fill}}}(rest of table preamble)
```

The following example shows these steps being followed and the form of the table preamble that will cause the table to spread out to the width of one column:

---

```
\begin{table}
\centering
\caption{Example Table Caption}
\begin{tabular*}{\hsize}{@{\extracolsep{\fill}}lcr}
$\alpha\beta\Gamma\Delta$ One&Two&Three\cr
\hline
one&two&three\cr
one&two&three\cr
\hline
\end{tabular*}
\end{table}
```

.....

**Table 3. Example Table Caption**

$\alpha\beta\Gamma\Delta$ One	Two	Three
one	two	three
one	two	three

---

## Making Table Notes

To make table notes, we have two new commands:

`\tablenote{}` Entered in the body of the table, within `tabular`

`\tablenotes` Entered after `tabular` ends

Below you can see an example of a table that expands to the fill page width, and uses table notes.

---

```
\begin{table}
```

```
\caption{Summary of the experimental results}
\begin{tabular*}{\hsize}{@{\extracolsep{\fill}}rrrrrrrrrrrr}
\multicolumn{3}{l}{Parameters}&
\multicolumn{5}{c}{Averaged Results}&
\multicolumn{5}{c}{Comparisons}\cr
\hline
\multicolumn{1}{c}{ $n$ }&\multicolumn{1}{c}{ $S^*_{MAX}$ }&
\multicolumn{1}{c}{ $t_1$ }&\multicolumn{1}{c}{ $r_1$ }&\multicolumn{1}{c}{ $m_1$ }&
\multicolumn{1}{c}{ $t_2$ }&\multicolumn{1}{c}{ $r_2$ }&\multicolumn{1}{c}{ $m_2$ }&
\multicolumn{1}{c}{ $t_{lb}$ }&\multicolumn{1}{c}{ $t_1/t_2$ }&
\multicolumn{1}{c}{ $r_1/r_2$ }&\multicolumn{1}{c}{ $m_1/m_2$ }&
\multicolumn{1}{c}{ $t_1/t_{lb}$ }&
\cr
\hline
10\tablenote{Stanford Synchrotron Radiation Laboratory (Stanford University,
Stanford, CA)}&1\quad .0007&4&.0020&4&1.000&.333&1.000&1.000\cr
10\tablenote{$R_{FREE}=R$ factor for the $\sim 5\%$ of the randomly
chosen unique reflections not used in the refinement.}&5\quad .0008&8&.0020&12&.999&.417&.698&1.020\cr
100\tablenote{Calculated for all observed data}&20\quad .0423&95&.1083&521&---&.990&.390&.182&---\quad \cr
\hline
\end{tabular*}
\tablenotes
\end{table}
```

Table 4. Summary of the experimental results

Parameters			Averaged Results					Comparisons				
$n$	$S^*_{MAX}$	$t_1$	$r_1$	$m_1$	$t_2$	$r_2$	$m_2$	$t_{lb}$	$t_1/t_2$	$r_1/r_2$	$m_1/m_2$	$t_1/t_{lb}$
10*	1	4	.0007	4	4	.0020	4	4	1.000	.333	1.000	1.000
10 <sup>†</sup>	5	50	.0008	8	50	.0020	12	49	.999	.417	.698	1.020
100 <sup>‡</sup>	20	2840975	.0423	95	2871117	.1083	521	—	.990	.390	.182	—

\*Stanford Synchrotron Radiation Laboratory (Stanford University, Stanford, CA)  
<sup>†</sup> $R_{FREE}$  =  $R$  factor for the  $\sim 5\%$  of the randomly chosen unique reflections not used in the refinement.  
<sup>‡</sup>Calculated for all observed data

Suggestions for Article Submission

Avoiding LaTeX Errors, Improving the Article Appearance

One of the most common errors a beginning LaTeX user makes is to use " for quote marks. This may print the first set of quote marks facing backwards. To avoid this use single quotes, ‘ ‘ and ’ ’ on the left and right side of the term.



---

Change "word" to ‘‘word’’

.....

---

Change "word" to “word”

---

## Using the Tilde

The tilde, which looks like this on the screen: ~, can be used to prevent line breaks as well as providing the correct intraword space. This may be used between a word and number, when it is inappropriate for the two to be separated, as in Figure~3. Another good use for the tilde is to give the correct space when you have a term that ends with a period but is midsentence, such as Ms.~Serandon.

## Hyphenation

Add discretionary hyphenation if necessary. This is used if LaTeX doesn’t know how to hyphenate a word and because of this sticks it out into the margin. The discretionary hyphen will not be used unless the word is on the right margin and needs to break over lines. This is convenient because it lets you add hyphens when they are needed but doesn’t print them if they are not.

---

```
su\~per\~frag\~i\~cal\~is\~tic
```

---

You may also build a hyphenation dictionary with words that are commonly found in your papers:

---

```
\hyphenation{su-per-frag-i-cal-is-tic, FORTRAN}
```

---

Including a word in the hyphenation dictionary and not putting in any hyphens will prevent that word from hyphenating when used in your paper. For example `\hyphenation{FORTRAN}` will prevent FORTRAN from breaking over lines.

You can make a hyphenation dictionary and use it for many papers by copying it into the top of the file you are working on, before `\begin{document}`.

---

As we see in Figure~\ref{thirdfig}, and Mr.~Smith

.....

---

As we see in Figure 3, and Mr. Smith

---

## Math Advice

### A Tip on Using Eqnarray

You can add space between lines in an array, which may improve visibility, by supplying a dimension in square brackets after the end of the table line, `\\[6pt]` as you see below.

---

```
\begin{eqnarray}
x_{1} &= & \left[\frac{(x - x_{0})}{\cos \Theta}\right] + (y - y_0) \sin \Theta + \\
(y - y_{0}) &\sin \Theta & \\
\Delta\Gamma y_{1} &= & -\frac{\left(\frac{x}{-x_0}\right)}{\sin \Theta} + (y - y_0) \cos \Theta + \\
(y - y_{0}) &\cos \Theta & . \\
\end{eqnarray}
```

---

$$x_1 = \left[ \frac{(x - x_0)}{\cos \Theta} \right] + (y - y_0) \sin \Theta \quad [1]$$

$$\Delta\Gamma y_1 = -\frac{\left(\frac{x}{-x_0}\right)}{\sin \Theta} + (y - y_0) \cos \Theta. \quad [2]$$


---

### Changing Font Size in Math

Font sizes in math can be changed in the same way that it would be any  $\text{\LaTeX}$  document. You can see several examples below of calling for a particular math font size, where the use of `\textstyle` keeps parts of the equation easily visible.

The math font size choices from large to small are:

`\displaystyle`, `\textstyle`, `\scriptstyle`, `\scriptscriptstyle`

Displaystyle is that normally found in display math,

`\displaystyle\sum ABC123`  $\sum ABC123$

Textstyle is the size of math in a paragraph,

`\sum ABC123`  $\sum ABC123$

Scriptstyle is the size found in a super or sub script, or in the top or bottom of a fraction,

`\scriptstyle xyz^{\scriptstyle ABC123}\frac{\scriptstyle ABC}{\scriptstyle 123}`  $xyz^{ABC123}\frac{ABC}{123}$

Scriptscriptstyle is the size of math in a super or subscript in math that is already super or subscripted, or a fraction found within a fraction.

`\scriptscriptstyle xyz^{\scriptscriptstyle ABC123^{\scriptscriptstyle ABC123}}\frac{\scriptscriptstyle \frac{\scriptscriptstyle ABC}{\scriptscriptstyle 123}}{\scriptscriptstyle \frac{\scriptscriptstyle ABC}{\scriptscriptstyle 123}}`  $xyz^{ABC123^{ABC123}\frac{ABC}{123}}\frac{ABC}{123}$

When you see an equation whose terms look so small and crowded, you will want to change the size of the terms. Typing in `\textstyle` or `\displaystyle` to make the expression readable.

This example shows the change in a fraction found underneath the summation sign, from the default to the somewhat larger version after using the `\textstyle` command, and a similar change in a fraction inside another fraction.

---

Change from

```
\[\sum_{a+\frac{b}{c}\atop N\to\infty}\qquad\qquad
\frac{\left(\frac{x}{-x_0}\right)}{\sin \Theta} \]
```

to

```
\[\sum_{\textstyle a+\frac{b}{c}\atop N\to\infty}\qquad\qquad
\frac{\left(\textstyle \frac{x}{\textstyle -x_0}\right)}{\sin \Theta} \]
```

.....

Change from

$$\sum_{a+\frac{b}{c}\atop N\rightarrow\infty} \frac{\left(\frac{x}{-x_0}\right)}{\sin \Theta}$$

to

$$\sum_{a+\frac{b}{c}\atop N\rightarrow\infty} \frac{\left(\frac{x}{-x_0}\right)}{\sin \Theta}$$


---

**Enjoy!**

– Amy Hendrickson

*TeXnology Inc.*

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# INDEX

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Author files

- `*.eps` files, 4

Author files

- author macro files, 5

Bibliography style, 10

BibTeX, 11

Commands

- `eqnarray`, 15

- `\caption{}`, 11

- `\tablenote{}`, 13

- `\tablenotes{}{}`, 13

Current Version, 1

Download file site, 1

Files in macro package, 2

Hyphenation

- discretionary, 14

- preventing for word, 15

Math

- font sizes, 15

- space between lines, 15

PostScript font file

- modifying, 4

Sample file

- `PNASoneS.tex`, 3

- `PNAStwoS.tex`, 3

Tables, 12

Technical support, 1

Template file

- `template.tex`, 3