

AMS Author Handbook Monograph Classes

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CHAPTER 1

Introduction

This handbook is directed mainly to authors preparing material for publication by the American Mathematical Society (AMS), using AMS- \LaTeX document classes. As such, it deals with the AMS publishing style. Since these document classes are also used by authors who are not submitting items to the AMS, the handbook also covers topics of more general relevance. However, it assumes familiarity with standard \LaTeX techniques and conventions, and contains only material specific to AMS packages.

The tagging of elements in a manuscript—title, author(s), section headings, theorems, etc.—is consistent through all AMS author packages, and the structure of elements in the body is based on that of the original \LaTeX document classes. Thus a manuscript prepared using an appropriate generic document class can be modified trivially to use a more specific AMS document class simply by updating the `\documentclass` statement and making a few adjustments to the tagging of data in the top matter. For example, specify the *Graduate Studies in Mathematics* monograph series as follows: `\documentclass{gsm-1}`. (The `-1` in the `\documentclass` name is an “ell”, for \LaTeX , not a “one”.)

TABLE 1. The AMS monograph series

Code	Full Series Name
<code>cbms</code>	CBMS Regional Conference Series in Mathematics (Monograph)
<code>cmim</code>	Clay Mathematics Monographs
<code>coll</code>	Colloquium Publications
<code>crmm</code>	CRM Monograph Series
<code>gsm</code>	Graduate Studies in Mathematics
<code>hmath</code>	History of Mathematics
<code>surv</code>	Mathematical Surveys and Monographs
<code>mawrld</code>	Mathematical World
<code>amstext</code>	Pure and Applied Undergraduate Texts
<code>smf</code>	SMF/AMS Texts and Monographs
<code>stml</code>	Student Mathematical Library
<code>mmono</code>	Translations of Mathematical Monographs
<code>mmono-s</code>	Translations of Mathematical Monographs (Iwanami Series)
<code>ulect</code>	University Lecture Series

The AMS- \LaTeX packages are available from:

www.ams.org/arc/books/book-produce.html

For more information, see Chapter 5.

The basics

A monograph is a long work by a single author or co-authors on a single subject. Each chapter should be prepared as a separate file, as should the bibliography. In addition, a “driver” file should be used to input all the others. These files should be given meaningful names, so that when they are transmitted to the AMS, there will be no question about which file represents which chapter. For example, a monograph by author Grey might be composed of files named `grey.tex` (the driver file), `grey-ch1.tex`, `grey-ch2.tex`, . . . , `grey-ch12.tex`, `grey-appa.tex`, etc., and `grey-bib.tex` (or `grey.bbl` if BibTeX is used). If the author name is a common one, please include something to make it unique, such as first initials.

Information that identifies the author(s), the subject matter of the monograph, acknowledgments of support, and so forth, will appear in the front matter of the book. Place this information in the driver file, and use the tags shown in Table 2 in the *Top matter* section (page 11). This section provides explanations and an indication of which tags are required. Most of the tags used for the top matter of a monograph are the same as the tags associated with the top matter of an article.

This information will be provided to online bibliographic services for indexing.

What's in it for the author?

If the guidelines in this handbook are followed, there are some clear benefits.

- The time between receipt of the manuscript and publication will be minimized.
- The opportunity for introducing unintended errors will be greatly reduced.

As author, *you* are responsible for the content of your book. At the production end, the concern is to turn the (electronic) manuscript into a published document in the style of the designated book series; this increasingly includes various electronic outputs that may involve (automatic) conversion to non-L^AT_EX forms. Use of standard packages and elimination of unneeded material from your files (unused macro definitions and packages, and commented text) will reduce the need for technical tinkering.

If you have special requirements, assistance can be requested—*before* submission of your files—from the technical support group; their email address is given on page 29.

Using the AMS monograph classes

1. The basic checklist

Some basic principles are important for effective handling of electronic submissions. Keep these principles in mind when preparing and submitting your files.

- Use the **template** supplied in the author package for your particular publication and the appropriate document class.
- Copy this template to a file with a name suitable to identify your document. File names should not exceed 20 characters in length, and consist only of numeric or unaccented alphabetic (ASCII) characters. Avoid overly generic file names such as `chap1.tex`, `mybib.tex` or `fig1.eps`.
- Do not modify page sizes or other **dimensions**. Page sizes must conform to the specifications of the publication for which you are preparing your manuscript. The text width is determined by the trim size of the publication, and use of a larger text width for the file you submit guarantees that line breaks will change in the final printed version. This is especially critical for math displays, and also affects tables and figures.
- Do not modify the default **font size**, except temporarily for proofreading your work. As with text width, any change will result in different line breaks in the final version.
- Use only “**public**” **packages** available from **CTAN** (the Comprehensive T_EX Archive Network).
- All of the AMS document classes incorporate the code for the AMS theorem (`amsthm`) package and automatically load the `amsmath` package. It is not necessary to request either one explicitly. Except for a brief overview of how to activate theorems (see page 10), the details will not be repeated here; see the user guides for these packages [**ATH**, **AMG**]. The `amsfonts` package is loaded as well, unless the `[noamsfonts]` option is specified; see the AMSFonts User’s Guide [**AFG**] for the features provided.
- Do not redefine **any** existing L^AT_EX or AMS-L^AT_EX commands. Use `\newcommand`, not `\def`, to be warned if the name you have chosen is already in use.
- Put **definitions** for frequently occurring mathematical expressions together **in the preamble**, before the start of the text of the manuscript. Once a macro is created for an expression, use it for every occurrence of that expression, except as noted below.
- Do not use **author-defined macros** in author names, titles, section and theorem headings, or references; use only standard commands. Do not hard-code font changes. Use T_EX coding for special fonts (e.g., boldface or italic) only within the text of the manuscript.

- Avoid the use of math in the title and in chapter and section headings. **Titles** are provided to online bibliographic services for indexing. Use of \TeX math coding (especially dollar signs) will result in inaccurate bibliographic listings, and problematic PDF bookmarks.
- Determine the **2020 Mathematics Subject Classification** numbers representing the primary and secondary subjects of the work. A list of these numbers can be found on the web at www.ams.org/msc. Enter the information with `\subjclass[2020]` where indicated in the template.
- Make sure that **graphics** do not extend into the margins; the width of the text may vary depending on the book series. Check that all graphics conform to the AMS graphics guidelines—see Chapter 3, page 22.
- Do not use \TeX coding to control **line and page breaks**. Lines and pages may break differently in the published book from the way they break in the file you submit. If you insert \TeX coding for line and page breaks, it will have to be removed for production. This work could offset any time saved by your keyboarding the manuscript, and any change to your \TeX file creates a small chance of additional errors being introduced.
- Avoid explicit horizontal and vertical **spacing commands** for the same reason.
- For **displayed equations**, the AMS style requires equation numbers to be on the left, flush with the left margin. See section 5.7, page 15.
- Use `\cite` to indicate **citations** in the manuscript.
- Include all available information for **references**; use the abbreviations for journals and book series from [ABMR], either in print or on the web.
- Include the research **address** or institutional affiliation and current address (if different) of each author. Email addresses and URLs may be included optionally. Email addresses will appear in books posted online; URLs will not; both will appear in print.
- **Proofread** your book thoroughly and carefully. Publications in some book series will not be given an editorial proofreading.
- **Verify** that author-submitted source files exactly match the accepted reference copy of the book.

2. A checklist for using AMS monograph classes

- Use a **driver file** and put the source code for each chapter in a separate file, using `\include` (not `\input`) to pull them together into a single document.
- An AMS-specific version of the **hyperref** package will be added by AMS staff at the appropriate stage of the production process primarily for the purpose of adding PDF bookmarks. This will also affect internal cross-references and external URLs.
- Ordinarily, every chapter must begin on a new right-hand (odd-numbered) page.
- In **chapter titles**, the first and last words of the title and all nouns, pronouns, adjectives, adverbs, and verbs should be capitalized; articles, conjunctions, and prepositions should be lowercased except for the first and last words of the title.
- The **running heads** on the left-hand (even-numbered) pages should have the chapter title; the exact style will be taken care of by the class file. The title in running heads should be shortened only if necessary to fit on one line,

leaving room for the page number. The running heads on the right-hand (odd-numbered) pages should have the section title (shortened if necessary) in the same style as the heading on left-hand pages. Uppercasing or other styling will be applied automatically if you are using an AMS document class.

- Give information for **grants** or contracts under which the research was performed, including grant number, in the preface, along with other acknowledgments.
- The following material must be provided for the **copyright page**, which will be prepared at the AMS: primary classification numbers according to the 2010 Mathematics Subject Classification scheme (www.ams.org/msc). For translations, include the name and city of the original publisher, the copyright year of the original publication, and the name and address of the translator.
- The title and copyright pages are for information only, so that a printed copy can be associated with the correct author(s). The final copy will be prepared at the AMS using the information you have provided.
- All **bibliographic data**, if it is not already prepared using `amsrefs`, will be converted to `amsrefs` form, drawing data from MathSciNet when that exists. These are called “enhanced references”; see section 7.1, page 18. This is to provide the data in consistent form to online bibliographic services, who may use it for indexing or to compile citation lists.

3. The preamble

The area between the `\documentclass` statement and the line `\begin{document}` is referred to as the “preamble”. This is the place to load external packages and define document-specific commands.

3.1. Document class options. There are several `\documentclass` options authors might find useful. Some restrictions that may apply to particular book series are not presented here in detail, but can be found in the author package instructions for those publications.

- **Paper size** defaults to `[letterpaper]`, and this is the size expected when files are submitted for publication. However, authors outside the U.S. may find `[a4paper]` useful for preparing drafts.
- **Two-sided or one-sided printing** defaults to `[twoside]`. `[oneside]` might also be useful for drafts, but should be removed when files are submitted for publication.
- **Version** can be specified as `[draft]` or `[final]`. The `[draft]` option causes overfull lines to be marked with a black slug in the right margin, calling attention to problems that should be corrected before submission. Also, for a file specified by `\includegraphics`, only the name of the file and the outline of the bounding box will be shown. The default option is `[final]`.
- The **font size** should not be changed from the default except by agreement with the Acquisitions Editor. The usual default size is `[10pt]`, but some series have a different default which is identified in the documentation for specific author packages. If a larger size is desired for proofreading, options `[11pt]` or `[12pt]` are also available. However, using a different size will affect line breaks, which is especially critical for displays or when math appears in text. If a different size is used, reprocess your document before submitting files, and check and fix any bad breaks.

- **Start on right- or left-hand page.** For most book series, chapters start on a right-hand page, but occasionally (when chapters are very short), starting on a left-hand page may be desirable. The options `[openright]` (default) and `[openany]` control this arrangement.
- **Equation numbering** defaults to the left, equivalent to `[leqno]`. Numbering on the right, with `[reqno]`, is also supported, but is strongly discouraged because it is incompatible with the marking of proof endings with a `\qed` box at the right margin.

For multiline equations, the equation number is by default centered vertically on the total height of the display (option `[centertags]`). To make the equation number print on the first line (for left-hand numbers) or the last line (for right-hand numbers), there is the option `[tbtags]` (top/bottom).

- **Flush left displays** can be specified by `[fleqn]`. With this option, displayed equations are aligned on the left instead of centered, with an indentation of `\mathindent` from the left margin.

3.2. Packages. The AMS document classes incorporate the code for the AMS theorem (`amsthm`) package and automatically load the `amsmath` package. It is not necessary to request either one explicitly. The user guides for these packages [[ATH](#), [AMG](#)] contain the details, which will not be repeated here, but see section [3.4](#) for suggestions on setting up theorems. The `amsfonts` package is loaded as well, unless the `[noamsfonts]` option is specified; see the AMSFonts User’s Guide [[AFG](#)] for the features provided.

Not all publicly available packages are compatible with the AMS document classes. For this reason, we mention some that are:

- `amssymb` provides names for additional symbols from the AMS symbol fonts; see [[AFG](#)] for details.
- `amsbooka` provides the ability to specify a different or additional author for an individual chapter or appendix, and have that information automatically included in the TOC in an appropriate format.
- `imakeidx` supports multiple indexes for a book, with some restrictions; see page [16](#).
- `chngcntr` provides the command `\counterwithout` that can be used to undo a default counter resetting. For example, `\counterwithout{footnote}{chapter}` will cause footnotes to be numbered continuously through a book, not reset for every chapter.
- `graphicx` is part of the L^AT_EX suite, preferred for inclusion of graphics.
- `longtable` facilitates tables longer than one page.
- `mathrsfs` (Ralph Snith’s formal script, `\mathscr`) defines a script font that some authors prefer to the default `\mathcal`.
- `mathtools` provides some display math enhancements that weren’t anticipated when `amsmath` was developed.
- `natbib` supports author-year referencing, appropriate for historical and expository works, when used with Bib_TE_X. `amsrefs` has a comparable facility.
- `upref` forces cross-references with `\ref` to roman (upright); see “Roman type”, page [15](#).
- `tikz` is recommended for creating charts and other graphics, including commutative diagrams.
- `xypic` is also recommended for creating commutative diagrams.

Some of these recommendations are noted in the templates that are included in every author package.

There are several packages that cause particular problems for AMS production. Their use should be avoided:

- `biblatex` is not supported by the AMS production stream, and requires that a bibliography be converted to a compatible form, opening a path for potential errors.
- `epsfig` has been superseded by `graphicx`.
- `diagrams`, by Paul Taylor, contains a “time bomb” that renders it inappropriate for a production environment.
- `geometry` changes page dimensions even if no explicit changes are specified by the author.
- `microtype` is not supported by the AMS production stream, which relies on dvi output for automated graphics checking.
- `makeidx` facilities are already in AMS document classes.
- `parskip` redefines the processing of tables of contents, as well as making other format changes that do not follow AMS guidelines.

Don’t load any packages that aren’t actually needed.

3.3. New commands. Place all definitions for new commands in the preamble. This includes instructions to access fonts that are not already defined in the AMS document classes or `amsmath`, such as a new math alphabet (see [AMG]).

Always use `\newcommand`; this will let you know if the name you have chosen has already been used. Do not redefine any command from L^AT_EX, `amsmath`, or any AMS document class, as this could cause problems in AMS production. Avoid (re)defining one-letter commands; many already exist, and a redefinition can result in mysterious error messages or difficult to detect errors in output.

New definitions may be used to provide shorthand forms for mathematical expressions that are used frequently, but do not use new definitions for ordinary text; for books posted online, this will prevent indexing software from identifying relevant references.

Use commands and environments provided by the AMS document classes and standard packages whenever applicable; for example, you should use the AMS `proof` environment rather than defining your own alternative.

When the file is complete, remove any commands that haven’t been used.

3.4. Theorem declarations. Comprehensive theorem facilities are provided by the inclusion of the `amsthm` code in the AMS document classes, but to use them, the particular theorem types must be activated in the preamble. A theorem “type” consists of two parts: a `\theoremstyle` and a `\newtheorem` statement. Three pre-defined theorem styles are provided: `plain` (default) adds extra space above and below, and sets the text in italic; `definition` adds space above and below, but sets the text in upright type; `remark` has no extra space above or below, and sets the text in upright type. Suggested associations for theorem types and theorem styles are given in the `amsthm` documentation [ATH].

To declare the theorem types to be used, list the declarations below the appropriate `\theoremstyle` line, as follows:

- `\newtheorem{thm}{Theorem}` will set up an environment `thm` that will be numbered consecutively throughout the entire document. To number theorems within sections, specify this as `\newtheorem{thm}{Theorem}[section]`.
- To number a different theorem type consecutively with ordinary theorems, declare it as `\newtheorem{lem}[thm]{Lemma}`. This works with any other element with a defined counter; substitute the desired counter for `[thm]`. For example, authors wishing to number theorem-class objects consecutively with equations can specify `\newtheorem{thm}[equation]{Theorem}` and thereafter use `[thm]` as the reference counter.
- The two “reference” counters can be thought of this way:
 - `\newtheorem{environment}{Heading}[\number-within]`
 - `\newtheorem{environment}[\reference-counter]{Heading}`

4. Top matter

The top matter associated with a book includes information that would appear in a bibliographic reference to the book, plus additional information about the author(s), subject classifications, and acknowledgments of support.

Top matter information should be input *after* `\begin{document}`.

4.1. Summary of tags and elements. Table 2 lists the top matter commands provided by AMS- \LaTeX version 2.0 and later. Not every tag is necessary for each book. The table shows which tags are required and which are optional. The template file included in every author package contains all the necessary tags and instructions for using them.

TABLE 2. Top matter tags for monographs

<code>\title[...]{...}</code>	required ¹
<code>\author[...]{...}</code>	required ¹
<code>\contrib[...]{...}</code>	if needed
<code>\address{...}</code>	required
<code>\curraddr{...}</code>	optional
<code>\email{...}</code>	optional
<code>\urladdr{...}</code>	optional
<code>\dedicatory{...}</code>	optional ²
<code>\date{...}</code>	(not used)
<code>\thanks{...}</code>	optional
<code>\translator{...}</code>	— ³
<code>\subjclass[2010]{...}</code>	required
<code>\keywords{...}</code>	optional
<code>\maketitle</code>	required

¹ If no short form is needed, omit the bracketed option.

² For monographs, a separate dedication page is preferable; see instructions below.

³ If this is necessary, it will be filled in by the AMS staff.

4.2. Title. The book `\title` is only for the purpose of identification during production. The actual title page will be created independently from information provided separately with the submitted files. Do capitalize all proper names. The title should be input in a style appropriate for use in a bibliography; the style of the

title that will appear in print for the particular publication will be generated automatically when the book is processed at the AMS.

A multiline title may be left for L^AT_EX to break, or a desired break may be indicated by `\\`.

Avoid the use of math in titles. In particular, only these fonts are compatible with the AMS production system when used in titles: fonts in the Computer Modern family; `amsmath` with `amssymb`, and the script fonts from the `mathrsfs` package. (Other fonts may be used in the body of the work.)

4.3. Author information. Enter the name(s) of the author(s) with the command `\author`, using standard capitalization for proper names. Use a separate `\author` command for each author. Names will be combined by L^AT_EX according to the dictates of the document class. See also “contributors”, below.

For each author you should provide one or more addresses. Tag them as follows, grouping them in this order by author:

- `\address{...}` address where the research was carried out (required)
- `\curraddr{...}` current address, if different from the research address (optional)
- `\email{...}` address for electronic mail (optional)
- `\urladdr{...}` URL address (optional)

Do *not* include any addresses within the scope of an `\author{}` command (this is different from basic L^AT_EX document classes). Do not use abbreviations in addresses.

Addresses are considered part of the top matter. Suitable labels will indicate the current, email, and URL addresses, typically *Current address:*, *Email address:*, *URL:*, respectively.

If a tilde (~) is needed in a URL address, enter it directly as `~` if you are using an AMS-L^AT_EX version later than 2010.

4.4. Contributors (versions since 2010). Contributors are much like authors, but are responsible for only a portion of a document, e.g., an appendix or auxiliary tables. The bracketed portion is not optional; it gives the exact text that will be printed to indicate the nature of the contribution:

```
\contrib[with an appendix by]{William Rogers}
```

Multiple contributors and contributions are input like this:

```
\contrib[with Appendix A by]{William Rogers}
```

```
\contrib[] {Henry Taylor}
```

```
\contrib[and Appendix B by]{John Henderson}
```

Note the empty brackets on the second line. Multiple contributors indicated in this way will be combined, adding punctuation and “and” as appropriate. (For this example the result is “... with an appendix by William Rogers and Henry Taylor, and Appendix B by John Henderson”.) Addresses provided for contributors will be treated the same as for regular authors.

4.5. Dedication. The dedication for a monograph is set on a separate page. The template provided in the author package includes instructions for formatting this page.

4.6. Acknowledgments of support. Information concerning grants and other kinds of support as well as personal acknowledgments are usually included in the preface of a monograph.

4.7. Subject information. Subject classifications and key words, like titles and author names, are part of the top matter.

Subject classifications may be primary (the major topic(s) of the book) or secondary (subject areas covered by ancillary results, motivation or origin of problems discussed, intended or potential field of application, or other significant aspects worthy of notice). At least one primary subject classification is **required**. Additional primaries and secondaries are optional.

These classifications are entered as

```
\subjclass[2020]{Primary primary class};
      Secondary secondary classes}
```

separated by commas within. Omitting [2020] will cause the 1991 Subject Classification to be cited; if an error for 2020 is reported, your version of the AMS document classes is from before 2020 and should be upgraded.

To determine the classifications, use the 2020 Mathematics Subject Classification scheme, which can be accessed on the Web at www.ams.org/msc. Please use the full number; the two-digit code from the Contents of *Mathematical Reviews* is **not** sufficient.

Key words are not required but may be provided by an author if desired. They should be entered as `\keywords{...}`, separated by commas, with only the first word and proper nouns capitalized.

5. Document body

5.1. Linking for the Web. Any new monograph may potentially be posted online. Electronic manuscripts prepared in L^AT_EX for any new book should be tagged for maximum linking on the Web. For use of `\label`, `\ref`, and `\cite`, see [MG]; for `\eqref`, see [AMG]. An AMS-specific version of the `hyperref` package will be added by AMS staff at the appropriate stage of the production process and will be applied to internal cross-references and external URLs.

5.2. Headings. Six levels of headings are provided to permit logical sectioning of a manuscript.

```
\part[...]{...}
\chapter[...]{...}
\specialsection{...}
\section[...]{...}
\subsection{...}
\subsubsection{...}
```

`\part` is the highest level, and is ordinarily used only when distinct portions of the manuscript have significantly different types of content, are directed toward different audiences, or are intended to be addressed at different times, e.g., as for different semesters in a multi-semester course.

The `\chapter` division is provided only for monographs.

In chapter titles, the first and last words of the title and all nouns, pronouns, adjectives, adverbs, and verbs should be capitalized. Articles, conjunctions, and

prepositions should be lowercased unless they are the first or last word of the title or the first word after a colon (:).

A multiline title may be left for \LaTeX to break, or a desired break may be indicated by `\`. Unless the chapter title is very short, provide an alternate form suitable for use in running heads. This should be entered in brackets between the tag `\chapter` and the full title: `\title[short title]{full title}`. Unlike the practice in the basic \LaTeX document classes, the optional alternate form is *not* the form used for the TOC; instead, the full form of the title is used there.

Starred heading commands (`\chapter*` and `\section*`) do not provide for a bracketed short form; if a short form is needed for running heads, use

```
\markboth{short chapter title}{short chapter title}
\markright{short section heading}
```

typing the heading text in all uppercase if that is the style of the running heads for the relevant series.

Do not use author-defined macros in the title.

If `\` has been used to break a chapter title, an adjustment must usually be made for the table of contents. This can be done by specifying what is to be included or omitted from the TOC as follows.

- `\except{toc}{...}` excludes material from the TOC, for example
`\chapter{some text\except{toc}{\} the rest of the title}`
- `\for{toc}{...}` inserts an additional directive in the TOC, often an alternate linebreak command.

`\specialsection` differs from `\section` mainly in the formatting of the heading. A `\specialsection` heading will not be used as a running head.

Any heading may be given a label to allow references to be made to it, by including a `\label{...}` command with a unique identifier directly *after* the heading. References are made using the command `\ref{...}` and the same identifier. For example,

```
\section{Historical note}
\label{s:hnote}
```

will establish a label for this section that can be referred to with `\ref{s:hnote}`. Cross references of this sort will require \LaTeX to be run at least twice for proper resolution. A warning at the end of the \LaTeX run, “Cross references may have changed...”, should be heeded in this regard.

5.3. Mathematical text. For instructions on preparing mathematical text, refer to [AMG] and [Gr]. See also “Roman type”, below.

5.4. Lists. Follow usual \LaTeX conventions for producing list environments.

5.5. Theorems, lemmas, and other proclamations. See the manual *Using the amsthm package* [ATH] for details. Theorem environments following AMS style with respect to punctuation, spacing, and paragraphing are defined in the AMS document classes. This is incompatible with the \LaTeX `theorem` package, which cannot be used with the AMS document classes.

Three different theorem styles are provided by AMS document classes: `plain`, `definition`, and `remark`. By referring to these styles and using the `\newtheorem` command, you can build a complement of theorem environments appropriate for

any paper or monograph. All `\newtheorem` specifications should be included in the preamble; a starter set is included in the template for every AMS author package.

Theorem support is also available separately in the `amsthm` package for users of document classes other than those from the AMS.

5.6. Equations. Check displayed equations carefully, making sure they are broken and aligned following the guidelines in [Sw, pp. 44–48], and that they do not exceed the width of the page for the publication in which they are to appear. For multi-line displays, use the structures defined in the `amsmath` user’s guide [AMG].

5.7. Equation numbering. AMS style (and the default behavior) for display numbers is always to place them at the left margin, so that they are always in a predictable location, and thus easily found. Left placement ensures that they don’t interfere with the qed box on proofs, or other similar flags. *Please note that the use of any other numbering style will be changed to accord with standard AMS practice, which may run the risk of introducing inadvertent errors.* If you have any questions about this, please contact AMS technical support; see page 29.

5.8. Roman type. Numbers, punctuation, (parentheses), [brackets], {braces}, and symbols used as labels should ideally be set in roman (upright) type. This is true even within the statement of a theorem, which is ordinarily set in italic type.

Be careful to distinguish between roman elements that are mathematical in nature (e.g., “a group of class 2”), and those that are part of the text (e.g., a label or a year). Mathematical expressions, no matter how short or insignificant, should be coded as `math`, by enclosing them within dollar signs `$. . . $` or `\(. . . \)`. Roman text elements should be coded as `\textup{. . .}` in potentially nonroman environments such as theorems.

Abbreviated forms of mathematical terms are also usually set in roman type to distinguish them from mathematical variables or constants. Use the control sequences for common mathematical functions and operators like `log` and `lim`; use `\DeclareMathOperator` to add additional operator names (see [AMG, §5]).

The style of reference citations, though publication-dependent, is usually roman. To ensure consistency and support linking for the Web, **always** use the standard `LATEX \cite` command when citing a reference (alternate forms of the `\cite` command are provided by `natbib` if that package is used for bibliographies in author-year style). Internal references with the `\ref` command are not automatically roman in non-roman environments, but can be forced by using the `upref` package (part of the AMS-`LATEX` collection). The command `\eqref`, to be used for references to numbered equations, includes parentheses along with the equation number, all in roman type, e.g., `\eqref{eqn2.4}` will produce “(2.4)” (assuming that is the correct label for that equation).

5.9. Exercises. The `xca` environment is encouraged for producing exercises that appear individually within a section. This environment is defined in the document preamble with `\theoremstyle{definition}` and the `\newtheorem` command; it is used in a manner similar to that of any other theorem-class environment.

The `xcb` environment is defined only for monographs and is used for exercises that occur at the end of a chapter. The environment is presented as a section, with

special formatting in some book series. In this environment, exercises are usually presented as an enumerated list, with each exercise introduced by `\item`.

5.10. Indexing. Ideally, index terms should be included directly in the \TeX file(s) for the document, to ensure correct page references. The output resulting from \TeX ing the file should conform to the rules of *MakeIndex*. Output of this program is processable only by \LaTeX . All indexing methods described here require that the *MakeIndex* program be run separately from the \LaTeX run, and that \LaTeX then be rerun to incorporate the actual index(es).

The tags needed for `\makeindex` are already included in AMS document classes. Do not include the `makeidx` package, but do put the command `\makeindex` in the preamble to launch a single index, and `\printindex` where you would like the index to appear. See [MG, chapter 11] and [KD, chapter 11] for use of `\makeindex`.

If more than one index is desired, a package is available that is compatible with AMS document classes. Do not use a glossary package for an additional index.

■ `imakeidx`. The package `imakeidx` follows “normal” \LaTeX style for specifying options. With `imakeidx`, no file name need be given for the main index; the name of any additional index is specified as an option. Specify the indexes in the preamble like this:

```
\usepackage[original]{imakeidx}
\makeindex % will get the same name as the main file
\makeindex[name=<name of additional index file>, title=<title of index>]
```

The `[original]` option is required to preserve the correct AMS-publication-specific formatting of the first index page.

To identify an entry for the main index in the text:

```
\index{<index term>}
```

or, for a different index,

```
\index[<name of index file>]{<index term>}
```

In the backmatter, where the indexes are to appear:

```
\printindex[<name of index file>, title=<title of index>]
```

for as many indexes as needed.

6. Floating objects: Figures and tables

Figures and tables are usually handled as floating inserts. Such items are often so large that fitting them into the document at the point of reference may cause problems with pagination. Placing such items into a floating insert allows them to be repositioned automatically by \LaTeX as required for good pagination.

A floating insert generally contains one of these possibilities:

- \LaTeX code that produces an object such as a table or commutative diagram;
- a command to incorporate an item produced by another application (most often an Encapsulated PostScript (EPS) file produced by a graphics utility; see *Graphics*, page 22).

If a figure is described by \LaTeX code (e.g., using `xypic`, `tikz`, or the `picture` environment), it should be included directly in the file; if the code is extensive (15–20 lines or more), it may be entered in a separate dedicated file and called in with `\input`.

6.1. Placement. Floats should

- (1) be numbered consistently throughout the paper (figures and tables are numbered separately),
- (2) be placed at the top or bottom of the page,
- (3) have an in-text reference, and
- (4) definitely appear within the same section as their first text reference.

A figure or table should not precede its first text reference unless they both appear on the same page spread. When a figure or table is an integral part of text, it may appear unnumbered in place in the middle of text; in this situation it may be appropriate to code it directly rather than as a `figure` or `table`, particularly if it is small.

Figures and tables should be allowed to float according to the \LaTeX defaults preset by the document class. If you are submitting a file that will be processed at the AMS, you could introduce major problems with pagination if you hard-set your figures and tables by using the `[h!]` option. Production problems will be avoided when you use the appropriate author package class file and avoid using figure or table options. For electronic manuscripts, the final placement of inserts will be determined by the AMS production staff, on the basis of the most appropriate page layout.

6.2. Captions. Captions for floating inserts are usually positioned above a table and below a figure. The following is the general structure used to specify a figure insert, with a caption at the bottom:

```
\begin{figure}
\includegraphics{<file name of .eps file>}
    or <code for the insertion>
\caption{<caption text>}
\label{<reference label>} (optional)
\end{figure}
```

This is the general structure for a table insert, with a caption at the top:

```
\begin{table}
\caption{<caption text>}
\label{<reference label>} (optional)
<code for the insertion body>
\end{table}
```

Caption headings (e.g., “TABLE 3.1.” or “FIGURE 7.”) will be supplied automatically. The *<caption text>* is any appropriate descriptive text, and may be omitted if no descriptive text is desired. (The style of the caption differs from the basic \LaTeX caption style.) A reference label should usually be associated with the caption, and must be given *after* the caption. A reference in text to the figure or table has the form `\ref{<reference label>}`.

\LaTeX packages for captions may appear to work with the AMS document classes, but the caption style usually doesn’t match the AMS style.

6.3. Centering tables and figures. All AMS classes center the content of `table` and `figure` environments. Using `\centering` or `\begin{center}` and `\end{center}`, therefore, is unnecessary. For example,

```

\begin{table}
\caption{This is a table}
\begin{tabular}{cccc}
1&2&3&4\\
5&6&7&8\\
9&10&11&12
\end{tabular}
\end{table}

```

causes this table to be typeset:

TABLE 3. This is a table

1	2	3	4
5	6	7	8
9	10	11	12

7. Bibliographic references

Bibliographies may be prepared using either `amsrefs` or `BibTEX`. Methods using other packages, including `biblatex`, are not supported.

7.1. Enhanced references. References in monographs will be replaced by enhanced information from MathSciNet, in `amsrefs` format. If an entry is not present in MathSciNet, the style of the entry may be updated (if necessary) for consistency. When enhanced references are enabled, the author’s bibliography is combined with data from MathSciNet to provide the following additional features:

- Direct links to journal articles published by the AMS (requires journal subscription).
- Article DOIs.
- Links to MathSciNet author pages (requires subscription to MathSciNet).
- More complete and standardized bibliographic information.

Enhanced references are offered to provide the researcher with greater opportunities to access information in the mathematical sciences literature. You will find that not every reference has a corresponding record in MathSciNet, so the enhancement process may result in style inconsistencies in some individual reference lists.

In addition, it is possible that in some cases, especially in older papers, a reference was published with an incorrect MR number, which would result in an incorrect reference appearing in the enhanced references. We will be grateful to have any such errors brought to our attention by sending email to eprod-support@ams.org.

7.2. Using BibT_EX to prepare a bibliography. An author may find it convenient to maintain a file of references in BibT_EX form, as described in *The L^AT_EX Companion* [MG, Section 13.2]. Two BibT_EX styles are provided:

<code>amsplain.bst</code>	will produce numeric labels; preferred for articles;
<code>amsalpha.bst</code>	will produce labels constructed from the author name(s) and year of publication.

Both will translate references in a BibT_EX input (`.bib`) file to L^AT_EX input in a `.bbl` file in the form appropriate for AMS publications, including all necessary formatting instructions. This method of preparing bibliographies is therefore recommended.

To access a BibT_EX bibliography in a monograph, include these instructions in the appropriate place in the input file:

```
\bibliographystyle{style}    (amsplain or amsalpha)
\bibliography{name of bibliography .bib file}
```

Running Bib_TEX using the name of the main file will read in the `.bib` file(s) specified by the `\bibliography` statement and produce a `.bbl` file. The `.bib` file(s) may have any name(s) the author finds convenient; the `.bbl` file will have the same name as the source file from which it is input. If a chapter has a separate bibliography, after the bibliography has been completed (including processing by Bib_TEX), the contents of the `.bbl` file should be inserted into the appropriate `.tex` input file, replacing the `\bibliographystyle` and `\bibliography` statements. If the bibliography is specific to a chapter, and appears within the chapter, change the environment name `thebibliography` to `inchapterbibliography` so that it will be presented as a section rather than as a separate chapter.

Items in the bibliography are usually ordered alphabetically by author. Bib_TEX processing may alter this order, especially if the `amsalpha` style is used.

All categories of bibliographic entries listed in [MG, Table 13.1] are supported in the two AMS Bib_TEX styles. In addition to the fields listed in Table 13.1, a `language` field is provided in the AMS styles for use in identifying the original language of an item whose title has been translated.

The `natbib` package (available from CTAN or present in distributions based on T_EX Live) provides an author-year style that is compatible with the AMS document classes. This should ordinarily be used only for monographs on historical topics.

Standard abbreviations for periodicals should be obtained from [ABMR].

7.3. Using `amsrefs` to prepare a bibliography. `amsrefs` is a L^AT_EX package for preparing bibliography or reference lists. It attempts to provide many of the convenient features that L^AT_EX and Bib_TEX users have come to expect without imposing all of the overhead that Bib_TEX entails. In particular, it has been carefully designed to encourage the preservation of structured markup of the bibliography throughout the entire lifetime of a document from rough draft to final archival version. It does this by replacing L^AT_EX's unstructured `.bbl` file format by a new, fully structured format. The package is compatible with the `showkeys`, `hyperref`,¹ and `backrefs` packages and implements the functionality of the popular `cite` package. Interoperability with Bib_TEX is supported via a special bibliography style file, but `amsrefs` can be used without Bib_TEX. Full documentation of the `amsrefs` package can be found in [AMSR].

7.3.1. *Using the `amsrefs` package.* There are three ways of using the `amsrefs` package:

- (1) Enter bibliography items directly in your L^AT_EX document using the `biblist` environment and the `\bib` command.
- (2) Import items from an external `.ltb` file.
- (3) Import items from a `.bib` file using Bib_TEX and the special bibliography styles distributed with the `amsrefs` package.

7.3.2. *Using the `amsrefs` package with Bib_TEX.* Finally, you can use `amsrefs` in conjunction with Bib_TEX:

```
\documentclass{...}
```

¹Note that unlike most packages, which must be loaded *before* `hyperref`, the `amsrefs` package must be loaded *after* `hyperref` in order to work properly.

```

\usepackage{amsrefs}

\begin{document}

Alan Sokal~\cite{Sokal96} recommends Bourbaki's
text~\cite{Bourbaki70} for a gentle introduction to set theory.

\bibliography{nonsense}

\end{document}

```

Note two things:

- Unlike when you use `\bibselect` to import entries from an `.ltb` file, in this case the `.bbl` file *will* contain the `bibdiv` and `biblist` environments.
- There is no need for a `\bibliographystyle` command. In fact, any `\bibliographystyle` command you put in your document will be ignored. `amsrefs` will automatically invoke the correct style.

The main advantages of using Bib_{TEX} are:

- you can take advantage of Bib_{TEX}'s ability to sort your items for you, and
- you can take advantage of the large number of Bib_{TEX} database files already in existence.

As when using an `.ltb` file, you may wish to replace the `\bibliography` command by the contents of the `.bbl` file when you have finished compiling your bibliography.

7.4. Preparing a bibliography without a bibliography package. The main references section of a work is contained between the commands

```

\begin{thebibliography}{\langle model label \rangle}
\end{thebibliography}

```

This environment resolves to an unnumbered chapter in a monograph, following AMS publication specifications. If the references are specific to a particular chapter, use the environment `inchapterbibliography` to present the material as a section rather than as an independent chapter.

The indentation for the labels is set to an appropriate width using the model given with the `\begin` command. Thus the widest label in the bibliography should be used as the model; for example, `99` will provide space for a 2-digit numeric label.

For the proper order of reference elements and use of fonts and punctuation, look at a volume in the book series for which your document is intended and follow the examples you see there. More examples are given in [Sw].

Reference input. Begin each item with the command `\bibitem{\langle bibitem label \rangle}`. The \LaTeX default is to number references automatically; however, other labels may be used by inserting an optional key argument in square brackets between the command and the internal label:

```

\bibitem[ABC]{Arno1994}

```

The item label and the key need not be identical. Whatever appears within the `[]` is what prints; whatever is within the curly braces is used for linking and must not include any math or special characters.

Give at least one full name; initials and last name is an acceptable form. If a subsequent reference is by the same author(s), use `\bysame` instead of the name(s). For examples, refer to [Sw].

8. Permissions

Authors must obtain permission for the use of any material, including graphics, photographs, and text, appearing in their Work which comes from *any* other source. Authors should use the Society's **Permission Form** to request permission from an author or publisher for material previously published or owned by another. Permissions must be obtained for both print and electronic rights for all editions (present and future) and must be free of any restrictions which may limit the AMS's ability for itself or through licensees to produce, publish, promote, and distribute the Work in any territory, any language, and any medium now known or hereafter discovered. If you are applying for permission using a publisher's online form, please match the AMS's requirements as closely as possible. Any permissions that include restrictions will likely result in the material being omitted from the Work.

Additional help is available from the AMS Acquisitions Department:

Acquisitions Department
American Mathematical Society
201 Charles Street
Providence, RI 02904-2294 USA
Email: acquisitions@ams.org

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CHAPTER 3

Graphics

1. Getting started

Please take a moment to review the material in this chapter. Problems with graphics in production can lead to significant delays in processing and publishing your work. Graphics are critically important in conveying large amounts of complex information and by observing a few relatively simple guidelines, you can assist in the efficiency of the publishing process.

- Use a standard T_EX graphics inclusion macro package. The recommended graphics inclusion package for L^AT_EX 2_ε is **graphicx**. Be sure that commands used to include graphics in T_EX are compatible with dvips.
- Do not place graphics for use in T_EX files in subdirectories.
- Number figures consistently throughout the paper.
- Use an in-text reference.
- Set figure captions in T_EX.
- Set figure captions below the figure.
- Make sure figures are sized correctly and do not extend into the margins of the page.
- Make sure that labels overlaid on a figure using a separate package do not extend beyond the space allotted to the figure.

2. File format

*AMS Books: The preferred file format for graphics is EPS (Encapsulated PostScript) AMS/MAA Press Books, the AMS Student Mathematical Library series (**stm1**), and AMS Pure and Applied Undergraduate Texts series (**amstext**): The preferred file format for graphics is PDF (Portable Document Format).*

3. Resolution requirements for bitmap graphics

Line art: 600 pixels per inch (PPI) at 100%.

Halftone: 300 PPI at 100%.

Combination halftone: 600 PPI at 100%.

4. Size of graphics

Create graphics at 100% of the size at which they will be printed.

- If the figure is too large, resize the figure in a graphics program, not in T_EX.
- This applies also to photographs (see section 15).

5. Naming files

File names should be no longer than 20 alphanumeric characters. Do not use accented alphabetic characters. Avoid overly generic file names such as `fig01.eps`.

6. Placing graphics in your document

Use a standard \TeX graphics inclusion macro package. We recommend `graphicx`.

7. Lines and rules

Do not use a line/rule weight less than half a point (.5 point) at 100%.

- If you must scale your figure, be sure that you compensate by making line weights thicker. A .5 point line scaled at 50% becomes a .25 point line. Lines with weights less than half a point *may* disappear during the printing process.
- Increase graded lines in half-point increments (i.e., .5 point, 1 point, 1.5 points). Otherwise, the lines will not appear as distinctly different lines.
- Give lines that are a shade of gray (screened) or colored a line weight of at least 1 point at 100%. Gray and colored lines with weights less than 1 point look broken and jagged because of the small dot pattern used to simulate a shade of gray or color tone.

8. Shades of gray (screens)

Screens (a pattern of small black and white dots used to simulate shades of gray) should not be lower than 10% or higher than 85%.

- Screens outside the range 10% to 85% are either too light or too dark to print correctly.
- Screen density should increase in increments of no less than 10%. Screen variations of less than 10% are not distinguishable.
- Do not put (black or colored) type on a screen darker than 35%. Type on a screen that is above 35% is not legible.
- White type can be used only on 100% black. White type on a gray background looks broken and jagged because a small dot pattern is used to simulate shades of gray.

9. Font usage

Fonts should be fully embedded in your graphics.

- Whenever possible, fonts used in graphics should match those used in text.
- Fonts should be fully embedded in your graphics. If the fonts are not embedded in a graphic, it is possible that the font will be replaced with a default font such as Courier and the characters will not print properly. If you are unable to embed the fonts in your graphic, convert the fonts to paths (or outlines) prior to exporting the file to EPS. The fonts can be converted in the program you used to create the graphics. (For assistance, consult your graphics program's documentation.)
- Use Type 1 outline fonts instead of bitmap fonts. Type 1 outline fonts are vector based. These fonts do not lose quality when they are output to high-resolution printers.

- Do not subset fonts included in your graphics. It is imperative that the full font set be included in every graphic. If only a subset of a font is included, a font error can occur, which may cause characters to disappear in both the graphic and the DVI file.
- Avoid using fonts with city names such as Chicago, Monaco, Geneva, etc.

10. Multiple-part figures

Multiple-part figures should be configured as one figure in a graphics program, not in \TeX .

- Aligning multiple-part figures is very difficult in \TeX . It is easier and more cost-effective to do so in a graphics program.

11. Cropping and bounding boxes

Do not crop by pasting areas of white over portions of the graphic.

- When using a smaller area of a larger graphic, clip or crop within the graphics application to delete all but the desired portion.
- Do not crop by pasting areas of white over portions of the graphic. Doing this will make the bounding box larger than it should be and will cause problems when the graphic is included in \TeX .
- If possible, verify that bounding box information is correct. If the bounding box is not correct, graphics might be clipped off in unexpected ways.

12. Color graphics

12.1. Color spaces and gamuts. There are two main color spaces in use: RGB (Red-Green-Blue) and CMYK (Cyan-Magenta-Yellow-Black). The former is used for light-emitting displays (computer monitors, for instance) while the latter is used for printing.

One of the characteristics of a color space, such as RGB or CMYK, is its *gamut*, the range of colors that it can reproduce. The RGB color space has a much larger color gamut than the CMYK color space, as shown in Figure 1 (page 25, left). Colors in the RGB color space that lie outside the gamut of the CMYK color space must be approximated by the CMYK color space, with varying degrees of success: Figure 1 (page 25, right) compares the color output from various color technologies. CMYK colors can generally appear more muted when compared to their RGB counterparts. All RGB color graphics have to be converted to CMYK for printing. All color graphics, both RGB and CMYK, are subjected to analysis here at the AMS and optimized for printed publication.

Above all, bear in mind that color graphics viewed on a monitor or printed on a personal printer will not necessarily be an accurate rendering of how colors will look when printed on a press. Our Graphic Arts group has years of experience in bringing out the best from a wide variety of graphics, particularly color graphics.

12.2. Requirements for graphics to be published in color. Graphics intended to be printed in color should be submitted in CMYK format. If you submit RGB files they will be converted to CMYK. The AMS cannot guarantee that color reproduction in the print product will match the RGB file.



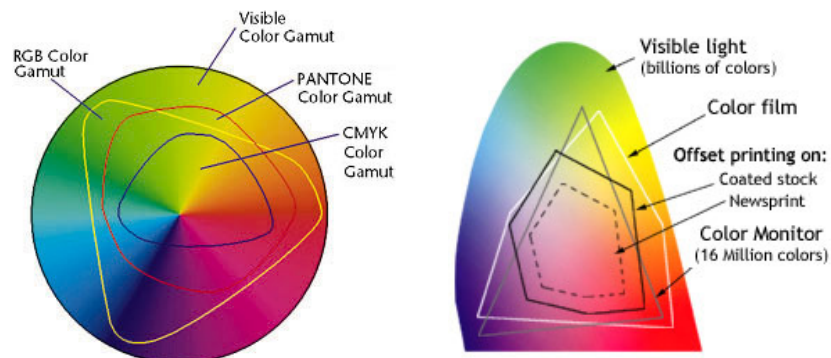


FIGURE 1. *Left:* A comparison of the colors available in various color spaces. *Right:* A comparison of the colors available with various display technologies.

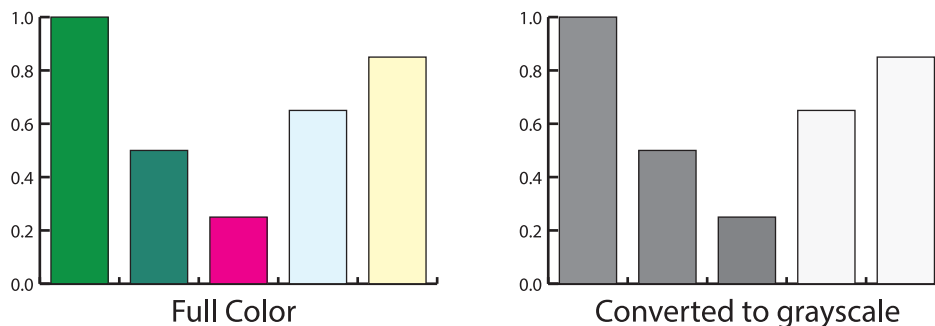


FIGURE 2. Colors don't always have the intended effect when converted to grayscale.

12.3. Color graphics to be printed in black and white or grayscale should be converted to black and white or grayscale before being submitted to the AMS. When color graphics are printed in black and white or grayscale, sometimes lighter colors, such as yellow, disappear, or darker colors, such as red and blue, appear to be the same tone. It is preferable that you convert your color graphics to grayscale and check to be sure that all the elements in your graphics print as desired—see Figure 2, above. Check your color figures on a black and white printer to ensure that the black and white printout of your figure is legible.

12.4. Shades of colors. Inherently light colors should be handled carefully when using shades of them. Whereas 50% red turns out to be a usable pink, a 50% yellow or cyan may be almost invisible.

12.5. Colored lines should be no less than .5 point in width. Colored lines in inherently light colors (e.g. yellow and cyan) should always be at or near 100% in tint.

13. Using type in graphics

Type within graphics requires special attention to reproduce legibly.

- Basic type size should be no less than 10 point at 100%. Although 10-point type is acceptable for print, for graphics intended to be viewed online, screen resolution is 72 PPI and 10-point type will be difficult to read.
- Do not put type on a dark background. Dark type on dark colors is not legible.
- Check your color figures on a black and white printer to ensure that the black and white printout of your figure is legible.

14. Tables

Tables can be thought of as a special kind of graphic. They often require a great deal of attention to make them effective.

- Make sure that the width of the table does not exceed the width of the text block.
- Very wide tables can be rotated using the `rotating` package together with the `sidewaystable` environment. Remember that tables (and figures) should be rotated such that the left-hand side of the table (or figure), after rotation, is at the bottom of the page.
- Set table captions above the table.
- For more help on the formatting of tables, see [MG, chapter 5] and [voss-tbl].

15. Photographs

Photographs must be at a minimum resolution of 300 dpi at the actual size that the photograph will be printed in the published product.

- Photographs should be at least 300 dpi in resolution at the actual size that the photograph will be printed in the published product. Do not scale photographs in \TeX .
- File format can be EPS, TIFF, or JPEG.
- Color photographs must be saved in CMYK format. (See Color graphics, section 12.)

16. \TeX graphics

There are several ways of providing graphics by the use of \TeX coding, the principal choices being

tikz: Based on the PGF (portable graphics format), this is a very flexible environment for creating graphics within a \TeX document. Note that it functions equally well in dvips-based \LaTeX and pdf \LaTeX as well as the newer varieties of \TeX such as Xe \LaTeX and Lua \LaTeX . The native documentation [tikz] is excellent, though massive. There are two very good primers by Mertz and Slough: [MeSlp] and [MeSlit]. A large set of examples, often generously documented, can be found at [tkz-ex].

pstricks: Also a very flexible and useful environment for drawing in \TeX . It is most easily used with dvips-based \TeX , though, with some care, it can be used with pdf \LaTeX . There is an excellent reference book by Herbert Voss, *PSTricks: Graphics and PostScript for \TeX and \LaTeX* [voss-pst]. The use of pstricks is also covered in some detail in [GM, chapters five and six].

xy and xypic: Though generally associated with commutative diagrams, these packages can also serve as a general drawing environment for \TeX .

A great deal of general information about other \LaTeX graphics packages can be found in [\[GM\]](#).

17. Using a package to apply labels to graphics

Several packages exist whose purpose is to place labels on graphics. Use of such a package does ensure consistent fonts. However, labels added by such a package do not modify the dimensions of a graphic, whether it is an EPS file or a drawing prepared by other means.

If labels are applied outside the edges of the graphic, they can extend into the margin on the sides, or above or below the graphic into space intended to separate the page content from the running head, or the graphic from a caption. In extreme cases, they can overprint surrounding material, with no warning being issued. Authors using such packages should be alert to this possibility, and carefully check the graphics where such labeling has been used.

If it is not possible to position labels within the boundaries of a graphic, extra space should be added with `\vspace` to compensate.

Submitting files to the AMS

1. Submission guidelines

Upon acceptance of your book, the source file(s) should be sent to the AMS office (this includes the \TeX source file(s) and any graphics files). Send *only* the files that are needed to process your submission or archive it for future reference. (This does *not* include `.log` or `.aux` files, for example.)

Before sending the source file(s), be sure you have proofread your monograph carefully. The files that you send must be the EXACT files used to generate the copy that was accepted for publication. In order to avoid any possible production problems, before sending the files, be sure to verify all items in the sections *The basic checklist* (page 6) and *A checklist for using AMS monograph classes* (page 7).

If your submission consists of **multiple files**, we recommend that you bundle them using the Zip utility; this can be obtained (free) for most platforms from freecode.com. Bundling means that only one (compressed) file needs to be sent, lessening the chance of name conflicts or file corruption.

2. Web server submissions (preferred)

Accepted electronic manuscripts can be submitted via the web server at www.ams.org/submit-book-journal. For security and confidentiality reasons, submitting through the web server requires an AMS web account. Authors who do not already have an account will be given the opportunity to create one as they go through the submission process.

3. Electronic mail submissions

Files sent by electronic mail should be addressed to `pub-submit@ams.org`. Include them as attachments, not as part of the message.

The subject line of the message should use the publication code to identify the monograph series (see the list of *The AMS monograph series*, page 4), and should include the name(s) of the author(s). By including this information in the subject line, you will help speed up the processing of your submission.

Submissions received through email will be acknowledged upon receipt by an automatic reply while your submission is reviewed. If there are any problems with the file received, you will be notified.

4. Other possibilities

If your attempt to submit both through the web server and by electronic mail fails, other arrangements are available. Send email to **AMS Technical Support** as described in the section “**Getting help: AMS resources**” on page 29.

Resources and getting help

1. Getting help: AMS resources

If you encounter difficulties in preparing or submitting your manuscript in electronic form after it has been accepted for publication by the appropriate editorial board, you can ask for help from AMS Technical Support:

Publications Technical Group
 Phone: 800-321-4267, ext. 4080 or 401-455-4080
 Email: tech-support@ams.org

All written correspondence should be sent to the appropriate AMS department at:

American Mathematical Society
 201 Charles Street
 Providence, RI 02904-2294 USA

Questions concerning what you need to prepare your manuscript should be directed to:

Acquisitions Department
 Phone: 800-321-4267, ext. 4051 or 401-455-4051
 Email: acquisitions@ams.org

Problems in accessing the web server should be reported to:

Email: webmaster@ams.org

2. T_EX resources

L^AT_EX and T_EX are available on the web free of charge. There are also several commercial T_EX implementations. AMS web pages devoted to T_EX information can be accessed at www.ams.org/tex. The first of these pages has links to other pages that identify the various sources for the T_EX program.

L^AT_EX is the most popular of the free front ends designed for use with T_EX, the basic typesetting program. Whereas plain T_EX defines basic macros, L^AT_EX defines stylistic packages, setting up styles for a monograph, journal article, and article in a proceedings collection, which you can then alter to your own specifications.

AMS-L^AT_EX is a collection of L^AT_EX extensions that make various kinds of mathematical constructions easier to produce and take more care with certain finer details in order to yield publication-quality results. It consists of two parts: **amsmath** (the part concerned with the mathematics) and **amscls**. The latter is a collection of companion design setup packages (variously referred to as ‘document class’ or ‘class’ files) that enable authors writing a monograph or article to get largely the

same visual appearance in their preliminary drafts as in a final publication with the AMS. Both parts of AMS- \LaTeX are included in the canonical \LaTeX distribution as part of \TeX Live.

Updates for `amsmath` are best obtained from [CTAN](#); updates for `amscs` can be obtained either from CTAN or from the AMS web server at www.ams.org/tex. Other AMS packages and collections are the AMSFonts and `amsrefs`. These too are included in \TeX Live as well as available from both the AMS web server and CTAN. All distributions include a copy of the relevant User's Guide and other related documentation in PDF form, which can either be printed or viewed electronically. (This Author Handbook is the User's Guide to the `amscs` collection.)

The book *More Math into \LaTeX* [Gr] is written from the point of view of a mathematician using AMS- \LaTeX , and contains many examples. The *Guide to \LaTeX* , fourth edition [KD], is a good general introduction to \LaTeX . The original and authoritative manual for \LaTeX is the *\LaTeX User's Guide & Reference Manual* [La]. George Grätzer has also written a series of articles for *Notices of the AMS* [Gr1, Gr2, Gr3, Gr4, Gr5, Gr6, Gr7] that keeps the interested user up-to-date with the latest developments in \LaTeX .

Another source of information on \TeX and \LaTeX is the \TeX Users Group (TUG). They can be contacted at:

[\$\TeX\$ Users Group](#)
 P. O. Box 2311
 Portland, OR 97208-2311
 (503) 223-9994, FAX: (206) 203-3960
office@tug.org

TUG also distributes the \TeX Live collection, which includes ready-to-run implementations of \TeX for Windows, Mac, and Unix platforms, as well as \LaTeX and an extensive selection of packages, all freeware.

3. Online assistance

One of the best places to ask for assistance is the group known by the acronym CTT, groups.google.com/forum/comp.text.tex. Most of the people who use CTT are more than willing to answer questions and give advice.

Another online source of assistance is tex.stackexchange.com. This is organized differently from most discussion groups. After signing up, you pose and answer questions. In the process, you gain points which in turn allow you to do more in the group. Be sure to read tex.stackexchange.com/about to get you started.

The AMS is not equipped to handle questions about specific platforms. Links to sites providing such support, as well as addresses for discussion lists and links for online forums, are given on this AMS web page:

www.ams.org/tex/additional-sources.

Bibliography

Discounts are available on some of these books when they are ordered using information available on the T_EX Users Group page [Books about TeX and Friends](#). In particular, books published by Pearson affiliates (including Addison-Wesley) are eligible for a discount.

- [ABMR] *Abbreviations of names of serials [reviewed in Mathematical Reviews]*, Amer. Math. Soc., Providence, RI. www.ams.org/msnhtml/serials.pdf
- [AFG] *User's Guide to AMSFonts*, version 2.2d, Amer. Math. Soc., Providence, RI, 2002. mirrors.ctan.org/fonts/amsfonts/doc/amsfndoc.pdf
- [AH] *AMS Author Handbook*, Amer. Math. Soc., Providence, RI, 2019. Link at www.ams.org/arc/handbook
- [AMG] *User's guide for the amsmath package version 2.1*, Amer. Math. Soc., Providence, RI, and the L^AT_EX3 Project, 2016. mirrors.ctan.org/macros/latex/required/amsmath/amslldoc.pdf
- [AMSR] *User's Guide to the amsrefs Package*, David Jones, Amer. Math. Soc., Providence, RI, 2013. mirrors.ctan.org/macros/latex/contrib/amsrefs/amsrdoc.pdf
- [ATH] *Using the amsthm Package*, version 2.20.3, Amer. Math. Soc., Providence, RI, 2015. mirrors.ctan.org/macros/latex/required/amscls/doc/amsthdoc.pdf
- [GM] Michel Goossens, Frank Mittelbach et al., *The L^AT_EX Graphics companion*, second ed., Addison-Wesley, Reading, MA, 2007.
- [GGr] George Grätzer, *Math into L^AT_EX*, third ed., Springer, New York, 2000.
- [Gr] George Grätzer, *More Math into L^AT_EX*, fifth ed., Springer, New York, 2016. (Supersedes [GGr].)
- [Gr1] G. Grätzer. What is new in L^AT_EX? I. Breaking free. *Notices of the AMS*, 56(1):52–54, January 2009. www.ams.org/notices/200901/tx090100052p.pdf
- [Gr2] G. Grätzer. What is new in L^AT_EX? II. T_EX implementations, evolution or revolution. *Notices of the AMS*, 56(5):627–629, May 2009. www.ams.org/notices/200905/rtx090500627p.pdf
- [Gr3] G. Grätzer. What is new in L^AT_EX? III. Formatting references. *Notices of the AMS*, 56(8):954–956, September 2009. www.ams.org/notices/200908/rtx090800954p.pdf
- [Gr4] G. Grätzer. What is new in L^AT_EX? IV. WYSIWYG L^AT_EX. *Notices of the AMS*, 58(6):828–830, June/July 2011. www.ams.org/notices/201106/rtx110600828p.pdf
- [Gr5] G. Grätzer. What is new in L^AT_EX? V. L^AT_EX on an iPad. Foundation. *Notices of the AMS*, 60(3):332–334, March 2013. www.ams.org/notices/201303/rnoti-p332.pdf

- [Gr6] G. Grätzer. What is new in L^AT_EX? VI. L^AT_EX on an iPad. Empire. *Notices of the AMS*, 60(4):434–439, April 2013.
www.ams.org/notices/201304/rnoti-p434.pdf
- [Gr7] G. Grätzer. What is new in L^AT_EX? VII. The STIX math symbols. *Notices of the AMS*, 62(6):667–669, June/July 2015.
www.ams.org/notices/201506/rnoti-p667.pdf
- [Hi] Nicholas J. Higham, *Handbook of Writing for the Mathematical Sciences*, second ed., SIAM, Philadelphia, PA, 1998.
- [KD] Helmut Kopka and Patrick W. Daly, *Guide to L^AT_EX*, fourth ed., Addison-Wesley, Boston, 2004.
- [Kn] Donald E. Knuth, *The T_EXbook*, Addison-Wesley, Reading, MA, 1984.
- [La] Leslie Lamport, *L^AT_EX: A document preparation system*, second ed., Addison-Wesley, Reading, MA, 1994.
- [LW] Mary Letourneau and Jennifer Wright Sharp, *AMS style guide: Journals*, Amer. Math. Soc., Providence, RI, 2017. www.ams.org/arc/styleguide/
- [MeSlp] Andrew Mertz, William Slough, *Graphics with TikZ*, PracT_EX Journal, **2007**:1. tug.org/pracjourn/2007-1/mertz/mertz.pdf
- [MeSlT] Andrew Mertz, William Slough, *Graphics with PGF and TikZ*, TUGboat, **28**:1 (2007), 91–99. tug.org/TUGboat/tb28-1/tb88mertz.pdf
- [MG] Frank Mittelbach, Michel Goossens, et al., *The L^AT_EX companion*, second ed., Addison-Wesley, Reading, MA, 2004. This is now also available as an ebook, in both **English** and **German**. The front matter, including the full Table of Contents, can be viewed online, at
www.latex-project.org/help/books/bookpart_tlc2-ch0.pdf.
- [MSC] 2020 Mathematics Subject Classification www.ams.org/msc.
- [SHSD] Norman E. Steenrod, Paul R. Halmos, Menahem M. Schiffer, and Jean A. Dieudonné, *How to write mathematics*, 6th printing (2000), Amer. Math. Soc., Providence, RI, 1973, reprinted with corrections 1981.
- [Sw] Ellen E. Swanson, *Mathematics into type*, updated ed., Amer. Math. Soc., Providence, RI, 1999. <http://www.ams.org/arc/styleguide/mit-2.pdf>.
- [tkz] Till Tantau, *The TikZ and PGF Packages: Manual for version 3.0.1a*, 2013.
www.ctan.org/graphics/pgf/base/doc/pgfmanual.pdf
- [tkz-ex] Online gallery of TikZ and PGF examples.
www.texample.net/tikz/examples/all/
- [voss-pst] Herbert Voss, *PSTricks: Graphics and PostScript for T_EX and L^AT_EX*, UIT Cambridge Ltd., 2011.
- [voss-tbl] Herbert Voss, *Typesetting Tables with L^AT_EX*, UIT Cambridge Ltd., 2010.