

The AAST_{TeX} Macros for Manuscript Preparation

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The AAS has developed an author markup package to assist authors in preparing manuscripts for articles that are intended for submission to the AAS- and ASP-affiliated journals. It is important that the markup used by authors in electronic manuscripts (sometimes called compuscripts) be consistent and standardized so that such manuscripts can be widely accepted by the journals, ultimately so that they can become part of the normal production procedures.

This guide contains basic instructions for creating manuscripts using the AAST_{TeX} markup package, which functions as substyles to the standard L^AT_{EX} `article` style. Authors are expected to be familiar with the editorial requirements of the journals so that they can make appropriate submissions, as well as to have at least a rudimentary knowledge of T_{EX} (for instance, knowing how to set up equations using T_{EX} commands). It is unrealistic to provide a tutorial on T_{EX}; readers who are unfamiliar with T_{EX} are advised that they will need additional sources of information. A number of useful publications are listed in the references section of this guide.

1. Introduction

The AAST_{TeX} author-prepared package was developed to provide authors with a consistent means of preparing articles for submission to AAS and ASP journals. The most important aspect of the package is that it defines the set of commands (called *markup*) that can be used to identify the structural elements of papers. When articles are marked up using this set of standard commands, the papers can be submitted electronically to the editorial offices, and it can also eventually be passed along to the publisher.

For purposes of producing paper output, the AAST_{TeX} package contains a number of L^AT_{EX} style files that produce variously formatted pages. There is a “manuscript” style, two “preprint” styles, and two “plano table” styles. The manuscript style is used for papers that are submitted to AAS and ASP journals for review. The preprint styles render articles in a compact form that may be suitable for distribution among colleagues. The plano table styles are used by authors who wish to submit camera-ready tables to the journals for publication.

2. General preparation instructions

Computer manuscripts must include all the necessary components, e.g., a title, author names and their affiliations, an abstract, a main body, tables, etc., in the proper order according to the editorial requirements of the journal. It is the author’s responsibility to ensure that the article conforms to all editorial specifications regarding content and organization, mathematical formulæ, chemical names, etc.

In the sections that follow, we review some essential procedures that must be followed when preparing T_{EX} input.

2.1. Running text

Printing is different from typewriting, and T_{EX} is different from other word processing tools. This section consists of reminders (admonitions) about things that require special attention so that T_{EX} can format the input properly.

The ends of words and sentences are marked by white space, and it doesn’t matter how many spaces are typed; one is as good as 100. T_{EX} treats the end of a line in the input file as a space.

Paragraphs are separated by blank lines. Don’t hyphenate words in the input file; T_{EX} takes care of hyphenation automatically. Continue to hyphenate modifiers within a line of text, e.g., “author-prepared copy.”

Quotation marks should be typed as pairs of opening and closing single quotes, e.g., ‘‘quoted text’’; don’t use double quotes (“bad form”).

Do not underline. In printing, text is emphasized by changing the type style, usually to *slanted* or *italic* type.

A number of common characters are interpreted as commands, and these must be entered specially, by preceding them with a backslash (\): \$ & % # { and } must be typed \ \$ \& \% \# \{ and \}.

Authors should refrain from adding vertical or horizontal space. Concentrate on the content of the document and identifying its components with the structural markup commands. Authors should avoid creating new commands by using L^AT_{EX} commands that create “private” markup commands that are not described in this guide.

2.2. Math

Mathematical expressions that are part of the running text are delimited by a single dollar sign (\$), e.g., `\pi r^2` yields πr^2 . To get the appropriately sized superscript or subscript in the roman font, use the `\rm`

command, e.g., `\J_{\rm HF}(t)` produces $J_{\rm HF}(t)$.

Displayed equations can be delimited in several ways. The most concise markup is to bracket the equation between `\[` and `\]` commands, which is equivalent to placing the formula in a `displaymath` environment. These markup commands will produce *unnumbered* equations.

Numbered equations can be typeset by typing the formula in an `equation` environment. A series of related equations that need vertical alignment, e.g., a derivation where alignment is wanted on the equal sign (`=`), can be typeset in an `eqnarray` environment.

While it is possible for authors to assign their own equation numbers, it is easier to let L^AT_EX number them automatically. By default, L^AT_EX will number equations sequentially from the beginning of the paper to the end.

It is sometimes appropriate for equation numbering sequences to carry through sections of the paper only. Equations can be numbered (*sec-eqn*) by placing the command `\eqsecnum` in the preamble of the document.

2.3. Tables

Tables are notoriously difficult to compose, and great care and patience are usually required before tabular information can be typeset satisfactorily. Tables should be placed in separate table environments, i.e., the tabular material must be enclosed within `\begin{table}` and `\end{table}` commands. Tables should have a title or caption and the correct number of descriptive column headings. A single horizontal rule should be set after the column headings with the `\tableline` command. Do not insert any other horizontal or vertical lines in the body of the table.

The `planotable` environment is intended to make it easier to prepare camera-ready tables, although many authors will find `planotable` suitable for *all* tables. Authors who are using the `plano` tables styles to prepare camera-ready tables are urged to read the `plano` tables section carefully.

Notes in tables should be marked by `\tablenotemark`; corresponding text should appear in a `\tablenotetext` command.

2.4. Cross-referencing

Cross-referencing equations, tables, and figures in text depends upon the use of “tags”, which are defined by the user. The `\label` command is used to define cross-reference tags for L^AT_EX; `\ref` is used to refer to them. Tags are simply text strings that serve to label equations, tables, and figures, so that they may be referred to symbolically in the text. Authors should place `\label`

commands immediately after the markup command that starts the structure being referenced. References to page numbers should *not* be made.

L^AT_EX keeps track of autonumbered counters and cross-reference information by maintaining an auxiliary file in the same working directory as the source file. The auxiliary file will have an extension of `.aux`. This file should not be deleted, since subsequent L^AT_EX processing uses the auxiliary data to resolve references, etc.

The auxiliary file mechanism makes it necessary to run L^AT_EX on a given source file more than once to ensure that the cross-reference information has been properly resolved. This is most evident when changes are made that affect the number or the placement of equations, tables, and the like. L^AT_EX will typically issue a warning message that advises the user to “rerun to get cross-references right”, in which case, run L^AT_EX again. If the error message appears after two successive L^AT_EX runs, it is likely that a reference has been made to an undefined label.

2.5. Alternate style options

It is not the objective of the AAST_EX project to develop L^AT_EX styles that produce pages that mimic the appearance of specific journals. Since this is the case, we have chosen to provide several format options within the preprint styles themselves so that output format can be varied. The `aaspp` substyle offers a single-spaced alternative for manuscripts, for instance. The primary motivation behind this idea is to provide some definitions that permit individuals to distribute “pretty” preprints with this package. In recognition of the fact that beauty is in the eye of the beholder, there is no intention that any of these styles should define pretty.

Editors prefer a large typeface with adequate space between typed lines for technical editing marks and wide margins for editor and author comments. The use of the `aasms` substyle will produce double-spaced, full-width output by default.

Authors may prefer a denser form of output for distribution to colleagues who are primarily interested in reading the paper, as opposed to copy editing it. The `aaspp` substyle is similar to the manuscript style, but it is single-spaced, and it is possible to use a smaller typeface. For wide text lines (as in the `aaspp` style), it is advisable to use faces no smaller than 11 points (11pt substyle option). Author’s remarks appear in the upper right corner of the title page, and no explicit page breaks are inserted in the front matter by the style.

Another alternative is to include the `\tighten` command in the document preamble when the `aasms` substyle

is used; its effect is to reduce the vertical spacing in the text. The rest of the formatting will be identical to the manuscript format.

For institutional purposes, it may be preferable for preprints to be set in two columns, have running heads, etc. The `aasptwo` substyle may be used instead to produce two-column pages. This style can be used as is, but it can also serve as a point of departure for L^AT_EX style writers at institutions that want preprints of this general nature.

The preparation of “plano tables” (camera-ready, or *planographic*) is possible by using one of the style files `aj_pt` or `apjpt`. These styles produce tables in formats suitable for the AJ and the ApJ, respectively; the `aj_pt` style could be used to create camera-ready tables for PASP as well. These styles are intended primarily for the production of tables that the author wishes to submit camera-ready; they are not designed to produce journal pages.

3. Command descriptions

This section describes the commands in the AAST_EX markup package that an author might enter in an electronic manuscript. In the interest of completeness, all the structural markup that is needed to identify components is discussed. The commands will be described in roughly the same order as they would appear in a manuscript. The reader will probably find it helpful to examine the sample papers (`sample1.tex` and `sample2.tex`) as well.

Preamble

Most documents processed with a formatter have a collection of commands at the beginning of the file that establish settings for global parameters; this initialization section is sometimes called the *preamble*. In L^AT_EX manuscripts, the preamble is that portion of the file before the `\begin{document}` command.

The first piece of markup in the manuscript must declare the overall style of the document.

```
\documentstyle[12pt,aasms]{article}
```

The `\documentstyle` command must appear first in any L^AT_EX file, and this one specifies the main style to be the `article` style using twelve point fonts, with modifications and additions for the `aasms` substyle. It is preferable to use fonts at twelve points to prevent illegibility due to exceedingly long lines (too many characters on a line make it hard to read). The `aasms` substyle will issue a warning message if the font size is smaller than twelve points, and the size will be set to twelve points; the file will still be processed.

Tightening the vertical spacing in the text results in output that may be attractive for distribution to colleagues who are primarily interested in reading the paper, as opposed to copy editing it. Authors may include a

```
\tighten
```

declaration in the preamble to direct the formatter to produce a somewhat denser manuscript. If the authors prefer not to insert this markup directly, the same effect can be achieved with the `tighten` document substyle.

```
\documentstyle[aasms,tighten]{article}
```

Double-spaced output for referees and copy editors is the main objective of this style, hence the double-spacing occurs by default. Neither the `\tighten` command nor the `tighten` substyle should be used for manuscripts submitted to the editorial office for scientific review.

Preprint format

A single-column preprint format can be specified with the `aaspp` substyle option.

```
\documentstyle[11pt,aaspp]{article}
```

The size of the typeface used is under author control by way of L^AT_EX’s `NNpt` article substyles (where `NN` is 10, 11, or 12). Use of 10 point type is not recommended with the `aaspp` style.

Authors may wish to adjust vertical spacing within a preprint, for instance, double-spacing text while single-spacing tables. Authors who want to alternate between single and double spacing in the manuscript may use the following commands.

```
\singlespace
\doublespace
```

`\singlespace` sets the vertical spacing to a smaller value, while `\doublespace` causes double-spacing. These are different from `\tighten`, which is intended for use in the preamble of the article.

Two-column format

The `aasptwo` substyle has the principle function of setting up two-column output.

```
\documentstyle[aasptwo]{article}
```

Although it is quite obvious, it is important to remember that text lines are considerably shorter when two of them are typeset side by side on a page. Long equations,

wide tables and figures, and the like, may not typeset in this format without some adjustments. The expenditure of great effort to adapt copy and markup for two-column pages is probably counterproductive. Remember that the main goal of this package at this point is to produce “correct” draft (or referee) format pages; it is the responsibility of the editors and publishers to produce publication format papers for the journals.

The `aaspptwo` substyle does not impose a format for the article’s front matter, although there is often merit in setting the title, author, abstract, and keyword material on a separate page at full text width. The author may supply the `\twocolumn` command wherever desired.

`\twocolumn`

Note that the two-column format begins at the point `\twocolumn` appears in the text, and if that point is before the front matter, title and author and so forth will be typeset in two-column mode along with the rest of the paper; that’s how this manual is prepared, for example. For purposes of producing “pretty” output, it is probably desirable to put the `\twocolumn` command after the abstract and keywords, just before the body of the paper. If `\twocolumn` is not specified explicitly in `aaspptwo` style documents, the introductory material of the paper will be set in one-column mode; the first `\section` command (presumably demarcating the beginning of the main body of the article) will engage the two-column mode.

Slug line data

Journal and article identification information is established by the editorial staff. The following markup will be used by personnel at the editorial office to record slug-line data; these commands appear in the manuscript preamble. These pieces of markup can be used to facilitate communication between the editorial office and the publisher.

`\received{RECEIPT DATE}`
`\revised{REVISION DATE}`
`\accepted{ACCEPT DATE}`

For preprints and manuscripts in draft/referee format, etc., the slug-line information is irrelevant and generally in those styles of that nature, the data are never formatted or printed. Receipt and acceptance dates (or blank lines representing them) are printed on `aasms` articles, that is, on true manuscripts. The `aaspp` and `aaspptwo` styles do not print the rules or the dates. Authors do not know what these dates are, however, so there is no reason for the author to include `\received` and `\accepted`

commands in manuscripts. Editorial staff will insert the correct information as appropriate.

`\journalid{VOL}{JOURNAL DATE}`
`\articleid{START PAGE}{END PAGE}`
`\paperid{MANUSCRIPT ID}`

The `\journalid` and `articleid` commands are used to identify the volume and page numbers of a scheduled article. The manuscript identification number used to track the manuscript is specified in the `\paperid` command.

`\copyright{TYPE}{YEAR}`
`\ccc{CODE}`

Copyright information is specified through the commands `\copyright` and `\ccc`. The “type” of copyright and the corresponding year are given in `\copyright`; valid copyright types are as follows.

AAS	Copyright has been assigned to the AAS.
ASP	Copyright has been assigned to the ASP.
Crown	Crown (UK) copyright has been assigned to the AAS.
PD	The article is in the public domain.
none	No copyright is claimed for the article.

The copyright type is case-sensitive, so the type string must be entered exactly as given above. The Copyright Clearing Center code may be given in the `\ccc` command; the code is taken as regular text, so any special characters, notably ‘\$’, must be properly specified.

Authors are invited to supply running head information. There are generally two different kinds of data in running heads; what is called here the left head contains an author list (last names, possibly truncated as “et al.”), while the right head is an abbreviated form of the paper title.

`\lefthead{TEXT}`
`\righthead{TEXT}`

Editors and publishers impose varying requirements on the brevity of these data; authors are asked to keep these items as short as possible.

Authors who wish to include a short remark on the title page, such as the name and date of the journal in which an article has been scheduled, may do so with the following command.

`\slugcomment{TEXT}`

In the `aasms` style, such comments appear after the dates; in the `aaspp` style, they are placed at the upper right corner of the title page.

Starting the main body

None of the markup that appears in the preamble actually typesets anything; the preamble is only a control section. The author must include a

`\begin{document}`

command to identify the beginning of the main textual portion of the manuscript.

Title, byline, abstract, etc.

Title and author identification are by way of the markup commands `\title` and `\author`. The authors' principal affiliation is specified with a separate command `\affil`. Each `\author` command should be followed by a corresponding `\affil`.

```
\title{LUCID TEXT}
\author{NAME(S)}
\affil{AFFILIATION}
\authoraddr{ADDRESS}
\and
```

Line breaks are permitted in the title if the author wishes to specify them with the `\\` command. Long titles will be broken automatically, so the `\\` markup is not required. If the title is explicitly broken over several lines, the preferred style for titles in AAS and ASP journals is the so-called “inverted pyramid” style. In this style, the longest line is the first (or top) line, and each succeeding line is shorter. The text of the title should be entered in mixed case; it will be converted to uppercase by the publisher. Footnotes are permissible in titles; be careful to ensure that alternate affiliations (see below) are properly numbered if a footnote to the title is specified.

Authors' names are given in `\author` commands, and should be entered in mixed case. Names that appear together in the author list for authors who have the same primary affiliation should be specified in a single `\author` command. Each author group (`\author` command) should be followed by an `\affil` command, giving the principal affiliation of that author. Physical and postal address information for the institution specified may be included with its name. The address can be broken over several lines by using the `\\` command to

indicate the line breaks. Usually, however, postal information will fit on one line. When there is more than one `\author` command, the last one should be preceded by an `\and` command.

When there is a lengthy author list, all authors' names may be specified in a single `\author` command, with affiliations specified using the `\altaffilmark` mechanism described below. In this case, no `\affil` commands would be used, and the affiliations would all be listed in a footnote block at the bottom of the title page. The style file performs this formatting.

Postal addresses for individual authors may be specified in `\authoraddr` commands. This command does not produce any formatted text in most AAST_{EX} styles, and can be used to specify the corresponding address of the first author for purposes of editorial communication.

Authors often have affiliations in addition to their principal employer, and these are specified with the `\altaffilmark` and `\altaffiltext` commands. These behave like the `\footnotemark` and `\footnotetext` commands of L^AT_EX. `\altaffilmark` is appended to author's names in the `\author` lists, and generates superscript identification numbers. The text for the individual alternate affiliations is generated by the `\altaffiltext` command.

```
\altaffilmark{TAG NUMBER(S)}
\altaffiltext{NUMERICAL TAG}{TEXT}
```

It is up to the author to make sure that `\altaffilmark` numbers attached to authors' names correspond to the correct alternate affiliation, i.e., that each TAG NUMBER match the NUMERICAL TAG for the corresponding TEXT.

Abstract

The paper abstract should be enclosed in an `abstract` environment.

```
\begin{abstract}
abstract text
\end{abstract}
```

Keywords

Keywords, subject headings, etc., are accommodated as a single piece of text.

```
\keywords{TEXT}
```

Authors must supply keywords delimited by the appropriate punctuation required by the journal. Keywords should be specified in alphabetical order. The `\keywords`

command supplies the proper leading text (“Keywords:”, “Subject headings:”, etc.), according to the style.

Sections

The `article` style for AAST_EX manuscripts supports four levels of sectioning.

```
\section{HEADING}
\subsection{HEADING}
\subsubsection{HEADING}
\paragraph{HEADING}
```

Section headings should be given in mixed case. Note that these commands delimit sections by marking the *beginning* of each section; there are not separate commands to identify the ends.

In addition, AAST_EX manuscript styles support an `\acknowledgments` section.

```
\acknowledgments
```

In the AAST_EX substyles, acknowledgments are set off from the concluding main body text simply by vertical space (no heading or type size change). For use in producing output for specific journals, this command might generate text saying “Acknowledg[e]ments”.

Appendices

When one or more appendices are needed in a paper, the end of the main body text must be marked.

```
\appendix
```

Note that the `\appendix` command has no arguments; sections in the appendix must be headed with `\section` commands containing the section headings, as described before. The `\appendix` command takes care of a number of internal housekeeping concerns, such as identifying sections with letters instead of numerals, resetting the equation counter, etc.

Citations

Citations in the text may be called out with either a `\markcite` command or a `\cite` command.

```
\markcite{TEXT}
\cite{TAG}
```

Which of these is used depends on the form chosen for the reference list (described below). `\markcite` corresponds to the use of the `references` environment, while `\cite` would be used in conjunction with `thebibliography`.

The conventional method used by authors to manage the citations and reference list in a paper is a manual one. For these authors, the `references` environment and `\markcite` are appropriate. The text supplied in the `\markcite` command is the text that will be inserted in the body at that point; this text should include any necessary punctuation.

L^AT_EX’s `thebibliography` environment allows authors to identify references symbolically using unique tags (the author makes these up). If this mechanism is used, the TAG given in the `\cite` command must correspond to a TAG given in a `\bibitem` command in the `thebibliography` environment (see below).

In many cases, citations may be called out explicitly by the author without any markup, since they are usually just running text for AAS and ASP journals. However, the use of `\markcite` is still encouraged, even for journals where no special formatting of citation call-outs is required. This will make the electronic texts more useful in the future in the event that they are perused with on-line browsers.

Equations

Displayed equations can be typeset in many ways using the standard displayed math environments of L^AT_EX; these three are probably of greatest use.

```
\begin{displaymath}
\end{displaymath}
\begin{equation}
\end{equation}
\begin{eqnarray}
\end{eqnarray}
```

The `displaymath` environment will break out a single, unnumbered formula. The equation will appear the same if it is set in an `equation` environment, and it will be autonumbered by L^AT_EX. In order to set several formulae in which vertical alignment is required, use the `eqnarray` environment.

Authors occasionally wish to group related equations together and identify them with letters appended to the same equation number, as opposed to having each with a separate numeral. When this is desired, such related equations should still be set in `equation` or `eqnarray` environments (whichever is appropriate may be used), and this grouping should be placed within a `mathletters` environment.

```
\begin{mathletters}
equation or eqnarray environment(s)
\end{mathletters}
```

It is possible to override L^AT_EX's automatic numbering within `equation` or `eqnarray` environments.

```
\eqnum{TEXT}
```

When `\eqnum` is specified inside an `equation` environment, or on a particular equation within an `eqnarray`, the text supplied as an argument to `\eqnum` is used as the equation identifier. L^AT_EX's equation counter is *not* incremented when `\eqnum` is used. `\eqnum` must be used *inside* the environment.

When unnumbered equations are desired, authors can use either the `displaymath` environment (for single displayed equations) or place a `\nonumber` command before the equation delimiter (`\`) in a particular equation in an `eqnarray`. L^AT_EX's equation counter is *not* incremented when `\nonumber` is used.

If, as a consequence of the use of `\eqnum` or `\nonumber`, L^AT_EX's equation counter gets out of the author's intended sequence, the counter may be reset to a particular value.

```
\setcounter{equation}{NUMBER}
```

The equation counter should be set to the number corresponding to the last equation that was formatted, so it is most appropriate for this command to appear immediately after an `equation` or `eqnarray` environment ends. `\setcounter{equation}` must be used *outside* the math environments.

Sometimes it is appropriate to number equations by section, rather than sequentially through the whole paper. When this is required,

```
\eqsecnum
```

should be specified in the document preamble. As is the case with tightening the interline spacing (`\tighten`, above), authors need not insert the extra markup command in the text. The same effect can be achieved with the `eqsecnum` document substyle.

```
\documentstyle[aaams,eqsecnum]{article}
```

Bibliography

As discussed briefly in the preceding section on citations, there are two main methods for managing citations and references. Many authors are comfortable with the standard process of entering citations in the proper format directly in the body of an article, and then organizing the reference list themselves. Such authors would use `\markcite` for the citation call-outs in the text, and employ the `references` environment for the reference list.

The `references` environment simply sets off the list of references and adjusts spacing parameters.

```
\begin{references}
\reference bibliographic data
.
.
\end{references}
```

Each reference is preceded by a `\reference` command.

Observe that the *bibliographic data* supplied by the author must conform to the standards of the journal. We have elected not to burden authors with tedious markup commands to delimit the bibliographic fields because many of the journals we have targeted in this project have agreed to reduce typographic overhead (bolding, italicizing, etc.) in reference lists (Abt 1990). It is the responsibility of the author to get these fields in the proper order with the correct punctuation; the information will be typeset as is, i.e., in roman with no size or style changes.

It is also possible to use the semantics of L^AT_EX's `thebibliography` environment, marking citations with `\cite` and associating references with them via `\bibitem`. The `\cite`-`\bibitem` mechanism associates citations and references symbolically while maintaining proper citation syntax within the paper. The author must create the citation label for each reference in proper journal format in the `\bibitem` command.

```
\begin{thebibliography}
\bibitem[LABEL]{TAG} \reference bibliographic data
.
.
\end{thebibliography}
```

where LABEL must adhere to journal standards, e.g., "Abt 1986". Note that it is not possible to use `\bibitem`s within the `references` environment, nor will `\cite` commands work properly in the main body if `\bibitem`s are not properly specified. This technique can be a bit tricky, and there are limitations on the way that the citation LABEL is formatted. Authors are advised to consult the L^AT_EX manual (Lamport 1985).

Citation management can be complex, and systems have been developed to assist authors in preparing bibliographies. The program that manages references within the T_EX family is called BIB_TE_X, and it is designed to work in conjunction with the citation and reference list capabilities of L^AT_EX. At the present time, there is no compelling reason to force an implementation based on BIB_TE_X, although it should be possible to build reference lists with BIB_TE_X if authors choose. (It is also

possible to define a bibliographic style for `BIBTEX` so that citations and reference lists are formatted correctly automatically.)

An identifier denoting that the article was prepared with the `AASTEX` package appears as a footnote on the last page of references.

Abbreviations for journals

There are markup commands for many of the oft-referenced journals so that authors may use the markup names as a shorthand rather than having to look up a particular journal's specific abbreviation. In principle, all the journals should be using the same abbreviations as well, but it is fair to anticipate some changes in the specific abbreviations before a set is finally settled on. As long as these commands are kept up to date, authors need not be concerned about such editorial preferences and changes.

<code>\aj</code>	Astronomical Journal
<code>\araa</code>	Annual Review of Astronomy and Astrophysics
<code>\apj</code>	Astrophysical Journal
<code>\apjl</code>	—, Letters to the Editor
<code>\apjs</code>	—, Supplement Series
<code>\ao</code>	Applied Optics
<code>\apss</code>	Astrophysics and Space Science
<code>\aap</code>	Astronomy and Astrophysics
<code>\aaps</code>	—, Supplement Series
<code>\azh</code>	Astronomicheskii Zhurnal
<code>\baas</code>	Bulletin of the AAS
<code>\jrasc</code>	Journal of the RAS of Canada
<code>\memras</code>	Memoirs of the RAS
<code>\mnras</code>	Monthly Notices of the RAS
<code>\pra</code>	Physical Review A: General Physics
<code>\prb</code>	Physical Review B: Solid State
<code>\prc</code>	Physical Review C:
<code>\prd</code>	Physical Review D:
<code>\prl</code>	Physical Review Letters
<code>\pasp</code>	Publications of the ASP
<code>\pasj</code>	Publications of the ASJ
<code>\qjras</code>	Quarterly Journal of the RAS
<code>\skytel</code>	Sky and Telescope
<code>\sovast</code>	Soviet Astronomy
<code>\ssr</code>	Space Science Reviews
<code>\zap</code>	Zeitschrift für Astrophysik

Tables

There is support in the `AASTEX` package for tables via two mechanisms: `LATEX`'s standard `table` and `tabular` environments, and a `planotable` environment that facilitates the formatting of lengthy tabular material. Short

tables may be marked up using either mechanism; long tables will require the use of `planotable`.

`LATEX` permits the preparation of fairly complex tables with arbitrary spacing, straddle heads and rules, and the like. Authors who need to specify complicated column headings and so forth are advised to consult the `LATEX` manual (Lamport 1985) for details. Most of the capabilities are applicable to `AASTEX`'s `planotable` environment as well as `LATEX`'s `tabular`.

Long tables, plano tables

This section describes the use of the `planotable` environment. This environment is so named because it was originally developed to aid authors in preparing camera-ready tables for an article; such camera-ready material would be produced in the same way as planographic figures, hence the term “plano table”.

There are several desiderata that are somewhat above and beyond `LaTeX`'s `tabular` environment that facilitate the formatting of such tables. Among these are breaking long tables across pages, using footnotes in a table, specifying comments and references for tables, etc.

There are special `LATEX` substyle options within the `AASTEX` package that authors can use to produce plano table output suitable for photographic reproduction in specific AAS and ASP journals; these are the `aj_pt` and `apjpt` substyles.

```
\documentstyle[aj_pt]{article}
\documentstyle[apjpt]{article}
```

When tabular material is prepared with one of these style files, the pages produced will be suitable for submission to the journal as camera-ready “art”. These special styles are intended for producing plano tables *only*; manuscripts should *not* be formatted with the `aj_pt` or the `apjpt` substyle; Plano tables should be formatted separately from the manuscript.

Very long tables can be formatted within manuscripts using the same markup commands as plano tables; the output looks different, of course. The `planotable` environment is delimited by `LATEX`'s familiar `\begin` and `\end` constructs.

```
\begin{planotable}{COLS}
\end{planotable}
```

`COLS` specifies the justification for each column. One of the letters ‘l’, ‘c’, or ‘r’ is given for each column, indicating left, center, or right justification. Authors are referred to the `LATEX` manual (Lamport 1985) for further information.

There are several items in a `planotable` environment that must be given before the data for the table.

```
\tablewidth{DIMEN}
\tablecaption{TEXT}
```

The width of a plano table is defined by `\tablewidth`; the default width is the width of the body text. The table can be set to its natural width by specifying a DIMEN of 0pt.

The caption (actually, the title) of the table is specified in `\tablecaption`. The intent is for the text of `\tablecaption` to be brief; explanatory notes may be specified in the end notes to the table (`\tablecomments`, see below).

```
\tablehead{TEXT}
\colhead{HEADING}
```

Column headings are specified within a `\tablehead`. Within the `\tablehead`, each column heading can be given in a `\colhead`, which will ensure that the heading is centered on the natural width of the column; this is the typical disposition of column headings, and the use of `\colhead` is encouraged. There should be a heading for each column, so there should be as many `\colhead` commands in the `\tablehead` as there are data columns. If more complicated column headings are required, any valid `tabular` commands that constitute a proper head line for the table may be used. Consult the L^AT_EX manual (Lamport 1985) for details about using the `tabular` environment to prepare tables.

```
\tableheadfrac{NUM}
```

It is possible that a complicated table heading will overflow the vertical space allotted for the table heading. The fraction of the page allocated for the table heading may be changed with `\tableheadfrac`. The NUM argument to `\tableheadfrac` should be the decimal fraction of the page used for heading information. The default value is .1, meaning that 10% of the page height is reserved for the table heading. It should rarely be necessary to change this value.

After the table title and column headings are specified, data lines can be entered. There are some concessions that must be made in the markup language in order to enable the automatic page breaking.

```
\startdata
```

The body of the plano table (the beginning of the data lines) is indicated by a `\startdata` command.

`\startdata` produces a table title (caption), the column headings are formatted, and tabular formatting is engaged.

```
\nl
\tablevspace{DIMEN}
```

Data elements within a row of the table are separated with & (ampersand) characters. The end of each row is indicated with `\nl`. Extra vertical space can be inserted between rows with a `\tablevspace` command; the argument is a dimension, and may be specified in any units that are legitimate in L^AT_EX.

```
\tablebreak
\nodata
```

If a page break needs to be forced in a plano table, `\tablebreak` should be used instead of `\nl`. This is sometimes necessary when several rows of data are associated with a single object or item; such logical groupings should not be broken across pages, and `\tablebreak` can be used to ensure that the page breaks are rational in these cases.

The journals often require that elements for which there are no data be explicitly marked. This is to differentiate such elements from blank elements, which are frequently interpreted as implicitly repeating the entry in the corresponding element in the row preceding. Data elements for which there are no data should contain a `\nodata` command; an appropriate symbol will be placed in that data element.

Within the plano table body, two kinds of “specialty” heads are recognized.

```
\cutinhead{TEXT}
\sidehead{TEXT}
```

A cut-in head is a piece of text that is centered on the table width; it is spaced above and below from the data rows that precede and follow it, and there may be rules associated, depending on the journal or manuscript style. All of these formatting particulars are managed by the style files. The author need only specify the text to be centered with a `\cutinhead` command. Similarly, a side head is a piece of text that is left-justified.

Table footnotes (more properly, table *endnotes*) may be used in the `planotable` environment; their use is described in detail in the section on *Table footnotes*, below. The markup commands for such endnotes are as follows.

```
\tablenotemark{TAG LETTER(S)}
\tablenotetext{ALPHA TAG}{TEXT}
```

```
\tablecomment{TEXT}
\tablerefs{TEXT}
```

It is possible to override L^AT_EX's automatic numbering within the `planotable` environment.

```
\tablenum{TEXT}
```

When `\tablenum` is specified inside a `planotable` environment, the text supplied as an argument to `\tablenum` is used as the table identifier. L^AT_EX's equation counter is *not* incremented when `\tablenum` is used. `\tablenum` must be used *inside* the `planotable` environment.

Short tables

Short tables (smaller than one manuscript page) may be marked and composed using the standard L^AT_EX tools for tables. Tables should appear in `table` environments.

```
\begin{table}
\end{table}
```

The `table` environment encloses not only the tabular material but also any title (caption) or footnote information associated with the table.

Titles or captions for short tables are indicated with

```
\caption{TEXT}
```

Tables will be identified with arabic numerals, e.g., "Table 2"; the identifying text, including the number, is generated automatically by `\caption` within the `table` environment.

Tabular information is typeset within the `tabular` environment.

```
\begin{tabular}{COLS}
\end{tabular}
```

where COLS specifies the justification for each column. One of the letters 'l', 'c', or 'r' is given for each column, indicating left, center, or right justification. Consult the L^AT_EX manual (Lamport 1985) for details about using the `tabular` environment to prepare tables. There should be only one `tabular` table per `table` environment. If the journal requests manuscripts with only one table per page, the author may need to insert a `\clearpage` command after especially short tables.

There is a `\tableline` command for use in `tabular` environments.

```
\tableline
```

This command produces the horizontal rule(s) between the column headings and the body of the table. Authors are discouraged from using any `\hlines` themselves; vertical rules are typically forbidden by editorial preference.

It is possible to override L^AT_EX's automatic numbering within the `table` environment.

```
\tablenum{TEXT}
```

When `\tablenum` is specified inside a `table` environment, the text supplied as an argument to `\tablenum` is used as the table identifier. L^AT_EX's equation counter is *not* incremented when `\tablenum` is used. `\tablenum` must be used *inside* the `table` environment.

Table footnotes

A^AS^T_EX supports footnotes (endnotes) that are associated with tables; this support applies to both the `planotable` environment and the standard L^AT_EX `table` environment. Footnotes for tables are usually identified by lower case letters rather than numbers. Marking and assigning associated text is achieved with the `\tablenotemark` and `\tablenotetext` commands, in which the note identifier is required (cf. `\altaffilmark` and `\altaffiltext`). The `\tablenotetext` *must* be specified before the enclosing `\end{table}`, since the text of notes to tables are displayed by that command.

```
\tablenotemark{TAG LETTER(S)}
\tablenotetext{ALPHA TAG}{TEXT}
```

Note that the TAG LETTER should be the same as the ALPHA TAG for the corresponding TEXT. It is the responsibility of the author to get the correspondence correct.

A^AS^T_EX also supports special kinds of table endnotes. Sometimes authors tabulate things which have corresponding references, and it may be desirable to associate these references with the table rather than (or in addition to) the formal reference list. Occasionally, authors wish to append a short paragraph of explanatory notes that pertain to the entire table, but which are different than the caption.

```
\tablerefs{REFERENCE LIST}
\tablecomments{TEXT}
```

The table endnotes are coupled to the table in which they occur, rather than being associated with a particular page, and they are printed with the table (relatively close to the caption) instead of appearing at the extreme bottom of the page. This is done to ensure that the notes wind up on the same page as the table, since tables are floats and can migrate from one page to another.

Figures

At this time, the most widely used means of including non-textual data in electronic manuscripts is to insert such information as PostScript.¹ There is limited support for handling PostScript figures in this version of the AAST_{TeX} markup package.

If the author wishes for the PostScript figure to be inserted in the page being produced, it is necessary to use the *dvips* program. This program is available in the public domain via anonymous FTP from labrea.stanford.edu. It is also necessary that the graphics files being included conform to the Encapsulated PostScript standard (Adobe 1990). Encapsulated PostScript will be referred to as ‘EPS’ in what follows.

There are three commands for including EPS files in AAST_{TeX} manuscripts, and these should be placed within a `figure` environment.

```
\begin{figure}
\plotone{EPSFILE}
\plottwo{EPSFILE}{EPSFILE}
\plotfiddle{EPSFILE}{VSIZE}
    {ROT}{HSF}{VSF}{HTRANS}{VTRANS}
\caption{TEXT}
\end{figure}
```

`\plotone` inserts the graphic in the named EPSFILE, scaled (in both dimensions) so that the horizontal dimension fits in the body text width; the vertical dimension is scaled to maintain the aspect ratio. `\plottwo` inserts two plots next to each other. Scale factors are determined automatically from information in the EPS file.

For the adventuresome, there is also `\plotfiddle`, which can be used to override any automatic scaling, or to compensate for the fact that scaling data in the EPS file may be erroneous. When this method is used, the author must specify the *vertical* space allotment for the graphic. The scaling and placement of the figure are controlled by these parameters:

VSIZE	vertical white space to allow for plot (L ^A T _E X dimension)
ROT	rotation angle (degrees)
HSF	horizontal scale (percentage)
VSF	vertical scale (percentage)
HTRANS	horizontal translation (PS points)
VTRANS	vertical translation (PS points)

PostScript points are 1/72 inches, so an HTRANS of 72 moves the graphic 1 inch to the right. The PostScript

reference point is the lower left corner of the page, so a VTRANS of 72 moves the graphic *up* 1 inch.

Authors are referred to the submission instructions for the appropriate editorial office if EPS figures will be submitted along with a manuscript via email. These instructions can be obtained by sending a request by email to one of the addresses given in the README file.

Figures may still be submitted on paper in the usual way, with or without a companion paper manuscript. When an author submits figures on paper, only the figure captions need to be generated with the text of the paper. They should be produced by using the `\caption` command within an otherwise empty `figure` environment.

```
\begin{figure}
\caption{TEXT}
\end{figure}
```

When the `figure` environment is used, the figure identification, e.g., “Figure 1”, is generated automatically by `\caption`. It is usually acceptable for several figure captions to appear on the same page.

It is possible to override L^AT_EX’s automatic numbering within the `figure` environment.

```
\figurenum{TEXT}
```

When `\figurenum` is specified inside a `figure` environment, the text supplied as an argument to `\figurenum` is used as the figure identifier. L^AT_EX’s equation counter is *not* incremented when `\figurenum` is used. `\figurenum` must be used *inside* the `figure` environment.

Footnotes are *not* supported for figures.

Miscellaneous

When discussing atomic species, ionization levels can be indicated with the following command.

```
\ion{ELEMENT}{LEVEL}
```

The ionization state is specified as the second argument, and should be given as a numeral. For example, Ca III is specified by typing `\ion{Ca}{3}`.

AAST_{TeX} contains two commands that permit authors to specify alternate forms for fractions. Authors submitting manuscripts electronically will generally find it unnecessary to use any markup other than the standard L^AT_EX `\frac`.

```
\case{NUM}{DENOM}
\slantfrac{NUM}{DENOM}
```

¹PostScript is a registered trademark of Adobe Systems Incorporated.

L^AT_EX will set fractions in displayed math as built-up fractions; it is sometimes desirable to use case fractions in displayed equations. In such instances, one should use `\case` rather than `\frac`. Occasionally, authors wish to typeset fractions with a solidus but in which the type size is reduced and the numerals are oriented diagonally. In this case, `\slantfrac` should be used instead of `\frac`. Note that this is different from a shilled fraction, which authors can produce without any special markup.

Built-up	<code>"frac-1"-2"</code>	$\frac{1}{2}$
Case	<code>"case-1"-2"</code>	$\frac{1}{2}$
Slant	<code>"slantfrac-1"-2"</code>	$\frac{1}{2}$
Shilled	<code>1/2</code>	$\frac{1}{2}$

The AAST_EX package also contains a collection of assorted macros for special symbols (or abbreviations) that authors tend to work out for themselves anyway. Some of the definitions come from the *A&A* package (Springer 1989); some are contributions from individuals. We have tried to select a tractable number that were useful and also somewhat difficult to get right because fussy kerning or some such is required.

<code>\deg</code>	°	<code>\sq</code>	□
<code>\sun</code>	☉	<code>\earth</code>	⊕
<code>\arcmin</code>	'	<code>\arcsec</code>	"
<code>\fd</code>	ḋ	<code>\fh</code>	ḥ
<code>\fm</code>	ḿ	<code>\fs</code>	ṡ
<code>\fdg</code>	ḡ	<code>\farcmin</code>	′
<code>\farcs</code>	″	<code>\fp</code>	Ṗ
<code>\micron</code>	μm		
<code>\onehalf</code>	$\frac{1}{2}$	<code>\ubvr</code>	<i>UBVR</i>
<code>\onethird</code>	$\frac{1}{3}$	<code>\ub</code>	<i>U-B</i>
<code>\twothirds</code>	$\frac{2}{3}$	<code>\bv</code>	<i>B-V</i>
<code>\onequarter</code>	$\frac{1}{4}$	<code>\vr</code>	<i>V-R</i>
<code>\threequarters</code>	$\frac{3}{4}$	<code>\ur</code>	<i>U-R</i>
<code>\$_lesssim\$</code>	≲	<code>\$_gtrsim\$</code>	≳

Most of these commands can be used in running text as well as when setting mathematical expressions. `\lesssim` and `\gtrsim` can only be used in math mode, which is sensible since they are relations. It is possible to use `\earth` and `\sun` as subscripts, e.g., `$1.4 M_{\sun}$` yields $1.4M_{\odot}$.

Concluding the file

The last thing in the electronic manuscript file should be the

```
\end{document}
```

command, which appears after all the back matter of the paper. This command directs the formatter to perform assorted termination activities and finish processing.

4. Additional documentation

The preceding detailed explanation of the markup commands in this package has certain merit, but many authors will prefer to examine the sample papers that are included with the style files. The files of interest are described below.

The file `sample1.tex` is a paper prepared with the AAST_EX package utilizing a minimal amount of markup. The most salient thing to observe about this example is that, apart from the document style declarations, no formatting instructions are given in the file.

A more comprehensive example requiring nearly all of the capabilities of the package (in terms of markup as well as formatting) is in `sample2.tex`. This file is annotated with comments that describe the purpose of most of the markup. `sample2.tex` includes `samp2tbl1.tex`, which contains an example of a long table marked up using the `planotable` environment. This demonstrates the use of `planotable` for long tables in manuscripts.

A set of three tables prepared as “plano” tables are contained in the files `table1.tex`, `table2.tex`, and `table3.tex`. They can be formatted by running L^AT_EX on the `samptb1s.tex` file, into which they are included. The document style in `samptb1s.tex` is `apjpt` in the distribution, but this can be changed to `aj_pt` to see the effects of differing requirements among journals. Page breaks are explicitly indicated in `table1.tex`, and they are set for the ApJ style; due to the different type size used in the AJ, the pages break somewhat irrationally when the `aj_pt` style is used. It is left as an exercise to the reader to make sense of this.

Also included in the distribution are files for two AAS meeting posters, marked up as they would be for submission; they are called `paper1.tex` and `paper2.tex`. One of these (`paper2.tex`) includes a discussion of some of the issues surrounding standardized markup for electronic manuscripts (Hanisch and Biemesderfer 1990). This user guide (`manual.tex`) is also marked up with the AAST_EX package, although it is not exemplary as a scientific paper.

A number of the markup commands described in the preceding sections are standard L^AT_EX commands, and the reader who is unfamiliar with their syntax is referred to the L^AT_EX manual (Lamport 1985) for details. A crib-sheet listing all the L^AT_EX commands (and some pertinent plain T_EX commands) with short descriptions of each is published by the T_EX Users Group (Botway and Biemes-

derfer 1989).

Authors who wish to know the ins and outs of \TeX itself should read the *TeXbook* (Knuth 1984), probably more than once. There is a good deal of information about typography in general in this source. Many details of mathematical typography are discussed in a book by Swanson (1971).

REFERENCES

- Abt, H. 1990, *ApJ*, 357, 1 (editorial)
- Adobe Systems, Inc. 1990, *PostScript Language Reference Manual*, Appendix H (Reading, MA: Addison-Wesley)
- Biemesderfer, C. and Hanisch R. 1989, *BAAS*, 21, 780
- Botway, L. and Biemesderfer, C. 1989, *L^AT_EX Command Summary* (Providence, RI: \TeX Users Group)
- Hanisch, R. and Biemesderfer, C. 1990, *BAAS*, 22, 829
- Knuth, D. 1984, *The TeXbook* (Reading, MA: Addison-Wesley)
- Lamport, L. 1985, *L^AT_EX: A Document Preparation System* (Reading, MA: Addison-Wesley)
- Springer-Verlag. 1989, *Springer-Verlag TeX AA macro package 1989* (Springer: Heidelberg)
- Springer-Verlag. 1990, *Springer-Verlag L^AT_EX AA macro package 1990* (Springer: Heidelberg)
- Swanson, E. 1979, *Mathematics into Type* (Providence, RI: American Mathematical Society)

A. Special symbols

The \LaTeX language has a wide variety of special symbols for which markup commands have already been defined. These range from diacritics to exotic mathematical operators.

This section groups \LaTeX 's symbols together more or less according to function. Some of these symbols are primarily for use in text; most of them are mathematical symbols, and can only be used in \LaTeX 's math mode. These tables are excerpted from the \LaTeX Command Summary (Botway 1989).

Table 1: Text-mode accents

ò	<code>\'o</code>	ō	<code>\=o</code>	ô	<code>\t{oo}</code>
ó	<code>\'o</code>	ô	<code>\.o</code>	q	<code>\c{o}</code>
ô	<code>\^o</code>	ö	<code>\u{o}</code>	q̇	<code>\d{o}</code>
ö	<code>\"o</code>	ö	<code>\v{o}</code>	q̄	<code>\b{o}</code>
õ	<code>\~o</code>	ö	<code>\H{o}</code>		

Table 2: National symbols

œ	<code>\oe</code>	â	<code>\aa</code>	l	<code>\l</code>
Œ	<code>\OE</code>	Å	<code>\AA</code>	L	<code>\L</code>
æ	<code>\ae</code>	ø	<code>\o</code>	ß	<code>\ss</code>
Æ	<code>\AE</code>	Ø	<code>\O</code>		

Table 3: Miscellaneous symbols

†	<code>\dag</code>	§	<code>\S</code>	©	<code>\copyright</code>
‡	<code>\ddag</code>	¶	<code>\P</code>	£	<code>\pounds</code>
#	<code>\#</code>	\$	<code>\\$</code>	%	<code>\%</code>
&	<code>\&</code>	-	<code>_</code>		
{	<code>\{</code>	}	<code>\}</code>		

Table 6: Binary operations (math mode)

\pm	<code>\pm</code>	\cap	<code>\cap</code>
\mp	<code>\mp</code>	\cup	<code>\cup</code>
\setminus	<code>\setminus</code>	\uplus	<code>\uplus</code>
\cdot	<code>\cdot</code>	\sqcap	<code>\sqcap</code>
\times	<code>\times</code>	\sqcup	<code>\sqcup</code>
\ast	<code>\ast</code>	\triangleleft	<code>\triangleleft</code>
\star	<code>\star</code>	\triangleright	<code>\triangleright</code>
\diamond	<code>\diamond</code>	\wr	<code>\wr</code>
\circ	<code>\circ</code>	\bigcirc	<code>\bigcirc</code>
\bullet	<code>\bullet</code>	\bigtriangleup	<code>\bigtriangleup</code>
\div	<code>\div</code>	\bigtriangledown	<code>\bigtriangledown</code>
\lhd	<code>\lhd</code>	\rhd	<code>\rhd</code>
\vee	<code>\vee</code>	\odot	<code>\odot</code>
\wedge	<code>\wedge</code>	\dagger	<code>\dagger</code>
\oplus	<code>\oplus</code>	\ddagger	<code>\ddagger</code>
\ominus	<code>\ominus</code>	\amalg	<code>\amalg</code>
\otimes	<code>\otimes</code>	\unlhd	<code>\unlhd</code>
\oslash	<code>\oslash</code>	\unrhd	<code>\unrhd</code>

Table 4: Math-mode accents

\hat{a}	<code>\hat{a}</code>	\dot{a}	<code>\dot{a}</code>
\check{a}	<code>\check{a}</code>	\ddot{a}	<code>\ddot{a}</code>
\tilde{a}	<code>\tilde{a}</code>	\breve{a}	<code>\breve{a}</code>
\acute{a}	<code>\acute{a}</code>	\bar{a}	<code>\bar{a}</code>
\grave{a}	<code>\grave{a}</code>	\vec{a}	<code>\vec{a}</code>

Table 5: Greek letters (math mode)

α	<code>\alpha</code>	ν	<code>\nu</code>
β	<code>\beta</code>	ξ	<code>\xi</code>
γ	<code>\gamma</code>	\omicron	<code>\omicron</code>
δ	<code>\delta</code>	π	<code>\pi</code>
ϵ	<code>\epsilon</code>	ρ	<code>\rho</code>
ζ	<code>\zeta</code>	σ	<code>\sigma</code>
η	<code>\eta</code>	τ	<code>\tau</code>
θ	<code>\theta</code>	υ	<code>\upsilon</code>
ι	<code>\iota</code>	ϕ	<code>\phi</code>
κ	<code>\kappa</code>	χ	<code>\chi</code>
λ	<code>\lambda</code>	ψ	<code>\psi</code>
μ	<code>\mu</code>	ω	<code>\omega</code>
ε	<code>\varepsilon</code>	ς	<code>\varsigma</code>
ϑ	<code>\vartheta</code>	φ	<code>\varphi</code>
ϱ	<code>\varrho</code>		
Γ	<code>\Gamma</code>	Σ	<code>\Sigma</code>
Δ	<code>\Delta</code>	Υ	<code>\Upsilon</code>
Θ	<code>\Theta</code>	Φ	<code>\Phi</code>
Λ	<code>\Lambda</code>	Ψ	<code>\Psi</code>
Ξ	<code>\Xi</code>	Ω	<code>\Omega</code>
Π	<code>\Pi</code>		

Table 7: Relations (math mode)

\leq	<code>\leq</code>	\geq	<code>\geq</code>
\prec	<code>\prec</code>	\succ	<code>\succ</code>
\preceq	<code>\preceq</code>	\succeq	<code>\succeq</code>
\ll	<code>\ll</code>	\gg	<code>\gg</code>
\subset	<code>\subset</code>	\supset	<code>\supset</code>
\subseteq	<code>\subseteq</code>	\supseteq	<code>\supseteq</code>
\sqsubset	<code>\sqsubset</code>	\sqsupset	<code>\sqsupset</code>
\sqsubseteq	<code>\sqsubseteq</code>	\sqsupseteq	<code>\sqsupseteq</code>
\in	<code>\in</code>	\ni	<code>\ni</code>
\vdash	<code>\vdash</code>	\dashv	<code>\dashv</code>
\smile	<code>\smile</code>	\mid	<code>\mid</code>
\frown	<code>\frown</code>	\parallel	<code>\parallel</code>
\neq	<code>\neq</code>	\perp	<code>\perp</code>
\equiv	<code>\equiv</code>	\cong	<code>\cong</code>
\sim	<code>\sim</code>	\bowtie	<code>\bowtie</code>
\simeq	<code>\simeq</code>	\propto	<code>\propto</code>
\asymp	<code>\asymp</code>	\models	<code>\models</code>
\approx	<code>\approx</code>	\doteq	<code>\doteq</code>
		\Join	<code>\Join</code>

Table 8: Variable-sized symbols (math mode)

Σ	\sum	<code>\sum</code>	\cap	\bigcap	<code>\bigcap</code>
\prod	\prod	<code>\prod</code>	\cup	\bigcup	<code>\bigcup</code>
\coprod	\coprod	<code>\coprod</code>	\sqcup	\bigsqcup	<code>\bigsqcup</code>
\int	\int	<code>\int</code>	\bigvee	\bigvee	<code>\bigvee</code>
\oint	\oint	<code>\oint</code>	\bigwedge	\bigwedge	<code>\bigwedge</code>
\odot	\odot	<code>\bigodot</code>	\otimes	\bigotimes	<code>\bigotimes</code>
\oplus	\oplus	<code>\bigoplus</code>	\oplus	\bigoplus	<code>\bigoplus</code>

Table 9: Delimiters (math mode)

$($	$($	$)$	$)$
$[$	$[$	$]$	$]$
$\{$	$\{$	$\}$	$\}$
\lfloor	\lfloor	\rfloor	\rfloor
\lceil	\lceil	\rceil	\rceil
\langle	\langle	\rangle	\rangle
$/$	$/$	\backslash	\backslash
\mid	\mid	\parallel	\parallel
\uparrow	\uparrow	\Uparrow	\Uparrow
\downarrow	\downarrow	\Downarrow	\Downarrow
\updownarrow	\updownarrow	\Updownarrow	\Updownarrow

Table 10: Function names (math mode)

<code>\arccos</code>	<code>\csc</code>	<code>\ker</code>	<code>\min</code>
<code>\arcsin</code>	<code>\deg</code>	<code>\lg</code>	<code>\Pr</code>
<code>\arctan</code>	<code>\det</code>	<code>\lim</code>	<code>\sec</code>
<code>\arg</code>	<code>\dim</code>	<code>\liminf</code>	<code>\sin</code>
<code>\cos</code>	<code>\exp</code>	<code>\limsup</code>	<code>\sinh</code>
<code>\cosh</code>	<code>\gcd</code>	<code>\ln</code>	<code>\sup</code>
<code>\cot</code>	<code>\hom</code>	<code>\log</code>	<code>\tan</code>
<code>\coth</code>	<code>\inf</code>	<code>\max</code>	<code>\tanh</code>

Table 11: Arrows (math mode)

\leftarrow	<code>\leftarrow</code>	\longleftarrow	<code>\longleftarrow</code>
\Lleftarrow	<code>\Lleftarrow</code>	\Longleftarrow	<code>\Longleftarrow</code>
\rightarrow	<code>\rightarrow</code>	\longrightarrow	<code>\longrightarrow</code>
\Rrightarrow	<code>\Rrightarrow</code>	\Longrightarrow	<code>\Longrightarrow</code>
\leftrightarrow	<code>\leftrightarrow</code>	\longleftrightarrow	<code>\longleftrightarrow</code>
\Leftrightarrow	<code>\Leftrightarrow</code>	\Longleftrightarrow	<code>\Longleftrightarrow</code>
\mapsto	<code>\mapsto</code>	\longmapsto	<code>\longmapsto</code>
\hookleftarrow	<code>\hookleftarrow</code>	\hookrightarrow	<code>\hookrightarrow</code>
\leftharpoonup	<code>\leftharpoonup</code>	\rightharpoonup	<code>\rightharpoonup</code>
\leftharpoondown	<code>\leftharpoondown</code>	\rightharpoondown	<code>\rightharpoondown</code>
\rightleftharpoons	<code>\rightleftharpoons</code>	\leadsto	<code>\leadsto</code>
\uparrow	<code>\uparrow</code>	\Updownarrow	<code>\Updownarrow</code>
\Uparrow	<code>\Uparrow</code>	\nearrow	<code>\nearrow</code>
\downarrow	<code>\downarrow</code>	\searrow	<code>\searrow</code>
\Downarrow	<code>\Downarrow</code>	\swarrow	<code>\swarrow</code>
\updownarrow	<code>\updownarrow</code>	\nwarrow	<code>\nwarrow</code>

Table 12: Miscellaneous symbols (math mode)

\aleph	<code>\aleph</code>	$'$	<code>\prime</code>
\hbar	<code>\hbar</code>	\emptyset	<code>\emptyset</code>
\imath	<code>\imath</code>	∇	<code>\nabla</code>
\jmath	<code>\jmath</code>	\surd	<code>\surd</code>
ℓ	<code>\ell</code>	\top	<code>\top</code>
\wp	<code>\wp</code>	\bot	<code>\bot</code>
\Re	<code>\Re</code>	\parallel	<code>\parallel</code>
\Im	<code>\Im</code>	\angle	<code>\angle</code>
∂	<code>\partial</code>	\triangle	<code>\triangle</code>
∞	<code>\infty</code>	\backslash	<code>\backslash</code>
\Box	<code>\Box</code>	\Diamond	<code>\Diamond</code>
\forall	<code>\forall</code>	\sharp	<code>\sharp</code>
\exists	<code>\exists</code>	\clubsuit	<code>\clubsuit</code>
\neg	<code>\neg</code>	\diamondsuit	<code>\diamondsuit</code>
\flat	<code>\flat</code>	\heartsuit	<code>\heartsuit</code>
\natural	<code>\natural</code>	\spadesuit	<code>\spadesuit</code>
\mathfrak{U}	<code>\mathfrak{U}</code>		