

# L<sup>A</sup>T<sub>E</sub>X Class for the *Association for Computing Machinery*\*

Boris Veytsman<sup>†</sup>

2018/07/16, v1.54

## Abstract

This package provides a class for typesetting publications of the Association for Computing Machinery.

## Contents

<b>1</b>	<b>Introduction</b>	<b>3</b>
<b>2</b>	<b>User's guide</b>	<b>3</b>
2.1	Installation	3
2.2	Invocation and options	6
2.3	Top matter	7
2.4	Algorithms	19
2.5	Figures and tables	19
2.6	Theorems	21
2.7	Online-only and offline-only material	21
2.8	Note about anonymous mode	21
2.9	Acknowledgments	22
2.10	Bibliography	22
2.11	Colors	25
2.12	Other notable packages and typographic remarks	26
2.13	A note for wizards: <code>acmart-preload-hook.tex</code>	26
2.14	Currently supported publications	27

---

\*©2016–2018, Association for Computing Machinery

<sup>†</sup>[borisv@lk.net](mailto:borisv@lk.net), [boris@varphi.com](mailto:boris@varphi.com)

<b>3</b>	<b>Implementation</b>	<b>30</b>
3.1	Identification	30
3.2	Preload hook	30
3.3	Options	30
3.4	Setting switches	33
3.5	Loading the base class and package	34
3.6	Citations	35
3.7	Paper size and paragraphing	42
3.8	Fonts	45
3.9	Floats	46
3.10	Lists	48
3.11	Top-matter data	49
3.12	Concepts system	63
3.13	Copyright system	64
3.14	Typesetting top matter	69
3.15	Headers and Footers	83
3.16	Sectioning	89
3.17	TOC lists	91
3.18	Theorems	92
3.19	Acknowledgments	95
3.20	Conditional typesetting	95
3.21	Additional bibliography commands	96
3.22	End of Class	96

# 1 Introduction

The Association for Computing Machinery<sup>1</sup> is the world's largest educational and scientific computing society, which delivers resources that advance computing as a science and a profession. It was one of the early adopters of T<sub>E</sub>X for its typesetting.

It provided several different classes for a number of journals and conference proceedings. Unfortunately during the years since these classes were written, the code was patched many times, and supporting different versions of the classes became difficult.

This package provides the uniform interface for all ACM publications. It is intended to replace all the different classes and packages and provide an up-to-date L<sup>A</sup>T<sub>E</sub>X package.

This package uses only free T<sub>E</sub>X packages and fonts included in T<sub>E</sub>XLive, MikT<sub>E</sub>X and other popular T<sub>E</sub>X distributions. It is intended to be published in these distributions itself, which minimizes users' efforts in the installation and support of this package.

I am grateful to Michael D. Adams, Leif Andersen, Dirk Beyer, Joachim Breitner, Benjamin Byholm, Michael Ekstrand, Matthew Fluett, Paolo G. Giarrusso, Ben Greenman, Jamie Davis, LianTze Lim, Ben Liblit, Kai Mindermann, Frank Mittelbach, Serguei Mokhov, Ross Moore, John Owens, Joel Nider, Tobias Pape, Mathias Rav, Andreas Reischinger, Matteo Riondato, Craig Rodkin, Bernard Rous, David Shamma, Gabriel Scherer, Stephen Spencer, Daniel Thomas, Zack Weinberg, John Wickerson and many others for their invaluable help.

The development version of the package is available at <https://github.com/borisveytsman/acmart>.

## 2 User's guide

This class uses many commands and customization options, so it might appear intimidating for a casual user. Do not panic! Many of these commands and options can be safely left with their default values or the values recommended by your conference or journal editors. If you have problems or questions, do not hesitate to ask me directly or the community at <https://github.com/borisveytsman/acmart>, <https://tex.stackexchange.com> or the closest T<sub>E</sub>X Users Group. The world-wide T<sub>E</sub>X Users Group is at <https://tug.org/>; please consider joining us if you use T<sub>E</sub>X regularly.

### 2.1 Installation

Most probably, you already have this package installed in your favorite T<sub>E</sub>X distribution; if not, you may want to upgrade. You may need to upgrade it anyway since this package uses a number of relatively recent packages, especially the ones related to fonts.

The latest released version of this package can be found on CTAN: <https://www.ctan.org/pkg/acmart>. The development version can be found on GitHub: <https://github.com/borisveytsman/acmart>. At this address you can file a bug report—or even contribute your own enhancement by making a pull request.

---

<sup>1</sup><http://www.acm.org/>

Please note that the version on Github is a development (or experimental) version: please download it for testing new features. The production version is the one on CTAN and ACM sites.

Most users should not attempt to install this package themselves but should rather rely on their  $\text{\TeX}$  distributions to provide it. If you decide to install the package yourself, follow the standard rules:

1. Run `latex acmart.ins`. This will produce the file `acmart.cls`
2. Put the files `acmart.cls` and `ACM-Reference-Format.bst` in places where  $\text{\TeX}$  can find them (see [1] or the documentation for your  $\text{\TeX}$  system).
3. Update the database of file names. Again, see [1] or the documentation for your  $\text{\TeX}$  system for the system-specific details.
4. The file `acmart.pdf` provides the documentation for the package. (This is probably the file you are reading now.)

As an alternative to items 2 and 3 you can just put the files in the working directory where your `.tex` file is.

This class uses a number of other packages. They are included in all major  $\text{\TeX}$  distributions ( $\text{\TeX}$ Live, Mac $\text{\TeX}$ , Mik $\text{\TeX}$ ) of 2015 and later, so you probably have them installed. Just in case here is the list of these packages:

- *amscs*, <http://www.ctan.org/pkg/amscs>
- *amsfonts*, <http://www.ctan.org/pkg/amsfonts>
- *amsmath*, <http://www.ctan.org/pkg/amsmath>
- *binhex*, <http://www.ctan.org/pkg/binhex>
- *caption*, <http://www.ctan.org/pkg/caption>
- *comment*, <http://www.ctan.org/pkg/comment>
- *cm-super*, <http://www.ctan.org/pkg/cm-super>
- *cmap*, <http://www.ctan.org/pkg/cmap>
- *draftwatermark*, <http://www.ctan.org/pkg/draftwatermark>
- *environ*, <http://www.ctan.org/pkg/environ>
- *etoolbox*, <http://www.ctan.org/pkg/etoolbox>
- *fancyhdr*, <http://www.ctan.org/pkg/fancyhdr>
- *float*, <http://www.ctan.org/pkg/float>
- *fontaxes*, <http://www.ctan.org/pkg/fontaxes>
- *geometry*, <http://www.ctan.org/pkg/geometry>

- *graphics*, <http://www.ctan.org/pkg/graphics>
- *hyperref*, <http://www.ctan.org/pkg/hyperref>
- *ifluatex*, <http://www.ctan.org/pkg/ifluatex>
- *ifxetex*, <http://www.ctan.org/pkg/ifxetex>
- *inconsolata*, <http://www.ctan.org/pkg/inconsolata>
- *libertine*, <http://www.ctan.org/pkg/libertine>
- *manyfoot*, <http://www.ctan.org/pkg/manyfoot>
- *microtype*, <http://www.ctan.org/pkg/microtype>
- *mmap*, <http://www.ctan.org/pkg/mmap>
- *ms*, <http://www.ctan.org/pkg/ms>
- *mweights*, <http://www.ctan.org/pkg/mweights>
- *natbib*, <http://www.ctan.org/pkg/natbib>
- *nccfoots*, <http://www.ctan.org/pkg/nccfoots>
- *newtx*, <http://www.ctan.org/pkg/newtx>
- *oberdiek*, <http://www.ctan.org/pkg/oberdiek>
- *pdftex-def*, <http://www.ctan.org/pkg/pdftex-def>
- *refcount*, <http://www.ctan.org/pkg/refcount>
- *setspace*, <http://www.ctan.org/pkg/setspace>
- *textcase*, <http://www.ctan.org/pkg/textcase>
- *totpages*, <http://www.ctan.org/pkg/totpages>
- *trimspaces*, <http://www.ctan.org/pkg/trimspaces>
- *upquote*, <http://www.ctan.org/pkg/upquote>
- *url*, <http://www.ctan.org/pkg/url>
- *xcolor*, <http://www.ctan.org/pkg/xcolor>
- *xkeyval*, <http://www.ctan.org/pkg/xkeyval>
- *xstring*, <http://www.ctan.org/pkg/xstring>

## 2.2 Invocation and options

To use this class, put in the preamble of your document

```
\documentclass[<options>]{acmart}
```

There are several options corresponding to the type of the document and its general appearance. They are described below. Generally speaking, the options have key=value forms, for example,

```
\documentclass[format=acmsmall, screen=true, review=false]{acmart}
```

The option `format` describes the format of the output. There are several possible values for this option, for example,

```
\documentclass[format=acmtog]{acmart}
```

Actually the words `format=` can be omitted, e.g.,

```
\documentclass[acmtog, review=false]{acmart}
```

The possible formats are listed in Table 1. Note that formats starting with `acm` are intended for journals and transactions, while formats starting with `sig` are intended for proceedings published as books.

Note that sometimes conference proceedings are published as a special issue (or issues) of an ACM journal. In this case, you should use the journal format for a conference paper. Please contact your conference committee if in doubt.

There are several Boolean options that can take `true` or `false` values. They are listed in Table 2. The words `=true` can be omitted when setting a Boolean option, so instead of `screen=true` one can write just `screen`, for example,

```
\documentclass[acmsmall, screen, review]{acmart}
```

The option `review` is useful when combined with the `manuscript` format option. It provides a version suitable for reviewers and copy editors.

The default for the option `screen` depends on the publication. At present it is `false` for all publications *but* PACM, since PACM is now electronic-only. Thus PACM titles (see Table 5) set this option to `true`. In the future this option may involve additional features suitable for on-screen versions of articles.

The option `natbib` is used when the corresponding BibTeX style is based on `natbib`. In most cases you do not need to set it. See Section 2.10.

The option `anonymous` is used for anonymous review processes and causes all author information to be obscured.

The option `timestamp` is used to include a time stamp in the footer of each page. When preparing a document, this can help avoid confusing different revisions. The footer also includes the page range of the document. This helps detect missing pages in hard copies.

Table 1: The possible values for the format option

Value	Meaning
manuscript	A manuscript. This is the default.
acmsmall	Small single-column format. Used for CIE, CSUR, DTRAP, JACM, JDIQ, JEA, JERIC, JETC, PACMCGIT, PACMHCI, PACMPL, TAAS, TACCESS, TACO, TALG, TALLIP (formerly TALIP), TCPS, TDSCI, TEAC, TECS, THRI, TIIS, TIOT, TISSEC, TIST, TKDD, TMIS, TOCE, TOCHI, TOCL, TOCS, TOCT, TODAES, TODS, TOIS, TOIT, TOMACS, TOMM (formerly TOMCCAP), TOMPECS, TOMS, TOPC, TOPLAS, TOPS, TOS, TOSEM, TOSN, TRETS, TSAS, TSC, TSLP and TWEB, including special issues.
acmlarge	Large single-column format. Used for IMWUT, JOCCH, POMACS and TAP, including special issues.
acmtog	Large double-column format. Used for TOG, including annual conference Technical Papers.
sigconf	Proceedings format for most ACM conferences (with the exceptions listed below) and all ICPS volumes.
sigplan	Proceedings format for SIGPLAN conferences.
sigchi	Proceedings format for SIGCHI conferences.
sigchi-a	Format for SIGCHI extended abstracts.

The option `authordraft` is intended for author’s drafts that are not intended for distribution. It typesets a copyright block to give the author an idea of its size and the overall size of the paper but overprints it with the phrase “Unpublished working draft. Not for distribution.”, which is also used as a watermark. This option sets `timestamp` and `review` to true, but these can be overridden by setting these options to false *after* setting `authordraft` to true.

## 2.3 Top matter

A number of commands set up *top matter* or (in computer science jargon) *metadata* for an article. They establish the publication name, article title, authors, DOI and other data. Some of these commands, like `\title` and `\author`, should be put by the authors. Others, like `\acmVolume` and `\acmDOI`—by the editors. Below we describe these commands and mention who should issue them. These macros should be used *before* the `\maketitle` command. Note that in previous versions of ACM classes some of these commands should be used before `\maketitle`, and some after it. Now they all must be used before `\maketitle`.

This class internally loads the `amsart` class, so many top-matter commands are inherited from `amsart` [2].

`\acmJournal` The macro `\acmJournal{<shortName>}` sets the name of the journal or transaction for journals and transactions. The argument is the short name of the publication *in uppercase*, for example,

Table 2: Boolean options

Option	Default	Meaning
review	false	A review version: lines are numbered and hyperlinks are colored
screen	see text	A screen version: hyperlinks are colored
natbib	true	Whether to use the natbib package (see Section 2.10)
anonymous	false	Whether to make author(s) anonymous
authorversion	false	Whether to generate a special version for the authors' personal use or posting (see Section 2.3)
nonacm	false	Use the class typesetting options for a non-ACM document, which will not include the conference/journal header and footers or permission statements
timestamp	false	Whether to put a time stamp in the footer of each page
authordraft	false	Whether author's-draft mode is enabled
acmthm	true	Whether to define theorem-like environments, see Section 2.6

`\acmJournal{TOMS}`

The currently recognized journals are listed in Table 5. Note that conference proceedings published in *book* form do not set this macro.

It is expected that this command is inserted by the author of the manuscript when she decides to which journal to submit the manuscript.

`\acmConference` The macro `\acmConference[⟨short name⟩]{⟨name⟩}{⟨date⟩}{⟨venue⟩}` is used for conference proceedings published in the book form. The arguments are the following:

**short name:** the abbreviated name of the conference (optional).

**name:** the name of the conference.

**date:** the date(s) of the conference.

**venue:** the place of the conference.

Examples:

```
\acmConference[TD'15]{Technical Data Conference}{November
12--16}{Dallas, TX, USA}
\acmConference{SA'15 Art Papers}{November 02--06, 2015}{Kobe, Japan}
```

`\acmBooktitle` By default we assume that conference proceedings are published in the book named *Proceedings of CONFERENCE*, where CONFERENCE is the name of the conference inferred from the command `\acmConference` above. However, sometimes the book title is different. The command `\acmBooktitle` can be used to set this title, for example,



```
\acmBooktitle{Companion to the first International Conference on the
Art, Science and Engineering of Programming (Programming '17)}
```

`\editor` In most cases, conference proceedings are edited. You can use the command `\editor{<editor>}` to set the editor of the volume. This command can be repeated, for example,

```
\editor{Jennifer B. Sartor}
\editor{Theo D'Hondt}
\editor{Wolfgang De Meuter}
```

`\title` The command `\title`, as in the `amsart` class, has two arguments: one optional, and one mandatory:

```
\title[<ShortTitle>]{<FullTitle>}
```

The mandatory argument is the full title of the article. The optional argument, if present, defines the shorter version of the title for running heads. If the optional argument is absent, the full title is used instead.

It is expected that this command is inserted by the author of the manuscript.

`\subtitle` Besides title, ACM classes allow a subtitle, set with the `\subtitle{<subtitle>}` macro.

The commands for specifying authors are highly structured. The reason is they serve double duty: the authors' information is typeset in the manuscript *and* is used by the metadata extraction tools for indexing and cataloguing. Therefore it is very important to follow the guidelines exactly.

`\author` The basic commands are `\author`, `\orcid` (for the researchers registered with ORCID, <http://www.orcid.org/>), `\affiliation` and `\email`. In the simplest case, you enter them in this order:

```
\author{...}
\orcid{...}
\affiliation{...}
\email{...}
```

Do *not* use the  $\LaTeX$  `\and` macro! Each author deserves his or her own `\author` command.

Note that some formats do not typeset e-mails or ORCID identifiers. Do not worry: the metadata tools will get them.

Sometimes an author has several affiliations. In this case, the `\affiliation` command should be repeated:

```
\author{...}
\orcid{...}
\affiliation{...}
\affiliation{...}
\email{...}
```

Similarly you can repeat the `\email` command.

You may have several authors with the same affiliation, different affiliations, or overlapping affiliations (author  $A_1$  is affiliated with institutions  $I_1$  and  $I_2$ , while author  $A_2$  is affiliated with  $I_2$  only, author  $A_3$  is affiliated with  $I_1$  and  $I_3$ , etc.). The recommended solution is to put the `\affiliation` commands after each author, possibly repeating them:

```
\author{...}
\orcid{...}
\affiliation{...}
\affiliation{...}
\email{...}
\author{...}
\orcid{...}
\affiliation{...}
\email{...}
\author{...}
\orcid{...}
\affiliation{...}
\affiliation{...}
\email{...}
```

In some cases, when several authors share the same affiliation, you can try to save space using the format

```
\author{...}
\email{...}
\author{...}
\email{...}
\affiliation{...}
```

However, this format is not generally recommended.

`\additionalaffiliation`

In some cases, too many affiliations can take too much space. The command `\additionalaffiliation{<affiliation>}` creates a footnote after an author's name with the words "Also with {<affiliation>}". You should use this command only as a last resort. An example of usage is:

```
\author{G. Tobin}
\author{Ben Trovato}
\additionalaffiliation{%
  \institution{The Th{\o}rv{"a}ld Group}
  \streetaddress{1 Th{\o}rv{"a}ld Circle}
  \city{Hekla}
  \country{Iceland}}
\affiliation{%
  \institution{Institute for Clarity in Documentation}
  \streetaddress{P.O. Box 1212}
  \city{Dublin}}
```

```
\state{Ohio}
\postcode{43017-6221}}
```

Here Trovato and Tobin share their affiliation with the Institute for Clarity in Documentation, but only Ben Trovato is affiliated with The Thørväld Group.

<pre>\position \institution \department \streetaddress \city \state \postcode \country</pre>	<p>The <code>\affiliation</code> and <code>\additionalaffiliation</code> commands are further structured to interact with the metadata extraction tools. Inside these commands you should use the <code>\position</code>, <code>\institution</code>, <code>\department</code>, <code>\city</code>, <code>\streetaddress</code>, <code>\state</code>, <code>\postcode</code> and <code>\country</code> macros to indicate the corresponding parts of the affiliation. Note that in some cases (for example, journals) these parts are not printed in the resulting copy, but they <i>are</i> necessary since they are used by the XML metadata extraction programs. Do <i>not</i> put commas or <code>\\</code> between the elements of <code>\affiliation</code>. They will be provided automatically.</p>
--	--

An example of the author block:

```
\author{A. U. Thor}
\orcid{1234-4564-1234-4565}
\affiliation{%
  \institution{University of New South Wales}
  \department{School of Biomedical Engineering}
  \streetaddress{Samuels Building (F25), Kensington Campus}
  \city{Sidney}
  \state{NSW}
  \postcode{2052}
  \country{Australia}}
\email{author@nsw.au.edu}
\author{A. N. Other}
\affiliation{%
  \institution{University of New South Wales}
  \city{Sidney}
  \state{NSW}
  \country{Australia}}
\author{C. O. Respondent}
\orcid{1234-4565-4564-1234}
\affiliation{%
  \institution{University of Pennsylvania}
  \city{Philadelphia}
  \state{PA}
  \country{USA}}
\affiliation{%
  \institution{University of New South Wales}
  \city{Sidney}
  \state{NSW}
  \country{Australia}}
```

Note that the old ACM conference formats did not allow more than six authors and required some effort from authors to achieve alignment. The new format is much better in this.

Sometimes an author works in several departments within the same institution. There could be two situations: the departments are independent, or one department is within another. In the first case, just repeat the command `\department` several times. To handle the second case the command has an optional numerical parameter. The departments with higher numbers are higher in the organizational chart. Compare

```
\affiliation{%
  \department[0]{Department of Lunar Studies} % 0 is the default
  \department[1]{John Doe Institute} % higher than 0
  \institution{University of San Serriffe}
  \country{San Serriffe}}
```

and

```
\affiliation{%
  \department{Department of Lunar Studies} % Not in the John Doe Institute!
  \department{John Doe Institute}
  \institution{University of San Serriffe}
  \country{San Serriffe}}
```

The command `\affiliation` formats its output according to American conventions. This might be wrong for some cases. Consider, for example, a German address. In Germany, the postcode is put before the city and is not separated by a comma. We can handle this order using

```
\affiliation{%
  \institution{Fluginstitut}
  \streetaddress{Sonnenallee 17}
  \postcode{123456}
  \city{Helm}
  \country{Germany}}
```

However, the comma after the postcode is unfortunate: the address will be typeset (in some formats) as

```
Fluginstitut
Sonnenallee 17
123456, Helm, Germany
```

To overcome this problem, the command `\affiliation` has an optional parameter `obeypunctuation`, which can be `false` (the default) or `true`. If this parameter is `true`, `\affiliation` obeys the author's command. Thus

```
\affiliation[obeypunctuation=true]{%
  \institution{Fluginstitut}\\
  \streetaddress{Sonnenallee 17}\\
  \postcode{123456}}
```

```
\city{Helm},
\country{Germany}}
```

will be typeset as

```
Fluginstitut
Sonentallee 17
123456 Helm, Germany
```

Note that you should *not* use this option for journals.

It is expected that these commands are inserted by the author of the manuscript.

`\thanks` Like `amsart` (and unlike standard  $\LaTeX$ ), we allow `\thanks` only *outside* of the commands `\title` and `\author`. This command is obsolete and should *not* be used in most cases. Do not list your acknowledgments or grant sponsors here. Put this information in the `acks` environment (see Section 2.9).

`\authorsaddresses` In some formats, addresses are printed as a footnote on the first page. By default  $\LaTeX$  typesets them itself using the information you give it. However, you can override its choice using the command `\authorsaddresses{<contact addresses>}`, for example,

```
\authorsaddresses{%
  Authors' addresses: G.~Zhou, Computer Science Department, College of
  William and Mary, 104 Jameson Rd, Williamsburg, PA 23185, US;
  V.~B\eranger, Inria Paris-Rocquencourt, Rocquencourt, France;
  A.~Patel, Rajiv Gandhi University, Rono-Hills, Doimukh, Arunachal
  Pradesh, India; H.~Chan, Tsinghua University, 30 Shuangqing Rd,
  Haidian Qu, Beijing Shi, China; T.~Yan, Eaton Innovation Center,
  Prague, Czech Republic; T.~He, C.~Huang, J.~A.~Stankovic University
  of Virginia, School of Engineering Charlottesville, VA 22903, USA;
  T. F. Abdelzaher, (Current address) NASA Ames Research Center,
  Moffett Field, California 94035.}
```

You can *suppress* printing authors' addresses by setting them to an empty string: `\authorsaddresses{}`.

`\titlenote` While the command `\thanks` generates a note without a footnote mark, sometimes  
`\subtitlenote` the authors might need notes more tightly connected to the title, subtitle or author. The  
`\authornote` commands `\titlenote`, `\subtitlenote` and `\authornote` that follow the corresponding commands (`\title`, `\subtitle` and `\author`) generate such notes. For example,

```
\title{This is a title}
\titlenote{This is a titlenote}
\author{A. U. Thor}
\authornote{This is an authornote}
```

Please never use a `\footnote` inside an `\author` or `\title` command since this confuses the metadata extraction software. (Actually these commands now produce errors.)

`\authornotemark` Sometimes one may need to have the same footnote connected to several authors.

The command `\authornotemark[number]` adds just the footnote mark, for example,

```
\author{A. U. Thor}
\authornote{Both authors contributed equally to the paper}
...
\author{A. N. Other}
\authornotemark[1]
```

The correct numbering of these marks is the responsibility of the user.

The macros `\acmVolume`, `\acmNumber`, `\acmArticle`, `\acmYear` and `\acmMonth` are inserted by the editor and set the journal volume, issue, article number, year and month correspondingly. The arguments of all these commands, including `\acmMonth`, is numerical. For example,

```
\acmVolume{9}
\acmNumber{4}
\acmArticle{39}
\acmYear{2010}
\acmMonth{3}
```

Note that `\acmArticle` is used not only for journals but also for some conference proceedings.

The articles in the same issue of a journal have a *sequence number*. It is used to vertically position the black blob on the first page of some formats. By default it is the same as the article number, but the command `\acmArticleSeq{n}` can be used to change it:

```
\acmArticle{39} % The sequence number will be 39 by default
\acmArticleSeq{5} % We redefine it to 5
```

Setting this number to zero suppresses the blob.

If your paper got a Submission ID from the Conference Management System, put it here:

```
\acmSubmissionID{123-A56-BU3}
```

The macro `\acmPrice{price}` sets the price for the article, for example,

```
\acmPrice{25.00}
```

Note that you do not need to put the dollar sign here, just the amount. By default the price is \$15.00, unless the copyright is set to `usgov`, `rightsretained`, `iw3c2w3`, or `iw3c2w3g`, when it is suppressed. Note that to override the defaults you need to set the price *after* the `\setcopyright` command. Also, the command `\acmPrice{}` suppresses the printing of the price.

Book-like volumes have ISBN numbers attached to them. The macro `\acmISBN{ISBN}`

sets it. Normally it is set by the typesetter, for example,

```
\acmISBN{978-1-4503-3916-2}
```

Setting it to the empty string, as `\acmISBN{}`, suppresses printing the ISBN.

`\acmDOI` The macro `\acmDOI{<DOI>}` sets the DOI of the article, for example,

```
\acmDOI{10.1145/9999997.9999999}
```

It is normally set by the typesetter. Setting it to the empty string, as `\acmDOI{}`, suppresses the DOI.

`\acmBadgeR` Some conference articles get special distinctions, for example, the artifact evaluation  
`\acmBadgeL` for PPOPP 2016 (see <http://ctuning.org/ae/ppopp2016.html>). These articles display special badges supplied by the conference organizers. This class provides commands to add these badges: `\acmBadgeR[<url>]{<graphics>}` and `\acmBadgeL[<url>]{<graphics>}`. The first command puts the badge to the right of the title, and the second one—to the left. The exception is the `sigchi-a` mode for SIGCHI extended abstracts, which puts the badges on the left margin. The arguments have the following meaning: `[<url>]`, if provided, sets the link to the badge authority in the screen version, while `{<graphics>}` sets the graphics file with the badge image. The file must be a cropped square, which is scaled to a standard size in the output. For example, if the badge image is `ae-logo.pdf`, the command is

```
\acmBadgeR[http://ctuning.org/ae/ppopp2016.html]{ae-logo}
```

`\startPage` The macro `\startPage{<page>}` sets the first page of the article in a journal or book. It is used by the typesetter.

`\terms` The command `\keywords{<keyword, keyword,...>}` sets keywords for the article.  
`\keywords` They must be separated by commas, for example,

```
\keywords{wireless sensor networks, media access control,  
multi-channel, radio interference, time synchronization}
```

`CCSXML` ACM publications are classified according to the ACM Computing Classification  
`\ccsdesc` Scheme (CCS). CCS codes are used both in the typeset version of the publications *and* in the metadata in various databases. Therefore you need to provide both  $\TeX$  commands and XML metadata with the paper.

The tool at <http://dl.acm.org/ccs.cfm> can be used to generate CCS codes. After you select the topics, click on “Generate CCS codes” to get results like the following:

```
\begin{CCSXML}  
<ccs2012>  
<concept>  
  <concept_id>10010520.10010553.10010562</concept_id>  
  <concept_desc>Computer systems organization~Embedded systems</concept_desc>  
  <concept_significance>500</concept_significance>  
</concept>  
</ccs2012>  
</CCSXML>
```

```

</concept>
<concept>
  <concept_id>10010520.10010575.10010755</concept_id>
  <concept_desc>Computer systems organization~Redundancy</concept_desc>
  <concept_significance>300</concept_significance>
</concept>
<concept>
  <concept_id>10010520.10010553.10010554</concept_id>
  <concept_desc>Computer systems organization~Robotics</concept_desc>
  <concept_significance>100</concept_significance>
</concept>
<concept>
  <concept_id>10003033.10003083.10003095</concept_id>
  <concept_desc>Networks~Network reliability</concept_desc>
  <concept_significance>100</concept_significance>
</concept>
</ccs2012>
\end{CCSXML}

\ccsdesc[500]{Computer systems organization~Embedded systems}
\ccsdesc[300]{Computer systems organization~Redundancy}
\ccsdesc{Computer systems organization~Robotics}
\ccsdesc[100]{Networks~Network reliability}

```

You just need to copy this code and paste it in your paper anywhere before `\maketitle`.

`\setcopyright` There are several possibilities for the copyright of the papers published by the ACM: the authors may transfer the rights to the ACM, license them to the ACM, some or all authors might be employees of the US or Canadian governments, etc. Accordingly the command `\setcopyright{...}` is introduced. Its argument is the copyright status of the paper, for example, `\setcopyright{acmcopyright}`. The possible values for this command are listed in Table 3.

The ACM submission software should generate the right command for you to paste into your file.

`\copyrightyear` Each copyright statement must have the year of copyright. By default it is the same as `\acmYear`, but you can override this using the macro `\copyrightyear`, e.g.,

```

\acmYear{2016}
\copyrightyear{2015}

```

There is a special case for a personal copy that the authors may be allowed to generate for their use or a posting on a personal site (check the instructions for the specific journal or conference for the details). The document option `authorversion=true` produces a special form of the copyright statement for this case. Note that you still need the `\setcopyright` command and (optionally) `\copyrightyear` command to tell  $\TeX$  about the copyright owner and year. Also, you should be aware that due to the different sizes of the permission blocks for the printed version and authors' version, the page breaks might be different between them.



Table 3: Parameters for the \setcopyright command

Parameter	Meaning
none	The copyright and permission information is not typeset. (This is the option for some ACM conferences.)
acmcopyright	The authors transfer the copyright to the ACM (the “traditional” choice).
acmlicensed	The authors retain the copyright but license the publication rights to ACM.
rightsretained	The authors retain the copyright and publication rights to themselves or somebody else.
usgov	All the authors are employees of the US government.
usgovmixed	Some authors are employees of the US government.
cagov	All the authors are employees of the Canadian government.
cagovmixed	Some authors are employees of the Canadian government.
licensedusgovmixed	Some authors are employees of the US government, and the publication rights are licensed to ACM.
licensedcagov	All the authors are employees of the Canadian government, and the publication rights are licensed to ACM.
licensedcagovmixed	Some authors are employees of the Canadian government, and the publication rights are licensed to ACM.
othergov	Authors are employees of a government other than the US or Canada.
licensedothergov	Authors are employees of a government other than the US or Canada, and the publication rights are licensed to ACM.
iw3c2w3	Special statement for conferences organized by IW3C2.
iw3c2w3g	Special statement for conferences organized by IW3C2, when some authors are approved Google employees.

Table 4: Settings for the `\settopmatter` command

Parameter	Values	Meaning
<code>printccs</code>	true/false	Whether to print CCS categories
<code>printacmref</code>	true/false	Whether to print the ACM bibliographic entry
<code>printfolios</code>	true/false	Whether to print page numbers (folios)
<code>authorsperrow</code>	numeric	Number of authors per row for the title page in conference proceedings formats

<code>abstract</code>	The environment <code>abstract</code> must <i>precede</i> the <code>\maketitle</code> command. Again, this is different from the standard $\LaTeX$ .
<code>teaserfigure</code>	<p>A special kind of figure is used for many two-column conference proceedings. This figure is placed just after the authors but before the main text. The environment <code>teaserfigure</code> is used for these figures. This environment must be used <i>before</i> <code>\maketitle</code>, for example,</p> <pre> \begin{teaserfigure}   \includegraphics[width=\textwidth]{sampleteaser}   \caption{This is a teaser}   \label{fig:teaser} \end{teaserfigure} </pre>
<code>\settopmatter</code>	<p>Some information in the top matter is printed for certain journals or proceedings and suppressed for others. You can override these defaults using the command <code>\settopmatter{&lt;settings&gt;}</code>. The settings and their meanings are listed in Table 4. For example,</p> <pre> \settopmatter{printacmref=false, printccs=true, printfolios=true} </pre> <p>The parameter <code>authorsperrow</code> requires some explanation. In conference proceedings authors' information is typeset in boxes, several boxes per row (see <code>sample-sigconf.pdf</code>, <code>sample-sigplan.pdf</code>, etc.). The number of boxes per row is determined automatically. If you want to override this, you can do it using this parameter, for example,</p> <pre> \settopmatter{authorsperrow=4} </pre> <p>However, in most cases you should <i>not</i> do this and should use the default settings. Setting <code>authorsperrow</code> to 0 will revert it to the default settings.</p>
<code>\received</code>	<p>The command <code>\received[&lt;stage&gt;]{&lt;date&gt;}</code> sets the history of the publication. The <code>[&lt;stage&gt;]</code> argument is optional; the default is Received for the first date and revised for the subsequent ones. For example,</p> <pre> \received{February 2007} \received[revised]{March 2009} \received[accepted]{June 2009} </pre>

`\maketitle`      The macro `\maketitle` must be the last command in the top-matter group. That is it must follow the commands defined in this section.

`\shortauthors`      *After* the command `\maketitle`, the macro `\shortauthors` stores the names of the authors for the running head. You can redefine it if the list of author's name is too long, e.g.,

```

\maketitle
\renewcommand{\shortauthors}{Zhou et al.}

```

## 2.4 Algorithms

There are now several good packages for typesetting algorithms [3, 4, 5], and the authors are free to choose their favorite one.

## 2.5 Figures and tables

The new ACM styles use the standard  $\text{\LaTeX}$  interface for figures and tables. There are some important items to be aware of, however.

1. The captions for figures must be entered *after* the figure bodies and for tables *before* the table bodies.
2. The ACM uses the standard types for figures and tables and adds several new ones. In total there are the following types:

**figure, table:** a standard figure or table taking a full text width in one-column formats and one column width in two-column formats.

**figure\*, table\*** in two-column formats, a special figure or table taking a full text width.

**teaserfigure:** a special figure before `\maketitle`.

**sidebar, marginfigure, margintable:** in the sigchi-a format, special sidebars, tables and figures in the margin.

3. Accordingly, when scaling images, one should use the following sizes:
  - (a) For `teaserfigure`, `figure` in one-column mode or `figure*` in two-column mode, use `\textwidth`. In one-column mode, you can also use `\columnwidth`, which coincides with `\textwidth` in this case.
  - (b) For `figure` in two-column mode, use `\columnwidth`.
  - (c) For `marginfigure`, use `\marginparwidth`.
  - (d) For `figure*` in SIGCHI extended abstracts, use `\fulltextwidth`.

It is strongly recommended to use the package `booktabs` [6] and follow its main principles of typography with respect to tables:

1. Never, ever use vertical rules.

## 2. Never use double rules.

It is also a good idea not to overuse horizontal rules.

For table *footnotes* you have several options described in the TeX FAQ [1]. The simplest one is to use a `\minipage` environment:

```
\begin{table}
\caption{Simulation Configuration}
\label{tab:conf}
\begin{minipage}{\columnwidth}
\begin{center}
\begin{tabular}{ll}
\toprule
TERRAIN\footnote{This is a table footnote. This is a
table footnote. This is a table footnote.} &
(200\,m$\times$200\,m) Square\\
Node Number & 289\\
Node Placement & Uniform\\
Application & Many-to-Many/Gossip CBR Streams\\
Payload Size & 32 bytes\\
Routing Layer & GF\\
MAC Layer & CSMA/MMSN\\
Radio Layer & RADIO-ACCNOISE\\
Radio Bandwidth & 250Kbps\\
Radio Range & 20m--45m\\
\bottomrule
\end{tabular}
\end{center}
\bigskip
\footnotesize\emph{Source:} This is a table
sourcenote. This is a table sourcenote. This is a table
sourcenote.

\emph{Note:} This is a table footnote.
\end{minipage}
\end{table}
```

sidebar  
marginfigure  
margintable

SIGCHI extended abstracts use margin space extensively. This package provides three environments for this with optional captions:

**sidebar:** textual information in the margin

**marginfigure:** a figure in the margin

**margintable:** a table in the margin

Tables and figures (including margin tables and margin figures) are by default centered. However, in some cases (for example, when you use several subimages per figure) you may need to override this. A good way to do so is to put the contents into a `\minipage` of the width `\columnwidth`.

## 2.6 Theorems

The ACM classes define two theorem styles and several pre-defined theorem environments:

**acmplain:** this is the style used for theorem, conjecture, proposition, lemma and corollary, and

**acmdefinition:** this is the style used for example and definition.

These environments are defined by default. In the unusual circumstance that a user does not wish to have these environments defined, the option `acmthm=false` in the preamble will suppress them.

## 2.7 Online-only and offline-only material

`printonly` Some supplementary material in ACM publications is put online but not in the printed  
`screenonly` version. The text inside the environment `screenonly` will be typeset only when the option `screen` (see Section 2.2) is set to true. Conversely, the text inside the environment `printonly` is typeset only when this option is set to false. For example,

```
\section{Supplementary materials}

\begin{printonly}
  Supplementary materials are available in the online version of this paper.
\end{printonly}

\begin{screenonly}
  (The actual supplementary materials.)
\end{screenonly}
```

We use the `comment` package for typesetting this code, so `\begin` and `\end` should start on a line of their own with no leading or trailing spaces.

## 2.8 Note about anonymous mode

`anonsuppress` When the option `anonymous` is selected,  $\text{\TeX}$  suppresses author information (including the number of authors) for a blind review. However, sometimes the information identifying the authors may be present in the body of the paper. For example,

```
\begin{anonsuppress}
  This is the continuation of the previous work by the author
  \cite{prev1, prev2}.
\end{anonsuppress}
```

As for the `printonly` and `screenonly` environments, `\begin{anonsuppress}` and `\end{anonsuppress}` should start on a line of their own with no leading or trailing spaces.

## 2.9 Acknowledgments

The traditional “Acknowledgments” section is conventionally used to thank persons and granting agencies for their help and support. However, there are several important considerations about this section.

First, in anonymous mode this section must be omitted: it gives too much information to reviewers. Second, data about grants is extracted and stored separately by the postprocessing software. ACM classes provide facilities for both these tasks.

`acks` The environment `acks` starts an unnumbered section “Acknowledgments” unless the anonymous mode is chosen. Put all thanks inside this environment.

As for the `printonly` and `screenonly` environments, `\begin{acks}` and `\end{acks}` should start on a line of their own with no leading or trailing spaces.

`\grantsponsor` All financial support *must* be listed using the commands `\grantsponsor` and  
`\grantnum` `\grantnum`. These commands tell the postprocessing software about the granting organization and grant. The format of these commands is the following:

```
\grantsponsor{\<sponsorID>}{\<name>}{\<url>}
\grantnum[\<url>]{\<sponsorID>}{\<number>}.
```

Here `{\<sponsorID>}` is the unique ID used to match grants to sponsors, `{\<name>}` is the name of the sponsor, `{\<url>}` is its URL, and `{\<number>}` is the grant number. The `{\<sponsorID>}` of the `\grantnum` command must correspond to the `{\<sponsorID>}` of a `\grantsponsor` command. Some awards have their own web pages, which you can include using the optional argument of the `\grantnum` command.

At present `{\<sponsorID>}` is chosen by the authors and can be an arbitrary key in the same way the label of a `\cite` is arbitrarily chosen. There might be a change to this policy if the ACM decides to create a global database of sponsoring organizations.

Example:

```
\begin{acks}
The authors would like to thank Dr. Yuhua Li for providing the
matlab code of the \textit{BEPS} method.

The authors would also like to thank the anonymous referees for
their valuable comments and helpful suggestions. This work is
supported by the \grantsponsor{GS501100001809}{National Natural
Science Foundation of
China}{https://doi.org/10.13039/501100001809} under Grant
No.:~\grantnum{GS501100001809}{61273304}
and~\grantnum[http://www.nnsf.cn/youngscientists]{GS501100001809}{Young
Scientists' Support Program}.
\end{acks}
```

## 2.10 Bibliography

The ACM uses the `natbib` package for formatting references and the `BibTeX` style file `ACM-Reference-Format.bst` for `BibTeX` processing. You can disable loading of `natbib` using the option `natbib=false` in `\documentclass`. However, it is not recommended,

as well as the use of Bib<sub>T</sub><sub>E</sub>X styles other than ACM-Reference-Format.bst, and may delay the processing of the manuscript.

`\citestyle` If you use natbib, you can select one of two predefined citation styles using the command `\citestyle`: the author-year format `acmauthoryear` or the numeric format `acmnumeric`. For example,

```
\citestyle{acmauthoryear}
```

Note that numeric citations are the default mode for most formats.

`\setcitestyle` You can further customize natbib using the `\setcitestyle` command, for example,

```
\setcitestyle{numbers,sort&compress}
```

One of the more common versions is

```
\setcitestyle{nosort}
```

It is useful if you do not like the way natbib sorts citation lists.

If you use natbib, then commands like `\cite` and `\citeauthor` are automatically supported. The command `\shortcite` is the same as `\cite` in numerical mode and cites the year in author-date mode.

Note that before version 1.48 the command `\citeyear` put the year in parentheses. In version 1.48 and later it produces just the year; the command `\citeyearpar` can be used to emulate its old behavior.

There are several customized Bib<sub>T</sub><sub>E</sub>X entry types and fields in the ACM style file ACM-Reference-Format.bst that you may want to be aware of.

The style supports the fields `doi` and `url`, for example,

```
doi = "10.1145/1188913.1188915",
url = "http://ccrma.stanford.edu/~jos/bayes/bayes.pdf",
```

The style supports the arXiv-recommended fields `eprint` and (optionally) `primaryclass`, for example,

```
eprint = "960935712",
primaryclass = "cs",
```

See the examples at <http://arxiv.org/hypertex/bibstyles/>.

There are the special entry types online and game for Web pages and games, for example,

```
@online{Thornburg01,
author = "Harry Thornburg",
year = "2001",
title = "Introduction to Bayesian Statistics",
url = "http://ccrma.stanford.edu/~jos/bayes/bayes.html",
```

```

month =      mar,
lastaccessed = "March 2, 2005",
}

```

For these entry types you can use the `lastaccessed` field to add the access date for the URL.

There are two ways to enter video or audio sources in the bibliography corresponding to two different possibilities. For standalone sources available online, you can use an online entry and set its `howpublished` field. For example,

```

@online{Obama08,
author =      "Barack Obama",
year   =      "2008",
title  =      "A more perfect union",
howpublished = "Video",
day    =      "5",
url    =      "http://video.google.com/videoplay?docid=6528042696351994555",
month  =      mar,
lastaccessed = "March 21, 2008",
}

```

For sources available as attachments to conference proceedings and similar documents, you can use the usual `inproceedings` entry type and set its `howpublished` field:

```

@Inproceedings{Novak03,
author =      "Dave Novak",
title  =      "Solder man",
booktitle =   "ACM SIGGRAPH 2003 Video Review on Animation theater Program",
year   =      "2003",
publisher =   "ACM Press",
address =     "New York, NY",
pages  =      "4",
month  =      "March 21, 2008",
doi    =      "10.9999/woot07-S422",
howpublished = "Video",
}

```

Sometimes you need to cite a complete issue of a journal. The `periodical` entry type is intended for this:

```

@periodical{JCohen96,
key =        "Cohen",
editor =     "Jacques Cohen",
title =      "Special issue: Digital Libraries",
journal =    "Communications of the {ACM}",
volume =     "39",
number =     "11",
month =      nov,

```



```

year =      "1996",
}

```

If you do not know the year of publication, the style will add “[n. d.]” (for “no date”) to the entry.

If you do not know the author (this is often the case for online entries), use the key field to add a key for sorting and citations, for example,

```

@online{TUGInstmem,
key =      {TUG},
year =      2017,
title =      "Institutional members of the {\TeX} Users Group",
url =      "http://wwtug.org/instmem.html",
lastaccessed = "May 27, 2017",
}

```

A note about sorting. The current ACM bibliography styles always sort the entries according to authors names and publication year. There is a controversy about sorting names with “von” or “van” part: should Ludwig van Beethoven be sorted under “V” or under “B”? The American practice is to use “van” in sorting, i.e. to file van Beethoven under “V”. However, some authorities recommend to sort Dutch persons according to their last names (see e.g. [https://www.ifla.org/files/assets/cataloguing/pubs/names-of-persons\\_1996.pdf](https://www.ifla.org/files/assets/cataloguing/pubs/names-of-persons_1996.pdf)). While I do not want to take a part in this dispute, I would like to point to the old “noopsort” trick by Oren Patashnik. Add to the .bib file the line

```
@PREAMBLE{"\providecommand{\noopsort}[1]{}}

```

and then encode the author as

```
author = {Ludwig {\noopsort{Beethoven}}van Beethoven},

```

This will make the author to be sorted as “Beethoven” rather than “van Beethoven”.

## 2.11 Colors

While printed ACM publications are usually black and white, screen mode allows the use of colors. The ACM classes pre-define several colors according to [7]: ACMBLue, ACMYellow, ACMOrange, ACMRed, ACMLightBlue, ACMGreen, ACMPurple and ACMDarkBlue. You can use them in color assignments.

The ACM provides the following recommendation on color use.

The most accessible approach would be to ensure that your article is still readable when printed in greyscale. The most notable reasons for this are:

1. The most common type of inherited Color Vision Deficiency (CVD) is red-green (in which similar-brightness colors that differ only in their amounts of red or green are often confused), and it affects up to 8% of males and 0.5% of females of Northern European descent.

2. The most common type of acquired Color Vision Deficiency (CVD) is blue-yellow (including mild cases for many older adults).
3. Most printing is in black and white.
4. Situational impairments (e.g., bright sunlight shining on a mobile screen) tend to reduce the entire color gamut, reducing color discriminability.

**Note:** It is *not* safe to encode information using only variations in color (i.e., only differences in hue and/or saturation) as there is bound to be someone affected!

To ensure that you are using the most accessible colors, the ACM recommends that you choose sets of colors to help ensure suitable variations in when printed in greyscale by using either of the following tools:

1. ColourBrewer: <http://colorbrewer2.org/>
2. ACE: The Accessible Colour Evaluator: <http://daprlab.com/ace/> for designing WCAG 2.0 compliant palettes.

## 2.12 Other notable packages and typographic remarks

Several other packages are recommended for specialized tasks.

The package `subcaption` [8] is recommended for complex figures with several subplots or subfigures that require separate subcaptioning. The packages `nomencl` [9] and `glossaries` [10] can be used for the automatic creation of the lists of symbols and concepts used.

By default `acmart` prevents all widows and orphans (i.e., lonely lines at the beginning or end of the page) and hyphenation at the end of the page. This is done by the rather strict settings

```
\widowpenalty=10000
\clubpenalty=10000
\brokenpenalty=10000
```

However, this may lead to frustrating results when the authors must obey a page limit. Setting these penalties to smaller values may help if you absolutely need to.

Another problem might be the too strict line breaking rules. Again, a strategically placed `\sloppy` command or putting the problematic paragraph inside `sloppypar` environment might help—but beware, the results might be, well, sloppy.

Note that the uppercasing in section titles is done using the `textcase` package [11], so the command `\NoCaseChange` inside the title may help to prevent extraneous uppercasing.

## 2.13 A note for wizards: `acmart-preload-hook.tex`

Sometimes you need to change the behavior of `acmart`. The usual way to do this is to redefine commands in the preamble. However, these definitions are executed *after* `acmart` is loaded and certain decisions are made. This presents a number of problems.

For example, one may want to use the `titletoc` package with `acmart`. This package should be loaded before `hyperref`. However, since `acmart` loads `hyperref` itself, the line `\usepackage{titletoc}` in the preamble will lead to grief (see <http://tex.stackexchange.com/questions/357265/using-titletoc-with-acm-acmart-style>).

Another example is passing options to a package. Suppose you want to use the `dvipsnames` option of the `xcolor` package. Normally you cannot do this because `acmart` loads this package itself without options.

The file `acmart-preload-hook.tex` can be used to solve these problems. If this file exists, it will be processed before any other package. You can use this file to load packages or pass options to them. For example, if you put in this file

```
\let\LoadClassOrig\LoadClass
\renewcommand\LoadClass[2][\LoadClassOrig[#1]{#2}%
\usepackage{titletoc}
```

then `titletoc` will be loaded before `hyperref`. If you put in this file

```
\PassOptionsToPackage{dvipsnames}{xcolor}
```

you will pass `dvipsnames` to `xcolor`.

**Important note.** This hook makes it too easy to create a manuscript that is not acceptable by the ACM. It is even easier to create a file that cannot be compiled. So please do not use it *unless you know what you are doing*. And if you use it, *do not ask for support*. If you decide to use this hook, you are on your own.

## 2.14 Currently supported publications

Table 5: ACM publications and arguments of the `\acmJournal` command

Abbreviation	Publication
CIE	ACM Computers in Entertainment
CSUR	ACM Computing Surveys
DTRAP	Digital Threats: Research and Practice
IMWUT	PACM on Interactive, Mobile, Wearable and Ubiquitous Technologies
JACM	Journal of the ACM
JDIQ	ACM Journal of Data and Information Quality
JEA	ACM Journal of Experimental Algorithmics
JERIC	ACM Journal of Educational Resources in Computing
JETC	ACM Journal on Emerging Technologies in Computing Systems
JOCCH	ACM Journal on Computing and Cultural Heritage
PACMCGIT	Proceedings of the ACM on Computer Graphics and Interactive Techniques
PACMHCI	PACM on Human-Computer Interaction
PACMPL	PACM on Programming Languages

Table 5: ACM publications and arguments of the \acmJournal command (continued)

Abbreviation	Publication
POMACS	PACM on Measurement and Analysis of Computing Systems
TAAS	ACM Transactions on Autonomous and Adaptive Systems
TACCESS	ACM Transactions on Accessible Computing
TACO	ACM Transactions on Architecture and Code Optimization
TALG	ACM Transactions on Algorithms
TALLIP	ACM Transactions on Asian and Low-Resource Language Information Processing
TAP	ACM Transactions on Applied Perception
TCPS	ACM Transactions on Cyber-Physical Systems
TDSCI	ACM Transactions on Data Science
TEAC	ACM Transactions on Economics and Computation
TECS	ACM Transactions on Embedded Computing Systems
THRI	ACM Transactions on Human-Robot Interaction
TIIS	ACM Transactions on Interactive Intelligent Systems
TIOT	ACM Transactions on Internet of Things
TISSEC	ACM Transactions on Information and System Security
TIST	ACM Transactions on Intelligent Systems and Technology
TKDD	ACM Transactions on Knowledge Discovery from Data
TMIS	ACM Transactions on Management Information Systems
TOCE	ACM Transactions on Computing Education
TOCHI	ACM Transactions on Computer-Human Interaction
TOCL	ACM Transactions on Computational Logic
TOCS	ACM Transactions on Computer Systems
TOCT	ACM Transactions on Computation Theory
TODAES	ACM Transactions on Design Automation of Electronic Systems
TODS	ACM Transactions on Database Systems
TOG	ACM Transactions on Graphics
TOIS	ACM Transactions on Information Systems
TOIT	ACM Transactions on Internet Technology
TOMACS	ACM Transactions on Modeling and Computer Simulation
TOMM	ACM Transactions on Multimedia Computing, Communications and Applications
TOMPECS	ACM Transactions on Modeling and Performance Evaluation of Computing Systems
TOMS	ACM Transactions on Mathematical Software
TOPC	ACM Transactions on Parallel Computing
TOPLAS	ACM Transactions on Programming Languages and Systems
TOPS	ACM Transactions on Privacy and Security
TOS	ACM Transactions on Storage
TOSEM	ACM Transactions on Software Engineering and Methodology
TOSN	ACM Transactions on Sensor Networks
TRETS	ACM Transactions on Reconfigurable Technology and Systems

Table 5: ACM publications and arguments of the `\acmJournal` command (continued)

Abbreviation	Publication
TSAS	ACM Transactions on Spatial Algorithms and Systems
TSC	ACM Transactions on Social Computing
TSLP	ACM Transactions on Speech and Language Processing
TWEB	ACM Transactions on the Web

## 3 Implementation

### 3.1 Identification

We start with a declaration of who we are. Most .dtx files put driver code in a separate .drv driver file. We roll this code into the main file and use the pseudo-guard <gobble> for it.

```
1 <class>\NeedsTeXFormat{LaTeX2e}
2 <*gobble>
3 \ProvidesFile{acmart.dtx}
4 </gobble>
5 <class>\ProvidesClass{acmart}
6 [2018/07/16 v1.54 Typesetting articles for the Association for
7 Computing Machinery]
```

And the driver code:

```
8 <*gobble>
9 \documentclass{ltxdoc}
10 \usepackage{array,booktabs,amsmath,graphicx,fancyvrb,tabularx, longtable}
11 \usepackage[tt=false, type1=true]{libertine}
12 \usepackage[varqu]{zi4}
13 \usepackage[libertine]{newtxmath}
14 \usepackage[tableposition=top]{caption}
15 \usepackage{hypdoc}
16 \PageIndex
17 \CodelineIndex
18 \RecordChanges
19 \EnableCrossrefs
20 \begin{document}
21   \DocInput{acmart.dtx}
22 \end{document}
23 </gobble>
24 <*class>
25 \def\@classname{acmart}
```

### 3.2 Preload hook

We preload acmart-preload-hook:

```
26 \InputIfFileExists{acmart-preload-hook.tex}{%
27   \ClassWarning{\@classname}{%
28     I am loading acmart-preload-hook.tex. You are fully responsible
29     for any problems from now on.}}{}
```

### 3.3 Options

We need xkeyval since some of our options may have values:

```
30 \RequirePackage{xkeyval}
```

We use xstring to check whether user input is integer

```
31 \RequirePackage{xstring}
```

format The possible formats

```

32 \define@choicekey*+{acmart.cls}{format}[\ACM@format\ACM@format@nr]{%
33 manuscript, acmsmall, acmlarge, acmtog, sigconf, siggraph,
34 sigplan, sigchi, sigchi-a}[manuscript]{}{%
35 \ClassError{\@classname}{The option format must be manuscript,
36 acmsmall, acmlarge, acmtog, sigconf, siggraph,
37 sigplan, sigchi or sigchi-a}}
38 \def\@DeclareACMFormat#1{\DeclareOptionX{#1}{\setkeys{acmart.cls}{format=#1}}}
39 \@DeclareACMFormat{manuscript}
40 \@DeclareACMFormat{acmsmall}
41 \@DeclareACMFormat{acmlarge}
42 \@DeclareACMFormat{acmtog}
43 \@DeclareACMFormat{sigconf}
44 \@DeclareACMFormat{siggraph}
45 \@DeclareACMFormat{sigplan}
46 \@DeclareACMFormat{sigchi}
47 \@DeclareACMFormat{sigchi-a}
48 \ExecuteOptionsX{format}

```

\if@ACM@screen Whether we use screen mode

```

49 \define@boolkey+{acmart.cls}[\ACM@]{screen}[true]{%
50 \if@ACM@screen
51 \PackageInfo{\@classname}{Using screen mode}%
52 \else
53 \PackageInfo{\@classname}{Not using screen mode}%
54 \fi}{\PackageError{\@classname}{The option screen can be either true or
55 false}}
56 \ExecuteOptionsX{screen=false}

```

\if@ACM@acmthm Whether we define theorem-like environments.

```

57 \define@boolkey+{acmart.cls}[\ACM@]{acmthm}[true]{%
58 \if@ACM@acmthm
59 \PackageInfo{\@classname}{Requiring acmthm}%
60 \else
61 \PackageInfo{\@classname}{Suppressing acmthm}%
62 \fi}{\PackageError{\@classname}{The option acmthm can be either true or
63 false}}
64 \ExecuteOptionsX{acmthm=true}

```

\if@ACM@review Whether we use review mode

```

65 \define@boolkey+{acmart.cls}[\ACM@]{review}[true]{%
66 \if@ACM@review
67 \PackageInfo{\@classname}{Using review mode}%
68 \AtBeginDocument{\ACM@printfoliostrue}%
69 \else
70 \PackageInfo{\@classname}{Not using review mode}%
71 \fi}{\PackageError{\@classname}{The option review can be either true or
72 false}}
73 \ExecuteOptionsX{review=false}

```

`\if@ACM@authorversion` Whether we use author's-version mode

```

74 \define@boolkey+{acmart.cls}[@ACM@]{authorversion}[true]{%
75   \if@ACM@authorversion
76     \PackageInfo{\@classname}{Using authorversion mode}%
77   \else
78     \PackageInfo{\@classname}{Not using authorversion mode}%
79   \fi}{\PackageError{\@classname}{The option authorversion can be either true or
80     false}}
81 \ExecuteOptionsX{authorversion=false}

```

`\if@ACM@nonacm` Special option for non-ACM publications using the ACM typesetting options.

```

82 \define@boolkey+{acmart.cls}[@ACM@]{nonacm}[true]{%
83   \if@ACM@nonacm
84     \PackageInfo{\@classname}{Using nonacm mode}%
85     \AtBeginDocument{\@ACM@printacmreffalse}%
86     % in 'nonacm' mode we disable the "ACM Reference Format"
87     % printing by default, but this can be re-enabled by the
88     % user using \settopmatter{printacmref=true}
89   \else
90     \PackageInfo{\@classname}{Not using nonacm mode}%
91   \fi}{\PackageError{\@classname}{The option nonacm can be either true or
92     false}}
93 \ExecuteOptionsX{nonacm=false}

```

`\if@ACM@natbib@override` This macro is no longer used.

`\if@ACM@natbib` Whether we use natbib mode

```

94 \define@boolkey+{acmart.cls}[@ACM@]{natbib}[true]{%
95   \if@ACM@natbib
96     \PackageInfo{\@classname}{Explicitly selecting natbib mode}%
97   \else
98     \PackageInfo{\@classname}{Explicitly deselecting natbib mode}%
99   \fi}{\PackageError{\@classname}{The option natbib can be either true or
100     false}}
101 \ExecuteOptionsX{natbib=true}

```

`\if@ACM@anonymous` Whether we use anonymous mode

```

102 \define@boolkey+{acmart.cls}[@ACM@]{anonymous}[true]{%
103   \if@ACM@anonymous
104     \PackageInfo{\@classname}{Using anonymous mode}%
105   \else
106     \PackageInfo{\@classname}{Not using anonymous mode}%
107   \fi}{\PackageError{\@classname}{The option anonymous can be either true or
108     false}}
109 \ExecuteOptionsX{anonymous=false}

```

`\if@ACM@timestamp` Whether we use timestamp mode

```

110 \define@boolkey+{acmart.cls}[@ACM@]{timestamp}[true]{%
111   \if@ACM@timestamp

```



```

112 \PackageInfo{\@classname}{Using timestamp mode}%
113 \else
114 \PackageInfo{\@classname}{Not using timestamp mode}%
115 \fi}{\PackageError{\@classname}{The option timestamp can be either true or
116 false}}
117 \ExecuteOptionsX{timestamp=false}

\if@ACM@authordraft Whether we use author-draft mode
118 \define@boolkey+{acmart.cls}{@ACM@}{authordraft}[true]{%
119 \if@ACM@authordraft
120 \PackageInfo{\@classname}{Using authordraft mode}%
121 \@ACM@timestamptrue
122 \@ACM@reviewtrue
123 \else
124 \PackageInfo{\@classname}{Not using authordraft mode}%
125 \fi}{\PackageError{\@classname}{The option authordraft can be either true or
126 false}}
127 \ExecuteOptionsX{authordraft=false}

\ACM@fontsize The font size to pass to the base class
128 \def\ACM@fontsize{}
129 \DeclareOptionX{9pt}{\edef\ACM@fontsize{\CurrentOption}}
130 \DeclareOptionX{10pt}{\edef\ACM@fontsize{\CurrentOption}}
131 \DeclareOptionX{11pt}{\edef\ACM@fontsize{\CurrentOption}}
132 \DeclareOptionX{12pt}{\edef\ACM@fontsize{\CurrentOption}}

133 \DeclareOptionX{draft}{\PassOptionsToClass{\CurrentOption}{amsart}}
134 \DeclareOptionX{*}{\PassOptionsToClass{\CurrentOption}{amsart}}
135 \ProcessOptionsX
136 \ClassInfo{\@classname}{Using format \ACM@format, number \ACM@format@nr}

```

### 3.4 Setting switches

```

\if@ACM@manuscript Whether we use manuscript mode
137 \newif\if@ACM@manuscript

\if@ACM@journal There are two kinds of publications: journals and books
138 \newif\if@ACM@journal

\if@ACM@sigchiamode The formatting of SIGCHI extended abstracts is quite unusual. We have a special switch
for them.
139 \newif\if@ACM@sigchiamode

Setting up switches
140 \ifnum\ACM@format@nr=5\relax % siggraph
141 \ClassWarning{\@classname}{The format siggraph is now obsolete.
142 I am switching to sigconf.}
143 \setkeys{acmart.cls}{format=sigconf}

```

```

144 \fi
145 \ifnum\ACM@format@nr=0\relax
146   \@ACM@manuscripttrue
147 \else
148   \@ACM@manuscriptfalse
149 \fi
150 \@ACM@sigchiamodef=false
151 \ifcase\ACM@format@nr
152 \relax % manuscript
153   \@ACM@journaltrue
154 \or % acmsmall
155   \@ACM@journaltrue
156 \or % acmlarge
157   \@ACM@journaltrue
158 \or % acmtog
159   \@ACM@journaltrue
160 \or % sigconf
161   \@ACM@journalfalse
162 \or % siggraph
163   \@ACM@journalfalse
164 \or % sigplan
165   \@ACM@journalfalse
166 \or % sigchi
167   \@ACM@journalfalse
168 \or % sigchi-a
169   \@ACM@journalfalse
170   \@ACM@sigchiamodetrue
171 \fi

```

### 3.5 Loading the base class and package

At this point we either have \ACM@fontsize or use defaults

```

172 \ifx\ACM@fontsize\@empty
173   \ifcase\ACM@format@nr
174   \relax % manuscript
175     \def\ACM@fontsize{9pt}%
176   \or % acmsmall
177     \def\ACM@fontsize{10pt}%
178   \or % acmlarge
179     \def\ACM@fontsize{10pt}%
180   \or % acmtog
181     \def\ACM@fontsize{9pt}%
182   \or % sigconf
183     \def\ACM@fontsize{9pt}%
184   \or % siggraph
185     \def\ACM@fontsize{9pt}%
186   \or % sigplan
187     \def\ACM@fontsize{10pt}%
188   \or % sigchi

```

```

189 \def\ACM@fontsize{10pt}%
190 \or % sigchi-a
191 \def\ACM@fontsize{10pt}%
192 \fi
193 \fi
194 \ClassInfo{\@classname}{Using fontsize \ACM@fontsize}
195 \LoadClass[\ACM@fontsize, reqno]{amsart}
196 \RequirePackage{microtype}

    We need etoolbox for delayed code
197 \RequirePackage{etoolbox}

    We need totpages to calculate the number of pages and refcount to use that num-
ber
198 \RequirePackage{refcount}
199 \RequirePackage{totpages}

    The \collect@body macro in amsmath is defined using \def. We load environ to
access the \long version of this command
200 \RequirePackage{environ}

    We use setspace for double spacing
201 \if@ACM@manuscript
202 \RequirePackage{setspace}
203 \onehalfspacing
204 \fi

    We need textcase for better upcasing
205 \RequirePackage{textcase}

```

### 3.6 Citations

We patch \setcitestyle to allow, for example, \setcitestyle{sort} and \setcitestyle{nosort}. We patch \citestyle to warn about undefined citation styles.

```

206 \if@ACM@natbib
207 \RequirePackage{natbib}
208 \renewcommand{\bibsection}{%
209 \section*{\refname}%
210 \phantomsection\addcontentsline{toc}{section}{\refname}%
211 }
212 \renewcommand{\bibfont}{\bibliofont}
213 \renewcommand{\setcitestyle}[1]{
214 \@for\@tempa:=#1\do
215 {\def\@tempb{round}\ifx\@tempa\@tempb
216 \renewcommand\NAT@open{(\}\renewcommand\NAT@close{)}\fi
217 \def\@tempb{square}\ifx\@tempa\@tempb
218 \renewcommand\NAT@open{[\}\renewcommand\NAT@close{]}\fi
219 \def\@tempb{angle}\ifx\@tempa\@tempb
220 \renewcommand\NAT@open{$<$}\renewcommand\NAT@close{$>$}\fi
221 \def\@tempb{curly}\ifx\@tempa\@tempb
222 \renewcommand\NAT@open{\{\}\renewcommand\NAT@close{\}}\fi

```

```

223 \def\@tempb{semicolon}\ifx\@tempa\@tempb
224 \renewcommand\NAT@sep{;} \fi
225 \def\@tempb{colon}\ifx\@tempa\@tempb
226 \renewcommand\NAT@sep{:} \fi
227 \def\@tempb{comma}\ifx\@tempa\@tempb
228 \renewcommand\NAT@sep{,} \fi
229 \def\@tempb{authoryear}\ifx\@tempa\@tempb
230 \NAT@numbersfalse \fi
231 \def\@tempb{numbers}\ifx\@tempa\@tempb
232 \NAT@numberstrue\NAT@superfalse \fi
233 \def\@tempb{super}\ifx\@tempa\@tempb
234 \NAT@numberstrue\NAT@supertrue \fi
235 \def\@tempb{nobibstyle}\ifx\@tempa\@tempb
236 \let\bibstyle=\@gobble \fi
237 \def\@tempb{bibstyle}\ifx\@tempa\@tempb
238 \let\bibstyle=\@citestyle \fi
239 \def\@tempb{sort}\ifx\@tempa\@tempb
240 \def\NAT@sort{\@ne} \fi
241 \def\@tempb{nosort}\ifx\@tempa\@tempb
242 \def\NAT@sort{\@z} \fi
243 \def\@tempb{compress}\ifx\@tempa\@tempb
244 \def\NAT@cmprs{\@ne} \fi
245 \def\@tempb{nocompress}\ifx\@tempa\@tempb
246 \def\NAT@cmprs{\@z} \fi
247 \def\@tempb{sort&compress}\ifx\@tempa\@tempb
248 \def\NAT@sort{\@ne}\def\NAT@cmprs{\@ne} \fi
249 \def\@tempb{mcite}\ifx\@tempa\@tempb
250 \let\NAT@merge\@ne \fi
251 \def\@tempb{merge}\ifx\@tempa\@tempb
252 \ifnum{\NAT@merge<\tw}{\let\NAT@merge\tw}{\fi
253 \def\@tempb{elide}\ifx\@tempa\@tempb
254 \ifnum{\NAT@merge<\thr@@}{\let\NAT@merge\thr@@}{\fi
255 \def\@tempb{longnamesfirst}\ifx\@tempa\@tempb
256 \NAT@longnamestrue \fi
257 \def\@tempb{nonamebreak}\ifx\@tempa\@tempb
258 \def\NAT@nmfmt#1{\mbox{\NAT@up#1}} \fi
259 \expandafter\NAT@find@eq\@tempa=\relax\@nil
260 \if\@tempc\relax\else
261 \expandafter\NAT@rem@eq\@tempc
262 \def\@tempb{open}\ifx\@tempa\@tempb
263 \xdef\NAT@open{\@tempc} \fi
264 \def\@tempb{close}\ifx\@tempa\@tempb
265 \xdef\NAT@close{\@tempc} \fi
266 \def\@tempb{aysep}\ifx\@tempa\@tempb
267 \xdef\NAT@aysep{\@tempc} \fi
268 \def\@tempb{yysep}\ifx\@tempa\@tempb
269 \xdef\NAT@yrsep{\@tempc} \fi
270 \def\@tempb{notesep}\ifx\@tempa\@tempb
271 \xdef\NAT@cmt{\@tempc} \fi
272 \def\@tempb{citesep}\ifx\@tempa\@tempb

```

```

273     \xdef\NAT@sep{\@tempc}\fi
274   \fi
275 }%
276 \NAT@@setcites
277 }
278 \renewcommand\citestyle[1]{%
279   \ifcsname bibstyle@#1\endcsname%
280   \csname bibstyle@#1\endcsname\let\bibstyle\gobble%
281   \else%
282   \@latex@error{Undefined ‘#1’ citestyle}%
283   \fi
284 }%
285 \fi

```

`\bibstyle@acmauthoryear` The default author-year format:

```

286 \newcommand{\bibstyle@acmauthoryear}{%
287   \setcitestyle{%
288     authoryear,%
289     open={},close={},citesep={;},%
290     aysep={},yysep={},,%
291     notesep={, }}%

```

`\bibstyle@acmnumeric` The default numeric format:

```

292 \newcommand{\bibstyle@acmnumeric}{%
293   \setcitestyle{%
294     numbers,sort&compress,%
295     open={},close={},citesep={},,%
296     notesep={, }}%

```

The default is numeric:

```

297 \if@ACM@natbib
298 \citestyle{acmnumeric}
299 \fi

```

`\@startsection` Before we call `hyperref`, we redefine `\startsection` commands to their  $\LaTeX$  defaults since the `amsart` ones are too AMS-specific. We need to do this early since we want `hyperref` to have a chance to redefine them again:

```

300 \def\@startsection#1#2#3#4#5#6{%
301   \if@noskipsec \leavevmode \fi
302   \par
303   \@tempskipa #4\relax
304   \@afterindenttrue
305   \ifdim \@tempskipa <\z@
306     \@tempskipa -\@tempskipa \@afterindentfalse
307   \fi
308   \if@nobreak
309     \everypar{}%
310   \else
311     \addpenalty\@secpenalty\addvspace\@tempskipa

```

```

312 \fi
313 \@ifstar
314   {\@ssect{#3}{#4}{#5}{#6}}%
315   {\@dblarg{\@sect{#1}{#2}{#3}{#4}{#5}{#6}}}%
316 \def\@sect#1#2#3#4#5#6[#7]#8{%
317   \edef\@toclevel{\ifnum#2=\@m 0\else\number#2\fi}%
318   \ifnum #2>\c@secnumdepth
319     \let\@svsec\@empty
320   \else
321     \refstepcounter{#1}%
322     \protected@edef\@svsec{\@seccntformat{#1}\relax}%
323   \fi
324   \@tempskipa #5\relax
325   \ifdim \@tempskipa>\z@
326     \begingroup
327       #6{%
328         \@hangfrom{\hskip #3\relax\@svsec}%
329         \interlinepenalty \@M #8\@par}%
330     \endgroup
331     \csname #1mark\endcsname{#7}%
332     \ifnum #2>\c@secnumdepth \else
333       \@tochangmeasure{\csname the#1\endcsname}%
334     \fi
335     \addcontentsline{toc}{#1}{%
336       \ifnum #2>\c@secnumdepth \else
337         \protect\numberline{\csname the#1\endcsname}%
338       \fi
339       #7}%
340   \else
341     \def\@svsechd{%
342       #6{\hskip #3\relax
343         \@svsec #8}%
344       \csname #1mark\endcsname{#7}%
345       \ifnum #2>\c@secnumdepth \else
346         \@tochangmeasure{\csname the#1\endcsname\space}%
347       \fi
348       \addcontentsline{toc}{#1}{%
349         \ifnum #2>\c@secnumdepth \else
350           \protect\numberline{\csname the#1\endcsname}%
351         \fi
352         #7}}%
353   \fi
354   \@xsect{#5}}
355 \def\@xsect#1{%
356   \@tempskipa #1\relax
357   \ifdim \@tempskipa>\z@
358     \par \nobreak
359     \vskip \@tempskipa
360     \@afterheading
361   \else

```

```

362 \@nobreakfalse
363 \global\@noskipsectrue
364 \everypar{%
365   \if@noskipsec
366     \global\@noskipsecfalse
367     {\setbox\z@\lastbox}%
368     \clubpenalty\@M
369     \begingroup \@svsechd \endgroup
370     \unskip
371     \@tempskipa #1\relax
372     \hskip -\@tempskipa
373   \else
374     \clubpenalty \@clubpenalty
375     \everypar{}%
376   \fi}%
377 \fi
378 \ignorespaces}
379 \def\@seccntformat#1{\csname the#1\endcsname\quad}
380 \def\@essect#1#2#3#4#5{%
381   \@tempskipa #3\relax
382   \ifdim \@tempskipa>\z@
383     \begingroup
384       #4{%
385         \@hangfrom{\hskip #1}%
386         \interlinepenalty \@M #5\@par}%
387     \endgroup
388   \else
389     \def\@svsechd{#4{\hskip #1\relax #5}}%
390   \fi
391   \@xsect{#3}}

```

`\@startsection` The `amsart` package redefines `\startsection`. Here we redefine it again to make the table of contents work.

```

392 \def\@starttoc#1#2{\begingroup\makeatletter
393   \setTrue{#1}%
394   \par\removelastskip\vskip\z@skip
395   \@startsection{section}\@M\z@{\linespacing\@plus\linespacing}%
396     {.5\linespacing}{\centering\contentsnamefont}{#2}%
397   \@input{\jobname.#1}%
398   \if@filesn
399     \xp\newwrite\csname tf@#1\endcsname
400     \immediate\xp\openout\csname tf@#1\endcsname \jobname.#1\relax
401   \fi
402   \global\@nobreakfalse \endgroup
403   \addvspace{32\p@\@plus14\p@}%
404 }

```

`\l@section` Section spacing is more generous than for `amsart`

```

405 \def\l@section{\@tocline{1}{0pt}{1pc}{2pc}{}}

```

```

\l@section The spacing in amsart is too large
406 \def\l@section{\@tocline{2}{0pt}{1pc}{3pc}{}}

\l@subsubsection The spacing in amsart is too large
407 \def\l@subsubsection{\@tocline{2}{0pt}{1pc}{5pc}{}}

We need to define footnote-related stuff before the call to hyperref (Ross Moore)

\@makefnmark We do not use indentation for footnotes
408 \def\@makefnmark{\noindent\@makefnmark}

\@footnotetext In sigchi-a mode our footnotes are in the margin!
409 \if@ACM@sigchiamode
410 \long\def\@footnotetext#1{\marginpar{%
411   \reset@font\small
412   \interlinepenalty\interfootnotelinepenalty
413   \protected@edef\@currentlabel{%
414     \csname p@footnote\endcsname\@thefnmark
415   }%
416   \color@begingroup
417     \@makefnmark{%
418       \rule{z}{\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
419     \color@endgroup}}%
420 \fi

\@mpfootnotetext We want the footnotes in minipages centered:
421 \long\def\@mpfootnotetext#1{%
422   \global\setbox\@mpfootins\vbox{%
423     \unvbox\@mpfootins
424     \reset@font\footnotesize
425     \hsize\columnwidth
426     \parboxrestore
427     \protected@edef\@currentlabel
428       {\csname p@mpfootnote\endcsname\@thefnmark}%
429     \color@begingroup\centering
430       \@makefnmark{%
431         \rule{z}{\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
432       \color@endgroup}}

\@makefnmark AMS classes use a buggy definition of \makefnmark. We revert to the standard one.
433 \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}

And now, hyperref
434 \let\@footnotemark@nolink\@footnotemark
435 \let\@footnotetext@nolink\@footnotetext
436 \RequirePackage[bookmarksnumbered,unicode]{hyperref}
437 \pdfstringdefDisableCommands{%
438   \def\unskip{}%
439   \def\textbullet{- }%

```



```

440 \def\textrightarrow{ -> }%
441 \def\footnotemark{}%
442 }
443 \urlstyle{rm}
444 \ifcase\ACM@format@nr
445 \relax % manuscript
446 \or % acmsmall
447 \or % acmlarge
448 \or % acmtog
449 \or % sigconf
450 \or % siggraph
451 \or % sigplan
452 \urlstyle{sf}
453 \or % sigchi
454 \or % sigchi-a
455 \urlstyle{sf}
456 \fi
457 \AtEndPreamble{%
458   \if@ACM@screen
459     \hypersetup{colorlinks,
460       linkcolor=ACMRed,
461       citecolor=ACMPurple,
462       urlcolor=ACMDarkBlue,
463       filecolor=ACMDarkBlue}
464   \else
465     \hypersetup{hidelinks}
466   \fi
467   \hypersetup{pdflang={English},
468     pdfdisplaydoctitle}}
  Bibliography mangling.
469 \if@ACM@natbib
470   \let\cite\cite
471   \let\cite\citep
472   \let\citeANP\citeauthor
473   \let\citeNN\citeyearpar
474   \let\citeyearNP\citeyear
475   \let\citeNP\citealt
476   \DeclareRobustCommand\citeA
477     {\begingroup\NAT@swafalse
478       \let\NAT@ctype\@ne\NAT@partrue\NAT@fullfalse\NAT@open\NAT@citetp}%
479   \providecommand\newblock{}%
480 \else
481   \AtBeginDocument{%
482     \let\shortcite\cite%
483     \providecommand\citename[1]{#1}}
484 \fi
485 \newcommand\shortcite[2][{}]{%
486   \ifNAT@numbers\cite[#1]{#2}\else\citeyearpar[#1]{#2}\fi}

```

`\bibliographystyle` The `amsart` package redefines `\bibliographystyle` since it prefers the AMS bibliography style. We turn it back to the  $\text{\LaTeX}$  definition:

```

487 \def\bibliographystyle#1{%
488   \ifx\@begindocumenthook\undefined\else
489     \expandafter\AtBeginDocument
490   \fi
491   {\if@files
492     \immediate\write\@auxout{\string\bibstyle{#1}}%
493   \fi}}
```

Graphics and color.

```

494 \RequirePackage{graphicx}
495 \RequirePackage[prologue]{xcolor}
```

We define ACM colors according to [7]:

```

496 \definecolor[named]{ACMBlue}{cmyk}{1,0.1,0,0.1}
497 \definecolor[named]{ACMYellow}{cmyk}{0,0.16,1,0}
498 \definecolor[named]{ACMOrange}{cmyk}{0,0.42,1,0.01}
499 \definecolor[named]{ACMRed}{cmyk}{0,0.90,0.86,0}
500 \definecolor[named]{ACMLightBlue}{cmyk}{0.49,0.01,0,0}
501 \definecolor[named]{ACMGreen}{cmyk}{0.20,0,1,0.19}
502 \definecolor[named]{ACMPurple}{cmyk}{0.55,1,0,0.15}
503 \definecolor[named]{ACMDarkBlue}{cmyk}{1,0.58,0,0.21}
```

Author-draft mode

```

504 \if@ACM@authordraft
505   \RequirePackage{draftwatermark}
506   \SetWatermarkFontSize{0.5in}
507   \SetWatermarkColor[gray]{.9}
508   \SetWatermarkText{\parbox{12em}{\centering
509     Unpublished working draft.\
510     Not for distribution.}}
511 \fi
```

### 3.7 Paper size and paragraphing

We use `geometry` for dimensions. Note that the present margins do not depend on the font size option—we might need to change this. See <https://github.com/borisveytsman/acmart/issues/5#issuecomment-272881329>.

```

512 \RequirePackage{geometry}
513 \ifcase\ACM@format@nr
514 \relax % manuscript
515   \geometry{letterpaper,head=13pt,
516     marginparwidth=6pc,heightrounded}%
517 \or % acmsmall
518   \geometry{twoside=true,
519     includeheadfoot, head=13pt, foot=2pc,
520     paperwidth=6.75in, paperheight=10in,
521     top=58pt, bottom=44pt, inner=46pt, outer=46pt,
```

```

522     marginparwidth=2pc,heightrounded
523 }%
524 \or % acmlarge
525 \geometry{twoside=true, head=13pt, foot=2pc,
526     paperwidth=8.5in, paperheight=11in,
527     includeheadfoot,
528     top=78pt, bottom=114pt, inner=81pt, outer=81pt,
529     marginparwidth=4pc,heightrounded
530 }%
531 \or % acmtog
532 \geometry{twoside=true, head=13pt, foot=2pc,
533     paperwidth=8.5in, paperheight=11in,
534     includeheadfoot, columnsep=24pt,
535     top=52pt, bottom=75pt, inner=52pt, outer=52pt,
536     marginparwidth=2pc,heightrounded
537 }%
538 \or % sigconf
539 \geometry{twoside=true, head=13pt,
540     paperwidth=8.5in, paperheight=11in,
541     includeheadfoot, columnsep=2pc,
542     top=57pt, bottom=73pt, inner=54pt, outer=54pt,
543     marginparwidth=2pc,heightrounded
544 }%
545 \or % siggraph
546 \geometry{twoside=true, head=13pt,
547     paperwidth=8.5in, paperheight=11in,
548     includeheadfoot, columnsep=2pc,
549     top=57pt, bottom=73pt, inner=54pt, outer=54pt,
550     marginparwidth=2pc,heightrounded
551 }%
552 \or % sigplan
553 \geometry{twoside=true, head=13pt,
554     paperwidth=8.5in, paperheight=11in,
555     includeheadfoot=false, columnsep=2pc,
556     top=1in, bottom=1in, inner=0.75in, outer=0.75in,
557     marginparwidth=2pc,heightrounded
558 }%
559 \or % sigchi
560 \geometry{twoside=true, head=13pt,
561     paperwidth=8.5in, paperheight=11in,
562     includeheadfoot, columnsep=2pc,
563     top=66pt, bottom=73pt, inner=54pt, outer=54pt,
564     marginparwidth=2pc,heightrounded
565 }%
566 \or % sigchi-a
567 \geometry{twoside=false, head=13pt,
568     paperwidth=11in, paperheight=8.5in,
569     includeheadfoot, marginparsep=72pt,
570     marginparwidth=170pt, columnsep=20pt,
571     top=72pt, bottom=72pt, left=314pt, right=72pt

```

```

572     }%
573     \@mparswitchfalse
574     \reversemarginpar
575 \fi

```

`\parindent` Paragraphing

```

\parskip 576 \setlength\parindent{10\p@}
577 \setlength\parskip{\z@}
578 \ifcase\ACM@format@nr
579 \relax % manuscript
580 \or % acmsmall
581 \or % acmlarge
582 \or % acmtog
583 \setlength\parindent{9\p@}%
584 \or % sigconf
585 \or % siggraph
586 \or % sigplan
587 \or % sigchi
588 \or % sigchi-a
589 \fi

```

`\normalparindent` The `amsart` package defines the `\normalparindent` length and initializes it to 12pt (the value of `\parindent` in `amsart`). It is later used to set the `\listparindent` length in the quotation environment and the `\parindent` length in the `\@footnotetext` command. We set `\normalparindent` to the value of `\parindent` as selected by `acmart` for consistent paragraph indents.

```

590 \setlength\normalparindent{\parindent}

```

Footnotes require some consideration. We have several layers of footnotes: front-matter footnotes, “regular” footnotes and the special insert for the bibstrip. In the old ACM classes, the bibstrip was a `\@float`. The problem with floats is that they tend to, well, float—and we want the guarantee they stay.

We use `manyfoot` for layered footnotes instead.

`\copyrightpermissionfootnoterule` This is the footnote rule that separates the bibstrip from the rest of the paper. It is a full width rule.

```

591 \def\copyrightpermissionfootnoterule{\kern-3\p@
592   \hrule \@width \columnwidth \kern 2.6\p@}

593 \RequirePackage{manyfoot}
594 \SelectFootnoteRule[2]{copyrightpermission}
595 \DeclareNewFootnote{authorsaddresses}
596 \SelectFootnoteRule[2]{copyrightpermission}
597 \DeclareNewFootnote{copyrightpermission}

```

`\footnoterule` Tschichold’s rules:

```

598 \def\footnoterule{\kern-3\p@
599   \hrule \@width 4pc \kern 2.6\p@}

```

`\endminipage` We do not use footnote rules in minipages

```
600 \def\endminipage{%
601   \par
602   \unskip
603   \ifvoid\@mpfootins\else
604     \vskip\skip\@mpfootins
605     \normalcolor
606     \unvbox\@mpfootins
607   \fi
608   \@minipagefalse
609   \color@endgroup
610   \egroup
611   \expandafter\@iiiparbox\@mpargs{\unvbox\@tempboxa}}
```

`\@textbottom` Add some stretch according to David Carlisle's advice at <http://tex.stackexchange.com/a/62318/5522>

```
612 \def\@textbottom{\vskip \z@ \@plus 1pt}
613 \let\@texttop\relax
```

### 3.8 Fonts

Somehow PDFTeX and XeTeX require different incantations to make a PDF compliant with the current Acrobat bugs. Xpdf is much better.

The code below is by Ross Moore.

```
614 \RequirePackage{iftex}
615 \ifPDFTeX
616 \input{glyptounicode}
617 \pdfglyptounicode{f_f}{FB00}
618 \pdfglyptounicode{f_f_i}{FB03}
619 \pdfglyptounicode{f_f_l}{FB04}
620 \pdfglyptounicode{f_i}{FB01}
621 \pdfglyptounicode{t_t}{0074 0074}
622 \pdfglyptounicode{f_t}{0066 0074}
623 \pdfglyptounicode{T_h}{0054 0068}
624 \pdfgentounicode=1
625 \fi
626 \RequirePackage{cmap}
```

`\if@ACM@newfonts` Whether we load the new fonts

```
627 \newif\if@ACM@newfonts
628 \@ACM@newfontstrue
629 \IfFileExists{libertine.sty}{\ClassWarning{\@classname}{You do not
630   have the libertine package installed. Please upgrade your
631   TeX}\@ACM@newfontsfalse}
632 \IfFileExists{zi4.sty}{\ClassWarning{\@classname}{You do not
633   have the zi4 package installed. Please upgrade your
634   TeX}\@ACM@newfontsfalse}
635 \IfFileExists{newtxmath.sty}{\ClassWarning{\@classname}{You do not
636   have the newtxmath package installed. Please upgrade your
```

```
637 TeX}\@ACM@newfontsfalse}
```

We use Libertine throughout.

```
638 \if@ACM@newfonts
639   \RequirePackage[T1]{fontenc}
640 \ifxetex
641   \RequirePackage[tt=false]{libertine}
642 \else
643   \RequirePackage[tt=false, type1=true]{libertine}
644 \fi
645 \RequirePackage[varqu]{zi4}
646 \RequirePackage[libertine]{newtxmath}
647 \fi
```

`\liningnums` Libertine defines `\liningnums`, which makes `fontspec` unhappy. While we do not use `fontspec`, some users do.

```
648 \let\liningnums\@undefined
649 \AtEndPreamble{%
650   \DeclareTextFontCommand{\liningnums}{\libertineLF}}
```

The SIGCHI extended abstracts are sans serif:

```
651 \if@ACM@sigchiamode
652   \renewcommand{\familydefault}{\sfdefault}
653 \fi
```

### 3.9 Floats

We use the caption package

```
654 \RequirePackage{caption, float}
655 \captionsetup[table]{position=top}
656 \if@ACM@journal
657   \captionsetup{labelfont={sf, small},
658     textfont={sf, small}, margin=\z@}
659   \captionsetup[figure]{name={Fig.}}
660 \else
661   \captionsetup{labelfont={bf},
662     textfont={bf}, labelsep=colon, margin=\z@}
663   \ifcase\ACM@format@nr
664     \relax % manuscript
665     \or % acmsmall
666     \or % acmlarge
667     \or % acmtog
668     \or % sigconf
669     \or % siggraph
670     \captionsetup{textfont={it}}
671     \or % sigplan
672     \captionsetup{labelfont={bf},
673       textfont={normalfont}, labelsep=period, margin=\z@}
674     \or % sigchi
```

```

675     \captionsetup[figure]{labelfont={bf, small},
676         textfont={bf, small}}
677     \or % sigchi-a
678     \captionsetup[figure]{labelfont={bf, small},
679         textfont={bf, small}}
680     \fi
681 \fi

sidebar The sidebar environment:
682 \newfloat{sidebar}{}{sbar}
683 \floatname{sidebar}{Sidebar}
684 \renewenvironment{sidebar}{}{\Collect@Body\@sidebar}{}

\@sidebar The processing of the saved text
685 \long\def\@sidebar#1{\bgroup\captionsetup{type=sidebar}%
686     \marginpar{\small#1}\egroup}

marginfigure The marginfigure environment:
687 \newenvironment{marginfigure}{}{\Collect@Body\@marginfigure}{}

\@marginfigure The processing of the saved text
688 \long\def\@marginfigure#1{\bgroup\captionsetup{type=figure}%
689     \marginpar{\centering\small#1}\egroup}

margintable The margintable environment:
690 \newenvironment{margintable}{}{\Collect@Body\@margintable}{}

\@margintable The processing of the saved text
691 \long\def\@margintable#1{\bgroup\captionsetup{type=table}%
692     \marginpar{\centering\small#1}\egroup}

SIGCHI extended abstracts provide an interesting possibility to push into the margin.
Here we use figure* and table* for this.

\fulltextwidth We define the width of the boxes as
693 \newdimen\fulltextwidth
694 \fulltextwidth=\dimexpr(\textwidth+\marginparwidth+\marginparsep)

\@dblfloat We redefine the double-float command. First, we make the size bigger. Second, our
default position is going to be tp (to give marginalia a chance)
695 \if@ACM@sigchiamode
696 \def\@dblfloat{\bgroup\columnwidth=\fulltextwidth
697     \let\@endfloatbox\@endwidefloatbox
698     \def\@fpsadddefault{\def\@fps{tp}}}%
699 \@float}
700 \fi

```

`\end@dblfloat` And the end. Just adding a `\bgroup`.

```
701 \if@ACM@sigchiamode
702 \def\end@dblfloat{%
703     \end@float\egroup}
704 \fi
```

`\@endwidefloatbox` This is the end of a wide box—we basically move everything to the left

```
705 \def\@endwidefloatbox{%
706     \par\vskip\z@skip
707     \@minipagefalse
708     \outer@nobreak
709     \egroup
710     \color@endbox
711     \global\setbox\@currbox=\vbox{\moveleft
712         \dimexpr(\fulltextwidth-\textwidth)\box\@currbox}%
713     \wd\@currbox=\textwidth
714 }
```

### 3.10 Lists

```
715 \ifcase\ACM@format@nr
716 \relax % manuscript
717 \or % acmsmall
718 \or % acmlarge
719 \or % acmtog
720 \or % sigconf
721 \or % siggraph
722 \or % sigplan
723 \def\labelenumi{\theenumi.}
724 \def\labelenumii{\theenumii.}
725 \def\labelenumiii{\theenumiii.}
726 \def\labelenumiv{\theenumiv.}
727 \or % sigchi
728 \or % sigchi-a
729 \fi
```

The AMS uses generous margins for lists. Note that `amsart` defines `\leftmargin` values for list levels at the beginning of the document, so we must redefine them in the same manner. Also, note that `amsart` redefines the `enumerate` and `itemize` environments with a `\makelabel` command that uses `\llap`, so the `\labelwidth` value is (effectively) irrelevant; nonetheless, we follow `amsart` and set `\labelwidth` to `\leftmargin` minus `\labelsep`.

```
730 \newdimen\@ACM@labelwidth
731 \AtBeginDocument{%
732     \setlength\labelsep{4pt}
733     \setlength{\@ACM@labelwidth}{6.5pt}
734
735     %% First-level list: when beginning after the first line of an
736     %% indented paragraph or ending before an indented paragraph, labels
```



```

737 %% should not hang to the left of the preceding/following text.
738 \setlength\leftmargini{\z@}
739 \addtolength\leftmargini{\parindent}
740 \addtolength\leftmargini{2\labelsep}
741 \addtolength\leftmargini{\@ACM@labelwidth}
742
743 %% Second-level and higher lists.
744 \setlength\leftmarginii{\z@}
745 \addtolength\leftmarginii{0.5\labelsep}
746 \addtolength\leftmarginii{\@ACM@labelwidth}
747 \setlength\leftmarginiii{\leftmarginii}
748 \setlength\leftmarginiv{\leftmarginiii}
749 \setlength\leftmarginv{\leftmarginiv}
750 \setlength\leftmarginvi{\leftmarginv}
751 \@listi}
752 \newskip\listisep
753 \listisep\smallskipamount
754 \def\@listI{\leftmargin\leftmargini
755 \labelwidth\leftmargini \advance\labelwidth-\labelsep
756 \listparindent\z@
757 \topsep\listisep}
758 \let\@listi\@listI
759 \def\@listii{\leftmargin\leftmarginii
760 \labelwidth\leftmarginii \advance\labelwidth-\labelsep
761 \topsep\z@skip}
762 \def\@listiii{\leftmargin\leftmarginiii
763 \labelwidth\leftmarginiii \advance\labelwidth-\labelsep}
764 \def\@listiv{\leftmargin\leftmarginiv
765 \labelwidth\leftmarginiv \advance\labelwidth-\labelsep}
766 \def\@listv{\leftmargin\leftmarginv
767 \labelwidth\leftmarginv \advance\labelwidth-\labelsep}
768 \def\@listvi{\leftmargin\leftmarginvi
769 \labelwidth\leftmarginvi \advance\labelwidth-\labelsep}
\descriptionlabel We do not use a colon by default like amsart does:
770 \renewcommand{\descriptionlabel}[1]{\upshape\bfseries #1}

\description Make the description environment indentation consistent with that of the itemize
and enumerate environments.
771 \renewenvironment{description}{\list{}{\%
772 \labelwidth\@ACM@labelwidth
773 \let\makelabel\descriptionlabel}%
774 }{
775 \endlist
776 }
777 \let\enddescription=\endlist % for efficiency

```

### 3.11 Top-matter data

We use the xkeyval interface to define journal titles and the relevant information

```

778 \define@choicekey*+{ACM}{acmJournal}[\@journalCode\@journalCode@nr]{%
779   CIE,%
780   CSUR,%
781   DTRAP,%
782   IMWUT,%
783   JACM,%
784   JDIQ,%
785   JEA,%
786   JERIC,%
787   JETC,%
788   JOCCH,%
789   PACMCGIT,%
790   PACMHCI,%
791   PACMPL,%
792   POMACS,%
793   TAAS,%
794   TACCESS,%
795   TACO,%
796   TALG,%
797   TALLIP,%
798   TAP,%
799   TCPS,%
800   TDSCI,%
801   TEAC,%
802   TECS,%
803   THRI,%
804   TIIS,%
805   TIOT,%
806   TISSEC,%
807   TIST,%
808   TKDD,%
809   TMIS,%
810   TOCE,%
811   TOCHI,%
812   TOCL,%
813   TOCS,%
814   TOCT,%
815   TODAES,%
816   TODS,%
817   TOG,%
818   TOIS,%
819   TOIT,%
820   TOMACS,%
821   TOMM,%
822   TOMPECS,%
823   TOMS,%
824   TOPC,%
825   TOPS,%
826   TOPLAS,%
827   TOS,%

```

```

828 TOSEM,%
829 TOSN,%
830 TRET$,%
831 TSAS,%
832 TSC,%
833 TSLP,%
834 TWEB%
835 }{%
836 \ifcase\@journalCode@nr
837 \relax % CIE
838 \def\@journalName{ACM Computers in Entertainment}%
839 \def\@journalNameShort{ACM Comput. Entertain.}%
840 \def\@permissionCodeOne{1544-3574}%
841 \or % CSUR
842 \def\@journalName{ACM Computing Surveys}%
843 \def\@journalNameShort{ACM Comput. Surv.}%
844 \def\@permissionCodeOne{0360-0300}%
845 \or % DTRAP
846 \def\@journalName{Digital Threats: Research and Practice}%
847 \def\@journalNameShort{Digit. Threat. Res. Pract.}%
848 \def\@permissionCodeOne{2576-5337}%
849 \or % IMWUT
850 \def\@journalName{Proceedings of the ACM on Interactive, Mobile,
851 Wearable and Ubiquitous Technologies}%
852 \def\@journalNameShort{Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.}%
853 \def\@permissionCodeOne{2474-9567}%
854 \@ACM@screentruer
855 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
856 \or % JACM
857 \def\@journalName{Journal of the ACM}%
858 \def\@journalNameShort{J. ACM}%
859 \def\@permissionCodeOne{0004-5411}%
860 \or % JDIQ
861 \def\@journalName{ACM Journal of Data and Information Quality}%
862 \def\@journalNameShort{ACM J. Data Inform. Quality}%
863 \def\@permissionCodeOne{1936-1955}%
864 \or % JEA
865 \def\@journalName{ACM Journal of Experimental Algorithmics}%
866 \def\@journalNameShort{ACM J. Exp. Algor.}%
867 \def\@permissionCodeOne{1084-6654}%
868 \or % JERIC
869 \def\@journalName{ACM Journal of Educational Resources in Computing}%
870 \def\@journalNameShort{ACM J. Edu. Resources in Comput.}%
871 \def\@permissionCodeOne{1073-0516}%
872 \or % JETC
873 \def\@journalName{ACM Journal on Emerging Technologies in Computing Systems}%
874 \def\@journalNameShort{ACM J. Emerg. Technol. Comput. Syst.}%
875 \def\@permissionCodeOne{1550-4832}%
876 \or % JOCCH
877 \def\@journalName{ACM Journal on Computing and Cultural Heritage}%

```

```

878 \def\@journalNameShort{ACM J. Comput. Cult. Herit.}%
879 \or % PACMCGIT
880 \def\@journalName{Proceedings of the ACM on Computer Graphics and Interactive Techniques}%
881 \def\@journalNameShort{Proc. ACM Comput. Graph. Interact. Tech.}%
882 \def\@permissionCodeOne{2577-6193}%
883 \@ACM@screentru
884 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
885 \or % PACMHCI
886 \def\@journalName{Proceedings of the ACM on Human-Computer Interaction}%
887 \def\@journalNameShort{Proc. ACM Hum.-Comput. Interact.}%
888 \def\@permissionCodeOne{2573-0142}%
889 \@ACM@screentru
890 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
891 \or % PACMPL
892 \def\@journalName{Proceedings of the ACM on Programming Languages}%
893 \def\@journalNameShort{Proc. ACM Program. Lang.}%
894 \def\@permissionCodeOne{2475-1421}%
895 \@ACM@screentru
896 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
897 \or % POMACS
898 \def\@journalName{Proceedings of the ACM on Measurement and Analysis of Computing Systems}%
899 \def\@journalNameShort{Proc. ACM Meas. Anal. Comput. Syst.}%
900 \def\@permissionCodeOne{2476-1249}%
901 \@ACM@screentru
902 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
903 \or % TAAS
904 \def\@journalName{ACM Transactions on Autonomous and Adaptive Systems}%
905 \def\@journalNameShort{ACM Trans. Autonom. Adapt. Syst.}%
906 \def\@permissionCodeOne{1556-4665}%
907 \or % TACCESS
908 \def\@journalName{ACM Transactions on Accessible Computing}%
909 \def\@journalNameShort{ACM Trans. Access. Comput.}%
910 \def\@permissionCodeOne{1936-7228}%
911 \or % TACO
912 \def\@journalName{ACM Transactions on Architecture and Code Optimization}%
913 \def\@journalNameShort{ACM Trans. Arch. Code Optim.}%
914 \or % TALG
915 \def\@journalName{ACM Transactions on Algorithms}%
916 \def\@journalNameShort{ACM Trans. Algor.}%
917 \def\@permissionCodeOne{1549-6325}%
918 \or % TALLIP
919 \def\@journalName{ACM Transactions on Asian and Low-Resource Language Information Processing}%
920 \def\@journalNameShort{ACM Trans. Asian Low-Resour. Lang. Inf. Process.}%
921 \def\@permissionCodeOne{2375-4699}%
922 \or % TAP
923 \def\@journalName{ACM Transactions on Applied Perception}%
924 \or % TCPS
925 \def\@journalName{ACM Transactions on Cyber-Physical Systems}%
926 \or % TDSCI
927 \def\@journalName{ACM Transactions on Data Science}%

```

```

928 \def\@journalNameShort{ACM Trans. Data Sci.}%
929 \def\@permissionCodeOne{2577-3224}%
930 \or % TEAC
931 \def\@journalName{ACM Transactions on Economics and Computation}%
932 \or % TECS
933 \def\@journalName{ACM Transactions on Embedded Computing Systems}%
934 \def\@journalNameShort{ACM Trans. Embedd. Comput. Syst.}%
935 \def\@permissionCodeOne{1539-9087}%
936 \or % THRI
937 \def\@journalName{ACM Transactions on Human-Robot Interaction}%
938 \def\@journalNameShort{ACM Trans. Hum.-Robot Interact.}%
939 \def\@permissionCodeOne{2573-9522}%
940 \or % TIIS
941 \def\@journalName{ACM Transactions on Interactive Intelligent Systems}%
942 \def\@journalNameShort{ACM Trans. Interact. Intell. Syst.}%
943 \def\@permissionCodeOne{2160-6455}%
944 \or % TIOT
945 \def\@journalName{ACM Transactions on Internet of Things}%
946 \def\@journalNameShort{ACM Trans. Internet Things}%
947 \def\@permissionCodeOne{2577-6207}%
948 \or % TISSEC
949 \def\@journalName{ACM Transactions on Information and System Security}%
950 \def\@journalNameShort{ACM Trans. Info. Syst. Sec.}%
951 \def\@permissionCodeOne{1094-9224}%
952 \or % TIST
953 \def\@journalName{ACM Transactions on Intelligent Systems and Technology}%
954 \def\@journalNameShort{ACM Trans. Intell. Syst. Technol.}%
955 \def\@permissionCodeOne{2157-6904}%
956 \or % TKDD
957 \def\@journalName{ACM Transactions on Knowledge Discovery from Data}%
958 \def\@journalNameShort{ACM Trans. Knowl. Discov. Data.}%
959 \def\@permissionCodeOne{1556-4681}%
960 \or % TMIS
961 \def\@journalName{ACM Transactions on Management Information Systems}%
962 \def\@journalNameShort{ACM Trans. Manag. Inform. Syst.}%
963 \def\@permissionCodeOne{2158-656X}%
964 \or % TOCE
965 \def\@journalName{ACM Transactions on Computing Education}%
966 \def\@journalNameShort{ACM Trans. Comput. Educ.}%
967 \def\@permissionCodeOne{1946-6226}%
968 \or % TOCHI
969 \def\@journalName{ACM Transactions on Computer-Human Interaction}%
970 \def\@journalNameShort{ACM Trans. Comput.-Hum. Interact.}%
971 \def\@permissionCodeOne{1073-0516}%
972 \or % TOCL
973 \def\@journalName{ACM Transactions on Computational Logic}%
974 \def\@journalNameShort{ACM Trans. Comput. Logic}%
975 \def\@permissionCodeOne{1529-3785}%
976 \or % TOCS
977 \def\@journalName{ACM Transactions on Computer Systems}%

```

```

978 \def\@journalNameShort{ACM Trans. Comput. Syst.}%
979 \def\@permissionCodeOne{0734-2071}%
980 \or % TOCT
981 \def\@journalName{ACM Transactions on Computation Theory}%
982 \def\@journalNameShort{ACM Trans. Comput. Theory}%
983 \def\@permissionCodeOne{1942-3454}%
984 \or % TODAES
985 \def\@journalName{ACM Transactions on Design Automation of Electronic Systems}%
986 \def\@journalNameShort{ACM Trans. Des. Autom. Electron. Syst.}%
987 \def\@permissionCodeOne{1084-4309}%
988 \or % TODS
989 \def\@journalName{ACM Transactions on Database Systems}%
990 \def\@journalNameShort{ACM Trans. Datab. Syst.}%
991 \def\@permissionCodeOne{0362-5915}%
992 \or % TOG
993 \def\@journalName{ACM Transactions on Graphics}%
994 \def\@journalNameShort{ACM Trans. Graph.}%
995 \def\@permissionCodeOne{0730-0301}%
996 \or % TOIS
997 \def\@journalName{ACM Transactions on Information Systems}%
998 \def\@permissionCodeOne{1046-8188}%
999 \or % TOIT
1000 \def\@journalName{ACM Transactions on Internet Technology}%
1001 \def\@journalNameShort{ACM Trans. Internet Technol.}%
1002 \def\@permissionCodeOne{1533-5399}%
1003 \or % TOMACS
1004 \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
1005 \def\@journalNameShort{ACM Trans. Model. Comput. Simul.}%
1006 \or % TOMM
1007 \def\@journalName{ACM Transactions on Multimedia Computing, Communications and Applications}%
1008 \def\@journalNameShort{ACM Trans. Multimedia Comput. Commun. Appl.}%
1009 \def\@permissionCodeOne{1551-6857}%
1010 \def\@permissionCodeTwo{0100}%
1011 \or % TOMPECS
1012 \def\@journalName{ACM Transactions on Modeling and Performance Evaluation of Computing Systems}%
1013 \def\@journalNameShort{ACM Trans. Model. Perform. Eval. Comput. Syst.}%
1014 \def\@permissionCodeOne{2376-3639}%
1015 \or % TOMS
1016 \def\@journalName{ACM Transactions on Mathematical Software}%
1017 \def\@journalNameShort{ACM Trans. Math. Softw.}%
1018 \def\@permissionCodeOne{0098-3500}%
1019 \or % TOPC
1020 \def\@journalName{ACM Transactions on Parallel Computing}%
1021 \def\@journalNameShort{ACM Trans. Parallel Comput.}%
1022 \def\@permissionCodeOne{1539-9087}%
1023 \or % TOPS
1024 \def\@journalName{ACM Transactions on Privacy and Security}%
1025 \def\@journalNameShort{ACM Trans. Priv. Sec.}%
1026 \def\@permissionCodeOne{2471-2566}%
1027 \or % TOPLAS

```

```

1028 \def\@journalName{ACM Transactions on Programming Languages and Systems}%
1029 \def\@journalNameShort{ACM Trans. Program. Lang. Syst.}%
1030 \def\@permissionCodeOne{0164-0925}%
1031 \or % TOS
1032 \def\@journalName{ACM Transactions on Storage}%
1033 \def\@journalNameShort{ACM Trans. Storage}%
1034 \def\@permissionCodeOne{1553-3077}%
1035 \or % TOSEM
1036 \def\@journalName{ACM Transactions on Software Engineering and Methodology}%
1037 \def\@journalNameShort{ACM Trans. Softw. Eng. Methodol.}%
1038 \def\@permissionCodeOne{1049-331X}%
1039 \or % TOSN
1040 \def\@journalName{ACM Transactions on Sensor Networks}%
1041 \def\@journalNameShort{ACM Trans. Sensor Netw.}%
1042 \def\@permissionCodeOne{1550-4859}%
1043 \or % TRET
1044 \def\@journalName{ACM Transactions on Reconfigurable Technology and Systems}%
1045 \def\@journalNameShort{ACM Trans. Reconfig. Technol. Syst.}%
1046 \def\@permissionCodeOne{1936-7406}%
1047 \or % TSAS
1048 \def\@journalName{ACM Transactions on Spatial Algorithms and Systems}%
1049 \def\@journalNameShort{ACM Trans. Spatial Algorithms Syst.}%
1050 \def\@permissionCodeOne{2374-0353}%
1051 \or % TSC
1052 \def\@journalName{ACM Transactions on Social Computing}%
1053 \def\@journalNameShort{ACM Trans. Soc. Comput.}%
1054 \def\@permissionCodeOne{2469-7818}%
1055 \or % TSLP
1056 \def\@journalName{ACM Transactions on Speech and Language Processing}%
1057 \def\@journalNameShort{ACM Trans. Speech Lang. Process.}%
1058 \def\@permissionCodeOne{1550-4875}%
1059 \or % TWEB
1060 \def\@journalName{ACM Transactions on the Web}%
1061 \def\@journalNameShort{ACM Trans. Web}%
1062 \def\@permissionCodeOne{1559-1131}%
1063 \fi
1064 \ClassInfo{\@classname}{Using journal code \@journalCode}%
1065 }{%
1066 \ClassError{\@classname}{Incorrect journal #1}%
1067 }%

```

\acmJournal And the syntactic sugar around it

```

1068 \def\acmJournal#1{\setkeys{ACM}{acmJournal=#1}}

```

The defaults:

```

1069 \def\@journalCode@nr{0}
1070 \def\@journalName{}%
1071 \def\@journalNameShort{\@journalName}%
1072 \def\@permissionCodeOne{XXXX-XXXX}%
1073 \def\@permissionCodeTwo{}%

```

`\acmConference` This is the conference command

```

1074 \newcommand\acmConference[4][{}]{%
1075   \gdef\acmConference@shortname{#1}%
1076   \gdef\acmConference@name{#2}%
1077   \gdef\acmConference@date{#3}%
1078   \gdef\acmConference@venue{#4}%
1079   \ifx\acmConference@shortname\@empty
1080     \gdef\acmConference@shortname{#2}%
1081   \fi}
1082 \acmConference[Conference'17]{ACM Conference}{July 2017}{Washington,
1083   DC, USA}

```

`\acmBooktitle` The book title of the conference:

`\@acmBooktitle`

```

1084 \def\acmBooktitle#1{\gdef\@acmBooktitle{#1}}
1085 \acmBooktitle{Proceedings of \acmConference@name
1086   \ifx\acmConference@name\acmConference@shortname\else
1087     \ (\acmConference@shortname)\fi}

```

`\@editorsAbbrev` How to abbreviate editors

```

1088 \def\@editorsAbbrev{(Ed.)}

```

`\@acmEditors` The list of editors

```

1089 \def\@acmEditors{}

```

`\editor` Add a new editor to the list

```

1090 \def\editor#1{\ifx\@acmEditors\@empty
1091   \gdef\@acmEditors{#1}%
1092   \else
1093     \gdef\@editorsAbbrev{(Eds.)}%
1094     \g@addto@macro\@acmEditors{\and#1}%
1095   \fi}

```

`\subtitle` The subtitle macro

```

1096 \def\subtitle#1{\def\@subtitle{#1}}
1097 \subtitle{}

```

`\num@authorgroups` The total number of “groups”. Each group is several authors with the same affiliations(s)

```

1098 \newcount\num@authorgroups
1099 \num@authorgroups=0\relax

```

`\num@author`s The total number of authors

```

1100 \newcount\num@author
1101 \num@author=0\relax

```

`\if@insideauthorgroup` Whether we are continuing an author group

```

1102 \newif\if@insideauthorgroup
1103 \@insideauthorgroupfalse

```



`\author` Adding an author to the list of authors and addresses

```

1104 \renewcommand\author[2][{}%
1105   \global\advance\num@authors by 1\relax
1106   \if@insideauthorgroup\else
1107     \global\advance\num@authorgroups by 1\relax
1108     \global\@insideauthorgrouptrue
1109   \fi
1110   \ifx\addresses\@empty
1111     \if@ACM@anonymous
1112       \gdef\addresses{\@author{Anonymous Author(s)}%
1113         \ifx\@acmSubmissionID\@empty\else\Submission Id:
1114           \@acmSubmissionID\fi}}%
1115       \gdef\authors{Anonymous Author(s)}%
1116     \else
1117       \gdef\addresses{\@author{#2}}%
1118       \gdef\authors{#2}%
1119     \fi
1120   \else
1121     \if@ACM@anonymous\else
1122       \g@addto@macro\addresses{\and\@author{#2}}%
1123       \g@addto@macro\authors{\and#2}%
1124     \fi
1125   \fi
1126   \if@ACM@anonymous
1127     \ifx\shortauthors\@empty
1128       \gdef\shortauthors{Anon.
1129         \ifx\@acmSubmissionID\@empty\else Submission Id:
1130           \@acmSubmissionID\fi}%
1131     \fi
1132   \else
1133     \def\@tempa{#1}%
1134     \ifx\@tempa\@empty
1135       \ifx\shortauthors\@empty
1136         \gdef\shortauthors{#2}%
1137       \else
1138         \g@addto@macro\shortauthors{\and#2}%
1139       \fi
1140     \else
1141       \ifx\shortauthors\@empty
1142         \gdef\shortauthors{#1}%
1143       \else
1144         \g@addto@macro\shortauthors{\and#1}%
1145       \fi
1146     \fi
1147   \fi}

```

`\affiliation` The macro `\affiliation` mimics `\address` from `amsart`. Note that it has an optional argument, which we use differently from `amsart`.

```

1148 \newcommand{\affiliation}[2][{}%

```

```

1149 \global\@insideauthorgroupfalse
1150 \if@ACM@anonymous\else
1151     \g@addto@macro\addresses{\affiliation{#1}{#2}}%
1152 \fi}

@ACM@affiliation@obeypunctuation Whether to use the author's punctuation (false by default, which adds American-style
address punctuation)
1153 \define@boolkey+{@ACM@affiliation@}[@ACM@affiliation@]{obeypunctuation}%
1154 [true]{}{\ClassError{\@classname}{The option obeypunctuation can be either true or false}}

\additionalaffiliation Additional affiliations go to footnotes
1155 \def\additionalaffiliation#1{\authornote{\@additionalaffiliation{#1}}}

\@additionalaffiliation Process \additionalaffiliation inside \authornote
1156 \def\@additionalaffiliation#1{\bgroup
1157     \def\position##1{\ignorespaces}%
1158     \def\institution##1{##1\ignorespaces}%
1159     \def\department{\@ifnextchar[{\@department}{\@department[]}}%
1160     \def\@department[##1]##2{\unskip, ##2\ignorespaces}%
1161     \let\streetaddress\position
1162     \let\city\position
1163     \let\state\position
1164     \let\postcode\position
1165     \let\country\position
1166     Also with #1\unskip.\egroup}

\email The macro \email mimics \email from amsart. Again, it has an optional argument that
we do not currently need but keep for possible future use.
1167 \renewcommand{\email}[2][]{%
1168     \if@ACM@anonymous\else
1169         \g@addto@macro\addresses{\email{#1}{#2}}%
1170     \fi}

\orcid Right now we do not typeset ORCIDs
1171 \def\orcid#1{\unskip\ignorespaces}

\authorsaddresses Setting up authors' addresses
1172 \def\authorsaddresses#1{\def\@authorsaddresses{#1}}
1173 \authorsaddresses{\mkauthorsaddresses}

\@titlenotes The title notes
1174 \def\@titlenotes{}

\titlenote Adding a note to the title
1175 \def\titlenote#1{%
1176     \g@addto@macro\@title{\footnotemark}%
1177     \if@ACM@anonymous
1178         \g@addto@macro\@titlenotes{%

```

```

1179     \stepcounter{footnote}\footnotetext{Title note}}%
1180 \else
1181     \g@addto@macro\@titlenotes{\stepcounter{footnote}\footnotetext{#1}}%
1182 \fi}

\@subtitlenotes The subtitle notes
1183 \def\@subtitlenotes{}

\subtitlenote Adding a note to the subtitle
1184 \def\subtitlenote#1{%
1185     \g@addto@macro\@subtitle{\footnotemark}%
1186     \if@ACM@anonymous
1187         \g@addto@macro\@subtitlenotes{%
1188             \stepcounter{footnote}\footnotetext{Subtitle note}}%
1189     \else
1190         \g@addto@macro\@subtitlenotes{%
1191             \stepcounter{footnote}\footnotetext{#1}}%
1192 \fi}

\@authornotes The author notes
1193 \def\@authornotes{}

\authornote Adding a note to the author
1194 \def\authornote#1{%
1195     \if@ACM@anonymous\else
1196         \g@addto@macro\addresses{\@authornotemark}%
1197         \g@addto@macro\@authornotes{%
1198             \stepcounter{footnote}\footnotetext{#1}}%
1199 \fi}

\authornotemark Adding a footnote mark to the authors
1200 \newcommand\authornotemark[1][\relax]{%
1201     \ifx#1\relax\relax\relax
1202     \g@addto@macro\addresses{\@authornotemark}%
1203     \else
1204     \g@addto@macro\addresses{\@authornotemark{#1}}%
1205 \fi}

\acmVolume The current volume
1206 \def\acmVolume#1{\def\@acmVolume{#1}}
1207 \acmVolume{1}

\acmNumber The current number
1208 \def\acmNumber#1{\def\@acmNumber{#1}}
1209 \acmNumber{1}

\acmArticle The current article
1210 \def\acmArticle#1{\def\@acmArticle{#1}}
1211 \acmArticle{}

```

<code>\acmArticleSeq</code>	The sequence number 1212 <code>\def\acmArticleSeq#1{\def\@acmArticleSeq{#1}}</code> 1213 <code>\acmArticleSeq{\@acmArticle}</code>
<code>\acmYear</code>	The current year 1214 <code>\def\acmYear#1{\def\@acmYear{#1}}</code> 1215 <code>\acmYear{\the\year}</code>
<code>\acmMonth</code>	The current month 1216 <code>\def\acmMonth#1{\def\@acmMonth{#1}}</code> 1217 <code>\acmMonth{\the\month}</code>
<code>\@acmPubDate</code>	The publication date 1218 <code>\def\@acmPubDate{\ifcase\@acmMonth\or</code> 1219 <code>January\or February\or March\or April\or May\or June\or</code> 1220 <code>July\or August\or September\or October\or November\or</code> 1221 <code>December\fi~\@acmYear}</code>
<code>\acmPrice</code>	The price 1222 <code>\def\acmPrice#1{\def\@acmPrice{#1}}</code> 1223 <code>\acmPrice{15.00}</code>
<code>\acmSubmissionID</code>	The submission ID 1224 <code>\def\acmSubmissionID#1{\def\@acmSubmissionID{#1}}</code> 1225 <code>\acmSubmissionID{}</code>
<code>\acmISBN</code>	The book ISBN 1226 <code>\def\acmISBN#1{\def\@acmISBN{#1}}</code> 1227 <code>\acmISBN{978-x-xxxx-xxxx-x/YY/MM}</code>
<code>\acmDOI</code>	The paper DOI 1228 <code>\def\acmDOI#1{\def\@acmDOI{#1}}</code> 1229 <code>\acmDOI{10.1145/nnnnnnn.nnnnnnn}</code>
<code>\if@ACM@badge</code>	Whether to print a badge. Note that either a left or right badge triggers it: 1230 <code>\newif\if@ACM@badge</code> 1231 <code>\@ACM@badgefalse</code>
<code>\@ACM@badge@width</code>	The width of the badge 1232 <code>\newlength\@ACM@badge@width</code> 1233 <code>\setlength\@ACM@badge@width{5pc}</code>
<code>\@ACM@title@width</code>	The width of the badge 1234 <code>\newlength\@ACM@title@width</code>
<code>\@ACM@badge@skip</code>	The space between the badge and the title 1235 <code>\newlength\@ACM@badge@skip</code> 1236 <code>\setlength\@ACM@badge@skip{1pc}</code>

`\acmBadgeR` Setting the right badge

```

1237 \newcommand\acmBadgeR[2][\@ACM@badgetrue
1238   \def\@acmBadgeR@url{#1}%
1239   \def\@acmBadgeR@image{#2}}
1240 \def\@acmBadgeR@url{}
1241 \def\@acmBadgeR@image{}

```

`\acmBadgeL` Setting the left badge

```

1242 \newcommand\acmBadgeL[2][\@ACM@badgetrue
1243   \def\@acmBadgeL@url{#1}%
1244   \def\@acmBadgeL@image{#2}}
1245 \def\@acmBadgeL@url{}
1246 \def\@acmBadgeL@image{}

```

`\startPage` The start page of the paper

```

1247 \def\startPage#1{\def\@startPage{#1}}
1248 \startPage{}

```

`\terms` Terms are obsolete. We use CCS now.

```

1249 \def\terms#1{\ClassWarning{\@classname}{The command \string\terms{} is
1250   obsolete. I am going to ignore it}}

```

`\keywords` Keywords are mostly obsolete. We use CCS now. Still it makes sense to keep them for compatibility.

```

1251 \def\keywords#1{\def\@keywords{#1}}
1252 \keywords{}

```

`abstract` The amsart package puts abstract in a box. Since we do not know whether we will use two-column mode, we prefer to save the text

```

1253 \renewenvironment{abstract}{\Collect@Body\@saveabstract}{}

```

`\@saveabstract` And saving the abstract

```

1254 \long\def\@saveabstract#1{\long\gdef\@abstract{#1}}
1255 \@saveabstract{}

```

`\@empty` The long version of `\@empty` (to compare with `\@abstract`)

```

1256 \long\def\@empty{}

```

`\if@ACM@printccs` Whether to print CCS

```

1257 \define@boolkey+{@ACM@topmatter@}{@ACM@}{printccs}[true]{%
1258   \if@ACM@printccs
1259     \ClassInfo{\@classname}{Printing CCS}%
1260   \else
1261     \ClassInfo{\@classname}{Suppressing CCS}%
1262   \fi}{\ClassError{\@classname}{The option printccs can be either true or false}}

```

`\if@ACM@printacmref` Whether to print the ACM bibstrip

```

1263 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printacmref}[true]{%
1264   \if@ACM@printacmref
1265     \ClassInfo{\@classname}{Printing bibformat}%
1266   \else
1267     \ClassInfo{\@classname}{Suppressing bibformat}%
1268   \fi}{\ClassError{\@classname}{The option printacmref can be either true or false}}

```

`\if@ACM@printfolios` Whether to print folios

```

1269 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printfolios}[true]{%
1270   \if@ACM@printfolios
1271     \ClassInfo{\@classname}{Printing folios}%
1272   \else
1273     \ClassInfo{\@classname}{Suppressing folios}%
1274   \fi}{\ClassError{\@classname}{The option printfolios can be either true or false}}

```

`\@ACM@authorssperrow` The number of authors per row. 0 means use the default algorithm.

```

1275 \define@cmdkey{@ACM@topmatter@}[@ACM@]{authorssperrow}[0]{%
1276   \IfInteger{#1}{\ClassInfo{\@classname}{Setting authorssperrow to
1277     #1}}{\ClassWarning{\@classname}{The parameter authorssperrow must be
1278     numerical. Ignoring the input #1}}\gdef\@ACM@authorssperrow{0}}

```

`\settopmatter` The usual syntactic sugar

```

1279 \def\settopmatter#1{\setkeys{@ACM@topmatter@}{#1}}

```

Now the settings

```

1280 \settopmatter{printccs=true, printacmref=true}
1281 \if@ACM@manuscript
1282   \settopmatter{printfolios=true}
1283 \else
1284   \if@ACM@journal
1285     \settopmatter{printfolios=true}
1286   \else
1287     \settopmatter{printfolios=false}
1288   \fi
1289 \fi
1290 \settopmatter{authorssperrow=0}

```

`\@received` The container for the paper history

```

1291 \def\@received{}

```

`\received` The `\received` command

```

1292 \newcommand\received[2][\def\@tempa{#1}%
1293   \ifx\@tempa\@empty
1294     \ifx\@received\@empty
1295       \gdef\@received{Received #2}%
1296     \else
1297       \g@addto@macro{\@received}{; revised #2}%
1298     \fi

```

```

1299 \else
1300   \ifx\@received\@empty
1301     \gdef\@received{#1 #2}%
1302   \else
1303     \g@addto@macro{\@received}{; #1 #2}%
1304   \fi
1305 \fi}
1306 \AtEndDocument{%
1307   \ifx\@received\@empty\else
1308     \par\bigskip\noindent\small\normalfont\@received\par
1309   \fi}

```

### 3.12 Concepts system

We exclude CCSXML stuff generated by the ACM system:

```

1310 \RequirePackage{comment}
1311 \excludecomment{CCSXML}

```

\@concepts This is the storage macro for concepts

```
1312 \let\@concepts\@empty
```

\ccsdesc The first argument is the significance, the second is the concept(s)

```

1313 \newcommand\ccsdesc[2][100]{%
1314   \ccsdesc@parse#1~#2~\ccsdesc@parse@end}

```

\ccsdesc@parse The parser of the expression Significance~General~Specific (we need textcomp for \textrightarrow). Note that Specific can be empty!

```

1315 \RequirePackage{textcomp}
1316 \def\ccsdesc@parse#1~#2~#3~{%
1317   \expandafter\ifx\csname CCS@General@#2\endcsname\relax
1318     \expandafter\gdef\csname CCS@General@#2\endcsname{\textbullet\
1319       \textbf{#2}}%
1320   \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{; }%
1321   \expandafter\gdef\csname CCS@Specific@#2\endcsname{}%
1322   \g@addto@macro{\@concepts}{\csname CCS@General@#2\endcsname
1323     \csname CCS@Punctuation@#2\endcsname
1324     \csname CCS@Specific@#2\endcsname}%
1325   \fi
1326   \ifx#3\relax\relax\else
1327     \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{
1328       \textrightarrow\ }%
1329     \expandafter\g@addto@macro\expandafter{\csname CCS@Specific@#2\endcsname}{%
1330       \ifnum#1>499\textbf{#3}; \else
1331       \ifnum#1>299\textit{#3}; \else
1332       #3; \fi\fi}%
1333   \fi
1334 \ccsdesc@parse@finish}

```

\ccdesc@parse@finish Gobble everything to \ccsdesc@parse@end

```
1335 \def\ccsdesc@parse@finish#1\ccsdesc@parse@end{}
```

### 3.13 Copyright system

This is from acmcopyright.sty

`\if@printcopyright` Whether to print a copyright symbol  
1336 `\newif\if@printcopyright`  
1337 `\@printcopyrighttrue`

`\if@printpermission` Whether to print the permission block  
1338 `\newif\if@printpermission`  
1339 `\@printpermissiontrue`

`\if@acmowned` Whether the ACM owns the rights to the paper  
1340 `\newif\if@acmowned`  
1341 `\@acmownedtrue`

Keys:

```
1342 \define@choicekey*{ACM@}{acmcopyrightmode}[%
1343   \acm@copyrightinput\acm@copyrightmode]{none,%
1344     acmcopyright,acmlicensed,rightsretained,%
1345     usgov,usgovmixed,cagov,cagovmixed,licensedusgovmixed,%
1346     licensedcagov,licensedcagovmixed,othergov,licensedothergov,%
1347     iw3c2w3,iw3c2w3g}{%
1348   \@printpermissiontrue
1349   \@printcopyrighttrue
1350   \@acmownedtrue
1351   \ifnum\acm@copyrightmode=0\relax % none
1352     \@printpermissionfalse
1353     \@printcopyrightfalse
1354     \@acmownedfalse
1355   \fi
1356   \ifnum\acm@copyrightmode=2\relax % acmlicensed
1357     \@acmownedfalse
1358   \fi
1359   \ifnum\acm@copyrightmode=3\relax % rightsretained
1360     \@acmownedfalse
1361   \AtBeginDocument{\acmPrice{}}%
1362   \fi
1363   \ifnum\acm@copyrightmode=4\relax % usgov
1364     \@printpermissiontrue
1365     \@printcopyrightfalse
1366     \@acmownedfalse
1367   \AtBeginDocument{\acmPrice{}}%
1368   \fi
1369   \ifnum\acm@copyrightmode=6\relax % cagov
1370     \@acmownedfalse
1371   \fi
1372   \ifnum\acm@copyrightmode=8\relax % licensedusgovmixed
1373     \@acmownedfalse
1374   \fi
```



```

1375 \ifnum\acm@copyrightmode=9\relax % licensedcagov
1376 \@acmownedfalse
1377 \fi
1378 \ifnum\acm@copyrightmode=10\relax % licensedcagovmixed
1379 \@acmownedfalse
1380 \fi
1381 \ifnum\acm@copyrightmode=11\relax % othergov
1382 \@acmownedtrue
1383 \fi
1384 \ifnum\acm@copyrightmode=12\relax % licensedothergov
1385 \@acmownedfalse
1386 \fi
1387 \ifnum\acm@copyrightmode=13\relax % iw3c2w3
1388 \@acmownedfalse
1389 \AtBeginDocument{\acmPrice{}}%
1390 \fi
1391 \ifnum\acm@copyrightmode=14\relax % iw3c2w3g
1392 \@acmownedfalse
1393 \AtBeginDocument{\acmPrice{}}%
1394 \fi}

```

\setcopyright This is the syntactic sugar around setting keys.

```

1395 \def\setcopyright#1{\setkeys{ACM@}{acmcopyrightmode=#1}}
1396 \setcopyright{acmcopyright}

```

\@copyrightowner Here is the owner of the copyright

```

1397 \def\@copyrightowner{%
1398 \ifcase\acm@copyrightmode\relax % none
1399 \or % acmcopyright
1400 Association for Computing Machinery.
1401 \or % acmlicensed
1402 Copyright held by the owner/author(s). Publication rights licensed to
1403 ACM\@.
1404 \or % rightsretained
1405 Copyright held by the owner/author(s).
1406 \or % usgov
1407 \or % usgovmixed
1408 Association for Computing Machinery.
1409 \or % cagov
1410 Crown in Right of Canada.
1411 \or %cagovmixed
1412 Association for Computing Machinery.
1413 \or %licensedusgovmixed
1414 Copyright held by the owner/author(s). Publication rights licensed to
1415 ACM\@.
1416 \or % licensedcagov
1417 Crown in Right of Canada. Publication rights licensed to
1418 ACM\@.
1419 \or %licensedcagovmixed
1420 Copyright held by the owner/author(s). Publication rights licensed to

```

```

1421 ACM\@.
1422 \or % othergov
1423 Association for Computing Machinery.
1424 \or % licensedothergov
1425 Copyright held by the owner/author(s). Publication rights licensed to
1426 ACM\@.
1427 \or % ic2w3www
1428 IW3C2 (International World Wide Web Conference Committee), published
1429 under Creative Commons CC-BY~4.0 License.
1430 \or % ic2w3wwwgoogle
1431 IW3C2 (International World Wide Web Conference Committee), published
1432 under Creative Commons CC-BY-NC-ND~4.0 License.
1433 \fi}

```

\@formatdoi Print a clickable DOI

```

1434 \def\@formatdoi#1{\url{https://doi.org/#1}}

```

\@copyrightpermission The canned permission block.

```

1435 \def\@copyrightpermission{%
1436   \ifcase\acm@copyrightmode\relax % none
1437   \or % acmcopyright
1438     Permission to make digital or hard copies of all or part of this
1439     work for personal or classroom use is granted without fee provided
1440     that copies are not made or distributed for profit or commercial
1441     advantage and that copies bear this notice and the full citation on
1442     the first page. Copyrights for components of this work owned by
1443     others than ACM must be honored. Abstracting with credit is
1444     permitted. To copy otherwise, or republish, to post on servers or to
1445     redistribute to lists, requires prior specific permission
1446     and\hspace*{.5pt}/or a fee. Request permissions from
1447     permissions@acm.org.
1448   \or % acmlicensed
1449     Permission to make digital or hard copies of all or part of this
1450     work for personal or classroom use is granted without fee provided
1451     that copies are not made or distributed for profit or commercial
1452     advantage and that copies bear this notice and the full citation on
1453     the first page. Copyrights for components of this work owned by
1454     others than the author(s) must be honored. Abstracting with credit
1455     is permitted. To copy otherwise, or republish, to post on servers
1456     or to redistribute to lists, requires prior specific permission
1457     and\hspace*{.5pt}/or a fee. Request permissions from
1458     permissions@acm.org.
1459   \or % rightsretained
1460     Permission to make digital or hard copies of part or all of this work
1461     for personal or classroom use is granted without fee provided that
1462     copies are not made or distributed for profit or commercial advantage
1463     and that copies bear this notice and the full citation on the first
1464     page. Copyrights for third-party components of this work must be
1465     honored. For all other uses, contact the
1466     owner\hspace*{.5pt}/author(s).

```

1467 \or % usgov  
1468 This paper is authored by an employee(s) of the United States  
1469 Government and is in the public domain. Non-exclusive copying or  
1470 redistribution is allowed, provided that the article citation is  
1471 given and the authors and agency are clearly identified as its  
1472 source.

1473 \or % usgovmixed  
1474 ACM acknowledges that this contribution was authored or co-authored  
1475 by an employee, contractor, or affiliate of the United States government. As such,  
1476 the United States government retains a nonexclusive, royalty-free right to  
1477 publish or reproduce this article, or to allow others to do so, for  
1478 government purposes only.

1479 \or % cagov  
1480 This article was authored by employees of the Government of Canada.  
1481 As such, the Canadian government retains all interest in the  
1482 copyright to this work and grants to ACM a nonexclusive,  
1483 royalty-free right to publish or reproduce this article, or to allow  
1484 others to do so, provided that clear attribution is given both to  
1485 the authors and the Canadian government agency employing them.  
1486 Permission to make digital or hard copies for personal or classroom  
1487 use is granted. Copies must bear this notice and the full citation  
1488 on the first page. Copyrights for components of this work owned by  
1489 others than the Canadian Government must be honored. To copy  
1490 otherwise, distribute, republish, or post, requires prior specific  
1491 permission and\hspace\*{.5pt}/or a fee. Request permissions from  
1492 permissions@acm.org.

1493 \or % cagovmixed  
1494 ACM acknowledges that this contribution was co-authored by an  
1495 affiliate of the national government of Canada. As such, the Crown  
1496 in Right of Canada retains an equal interest in the copyright.  
1497 Reprints must include clear attribution to ACM and the author's  
1498 government agency affiliation. Permission to make digital or hard  
1499 copies for personal or classroom use is granted. Copies must bear  
1500 this notice and the full citation on the first page. Copyrights for  
1501 components of this work owned by others than ACM must be honored.  
1502 To copy otherwise, distribute, republish, or post, requires prior  
1503 specific permission and\hspace\*{.5pt}/or a fee. Request permissions  
1504 from permissions@acm.org.

1505 \or % licensedusgovmixed  
1506 Publication rights licensed to ACM\@. ACM acknowledges that this  
1507 contribution was authored or co-authored by an employee, contractor  
1508 or affiliate of the United States government. As such, the  
1509 Government retains a nonexclusive, royalty-free right to publish or  
1510 reproduce this article, or to allow others to do so, for Government  
1511 purposes only.

1512 \or % licensedcagov  
1513 This article was authored by employees of the Government of Canada.  
1514 As such, the Canadian government retains all interest in the  
1515 copyright to this work and grants to ACM a nonexclusive,  
1516 royalty-free right to publish or reproduce this article, or to allow

```

1517 others to do so, provided that clear attribution is given both to
1518 the authors and the Canadian government agency employing them.
1519 Permission to make digital or hard copies for personal or classroom
1520 use is granted. Copies must bear this notice and the full citation
1521 on the first page. Copyrights for components of this work owned by
1522 others than the Canadian Government must be honored. To copy
1523 otherwise, distribute, republish, or post, requires prior specific
1524 permission and\hspace*{.5pt}/or a fee. Request permissions from
1525 permissions@acm.org.
1526 \or % licensedcagovmixed
1527 Publication rights licensed to ACM\@. ACM acknowledges that this
1528 contribution was authored or co-authored by an employee, contractor
1529 or affiliate of the national government of Canada. As such, the
1530 Government retains a nonexclusive, royalty-free right to publish or
1531 reproduce this article, or to allow others to do so, for Government
1532 purposes only.
1533 \or % othergov
1534 ACM acknowledges that this contribution was authored or co-authored
1535 by an employee, contractor or affiliate of a national government. As
1536 such, the Government retains a nonexclusive, royalty-free right to
1537 publish or reproduce this article, or to allow others to do so, for
1538 Government purposes only.
1539 \or % licensedothergov
1540 Publication rights licensed to ACM\@. ACM acknowledges that this
1541 contribution was authored or co-authored by an employee, contractor
1542 or affiliate of a national government. As such, the Government
1543 retains a nonexclusive, royalty-free right to publish or reproduce
1544 this article, or to allow others to do so, for Government purposes
1545 only.
1546 \or % iw3c2w3
1547 This paper is published under the Creative Commons Attribution~4.0
1548 International (CC-BY~4.0) license. Authors reserve their rights to
1549 disseminate the work on their personal and corporate Web sites with
1550 the appropriate attribution.
1551 \or % iw3c2w3g
1552 This paper is published under the Creative Commons
1553 Attribution-NonCommercial-NoDerivs~4.0 International
1554 (CC-BY-NC-ND~4.0) license. Authors reserve their rights to
1555 disseminate the work on their personal and corporate Web sites with
1556 the appropriate attribution.
1557 \fi}

\copyrightyear By default, the copyright year is the same as \acmYear, but one can override this:
1558 \def\copyrightyear#1{\def\@copyrightyear{#1}}
1559 \copyrightyear{\@acmYear}

\@teaserfigures The teaser figures container
1560 \def\@teaserfigures{}

teaserfigure The teaser figure

```

```

1561 \newenvironment{teaserfigure}{\Collect@Body@saveteaser}{}
\@saveteaser Saving the teaser
1562 \long\def\@saveteaser#1{\g@addto@macro\@teaserfigures{\@teaser{#1}}}

\thanks We redefine amsart \thanks so the anonymous key works
1563 \renewcommand{\thanks}[1]{%
1564   \ifnotempty{#1}{%
1565     \if@ACM@anonymous
1566       \g@addto@macro\thankses{\thanks{A note}}%
1567     \else
1568       \g@addto@macro\thankses{\thanks{#1}}%
1569     \fi}}

```

### 3.14 Typesetting top matter

`\mktitle@bx` Some of our formats use a two-column design. Some use a one-column design. In all cases we use a wide title. Thus we typeset the top matter in a special box to be used in the construction `\@twocolumn[<box>]`.

```
1570 \newbox\mktitle@bx
```

`\maketitle` The (in)famous `\maketitle`. Note that in sigchi-a mode, authors are *not* in the title box.

Another note: there is a subtle difference between author notes, title notes and thanks. The latter two refer to the paper itself and therefore belong to the copyright/permission block. By the way, this was the default behavior of the old ACM classes.

```

1571 \def\maketitle{%
1572   \if@ACM@anonymous
1573     % Anonymize omission of \author-s
1574     \ifnum\@authorgroups=0\author{}\fi
1575   \fi
1576   \begingroup
1577   \let\@footnotemark\@footnotemark@nolink
1578   \let\@footnotetext\@footnotetext@nolink
1579   \renewcommand\thefootnote{\@fnsymbol\c@footnote}%
1580   \global\@topnum\z@ % this prevents floats from falling
1581                     % at the top of page 1
1582   \global\@botnum\z@ % we do not want them to be on the bottom either
1583   \hsize=\textwidth
1584   \def\@makefnmark{\hbox{\@textsuperscript{\@thefnmark}}}%
1585   \@mktitle\if@ACM@sigchiamode\else\mkauthors\fi\mkteasers
1586   \@printtopmatter
1587   \if@ACM@sigchiamode\mkauthors\fi
1588   \setcounter{footnote}{0}%
1589   \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}%
1590   \@titlenotes
1591   \@subtitlenotes
1592   \@authornotes

```

```

1593 \let\@makefnmark\relax
1594 \let\@thefnmark\relax
1595 \let\@makefnmark\relax
1596 \ifx\@empty\thankses\else
1597   \footnotetextauthorsaddresses{%
1598     \def\par{\let\par\@par}\parindent\z@\@setthanks}%
1599 \fi
1600 \ifx\@empty\@authorsaddresses\else
1601   \if@ACM@anonymous\else
1602     \if@ACM@journal
1603       \footnotetextauthorsaddresses{%
1604         \def\par{\let\par\@par}\parindent\z@\@setauthorsaddresses}%
1605     \fi
1606   \fi
1607 \fi
1608 \if@ACM@nonacm\else\footnotetextcopyrightpermission{%
1609   \if@ACM@authordraft
1610     \raisebox{-2ex}{\z@}{\z@}{\makebox[0pt][l]{\large\bfseries
1611       Unpublished working draft. Not for distribution.}}%
1612     \color[gray]{0.9}%
1613   \fi
1614   \parindent\z@\parskip0.1\baselineskip
1615   \if@ACM@authorversion\else
1616     \if@printpermission\@copyrightpermission\par\fi
1617   \fi
1618   \if@ACM@manuscript\else
1619     \if@ACM@journal\else % Print the conference information
1620       {\itshape \acmConference@shortname, \acmConference@date, \acmConference@venue}\par
1621     \fi
1622   \fi
1623   \if@printcopyright
1624     \copyright\ \@copyrightyear\ \@copyrightowner\
1625   \else
1626     \@copyrightyear.\
1627   \fi
1628   \if@ACM@manuscript
1629     Manuscript submitted to ACM\
1630   \else
1631     \if@ACM@authorversion
1632       This is the author's version of the work. It is posted here for
1633       your personal use. Not for redistribution. The definitive Version
1634       of Record was published in
1635       \if@ACM@journal
1636         \emph{\@journalName}%
1637       \else
1638         \emph{\@acmBooktitle}%
1639       \fi
1640       \ifx\@acmDOI\@empty
1641         .
1642       \else

```

```

1643         , \@formatdoi{\@acmDOI}.
1644     \fi\\
1645     \else
1646         \if@ACM@nonacm\else
1647             \if@ACM@journal
1648                 \@permissionCodeOne/\@acmYear/\@acmMonth-ART\@acmArticle
1649                 \ifx\@acmPrice\@empty\else\ $\@acmPrice\fi\\
1650                 \@formatdoi{\@acmDOI}%
1651             \else % Conference
1652                 \ifx\@acmISBN\@empty\else ACM~ISBN~\@acmISBN
1653                 \ifx\@acmPrice\@empty.\else\dots\$\@acmPrice\fi\\fi
1654                 \ifx\@acmDOI\@empty\else\@formatdoi{\@acmDOI}\fi%
1655             \fi
1656         \fi
1657     \fi
1658 \fi}
1659 \fi
1660 \endgroup
1661 \setcounter{footnote}{0}%
1662 \@mkabstract
1663 \if@ACM@printccs
1664     \ifx\@concepts\@empty\else\bgroup
1665         {\@specialsection{CCS Concepts}%
1666         \@concepts\par}\egroup
1667     \fi
1668 \fi
1669 \ifx\@keywords\@empty\else\bgroup
1670     {\if@ACM@journal
1671         \@specialsection{Additional Key Words and Phrases}%
1672     \else
1673         \@specialsection{Keywords}%
1674     \fi
1675     \@keywords}\par\egroup
1676 \fi
1677 \andify\authors
1678 \andify\shortauthors
1679 \global\let\authors=\authors
1680 \global\let\shortauthors=\shortauthors
1681 \if@ACM@printacmref
1682     \@mkbibcitation
1683 \fi
1684 \hypersetup{%
1685     pdfauthor={\authors},
1686     pdftitle={\@title},
1687     pdfsubject={\@concepts},
1688     pdfkeywords={\@keywords},
1689     pdfcreator={LaTeX with acmart
1690         \csname ver@acmart.cls\endcsname\space
1691         and hyperref
1692         \csname ver@hyperref.sty\endcsname}}}%

```

```

1693 \@printendtopmatter
1694 \@afterindentfalse
1695 \@afterheading
1696 }

```

`\@specialsection` This macro starts sections for proceedings and uses `\small` for journals

```

1697 \def\@specialsection#1{%
1698   \ifcase\ACM@format@nr
1699   \relax % manuscript
1700   \par\medskip\small\noindent#1: %
1701   \or % acmsmall
1702   \par\medskip\small\noindent#1: %
1703   \or % acmlarge
1704   \par\medskip\small\noindent#1: %
1705   \or % acmtog
1706   \par\medskip\small\noindent#1: %
1707   \or % sigconf
1708   \section*{#1}%
1709   \or % siggraph
1710   \section*{#1}%
1711   \or % sigplan
1712   \paragraph*{#1}%
1713   \or % sigchi
1714   \section*{#1}%
1715   \or % sigchi-a
1716   \section*{#1}%
1717   \fi}

```

`\@printtopmatter` The printing of top matter starts a new page and uses the given title box. Note that for `sigchi-a` we print badges here rather than in `\mktitle` since we want them in the margins.

```

1718 \def\@printtopmatter{%
1719   \ifx\@startPage\@empty
1720     \gdef\@startPage{1}%
1721   \else
1722     \setcounter{page}{\@startPage}%
1723   \fi
1724   \thispagestyle{firstpagestyle}%
1725   \noindent
1726   \ifcase\ACM@format@nr
1727   \relax % manuscript
1728   \box\mktitle@bx\par
1729   \or % acmsmall
1730   \box\mktitle@bx\par
1731   \or % acmlarge
1732   \box\mktitle@bx\par
1733   \or % acmtog
1734   \twocolumn[\box\mktitle@bx]%
1735   \or % sigconf

```



```

1736 \twocolumn[\box\mktitle@bx]%
1737 \or % siggraph
1738 \twocolumn[\box\mktitle@bx]%
1739 \or % sigplan
1740 \twocolumn[\box\mktitle@bx]%
1741 \or % sigchi
1742 \twocolumn[\box\mktitle@bx]%
1743 \or % sigchi-a
1744 \par\box\mktitle@bx\par\bigskip
1745 \if@ACM@badge
1746 \marginpar{\noindent
1747 \ifx\@acmBadgeL@image\@empty\else
1748 \href{\@acmBadgeL@url}{%
1749 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}%
1750 \hskip\@ACM@badge@skip
1751 \fi
1752 \ifx\@acmBadgeR@image\@empty\else
1753 \href{\@acmBadgeR@url}{%
1754 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}%
1755 \fi}%
1756 \fi
1757 \fi
1758 }

```

\@mktitle The title of the article

```

1759 \def\@mktitle{%
1760 \ifcase\ACM@format@nr
1761 \relax % manuscript
1762 \@mktitle@i
1763 \or % acmsmall
1764 \@mktitle@i
1765 \or % acmlarge
1766 \@mktitle@i
1767 \or % acmtog
1768 \@mktitle@i
1769 \or % sigconf
1770 \@mktitle@iii
1771 \or % siggraph
1772 \@mktitle@iii
1773 \or % sigplan
1774 \@mktitle@iii
1775 \or % sigchi
1776 \@mktitle@iii
1777 \or % sigchi-a
1778 \@mktitle@iv
1779 \fi
1780 }

```

\@titlefont The font to typeset the title

```

1781 \def\@titlefont{%
1782   \ifcase\ACM@format@nr
1783   \relax % manuscript
1784   \LARGE\sffamily\bfseries
1785   \or % acmsmall
1786   \LARGE\sffamily\bfseries
1787   \or % acmlarge
1788   \LARGE\sffamily\bfseries
1789   \or % acmtog
1790   \Huge\sffamily
1791   \or % sigconf
1792   \Huge\sffamily\bfseries
1793   \or % siggraph
1794   \Huge\sffamily\bfseries
1795   \or % sigplan
1796   \Huge\bfseries
1797   \or % sigchi
1798   \Huge\sffamily\bfseries
1799   \or % sigchi-a
1800   \Huge\bfseries
1801   \fi}

```

\@subtitlefont The font to typeset the subtitle

```

1802 \def\@subtitlefont{\normalsize
1803   \ifcase\ACM@format@nr
1804   \relax % manuscript
1805   \mdseries
1806   \or % acmsmall
1807   \mdseries
1808   \or % acmlarge
1809   \mdseries
1810   \or % acmtog
1811   \LARGE
1812   \or % sigconf
1813   \LARGE\mdseries
1814   \or % siggraph
1815   \LARGE\mdseries
1816   \or % sigplan
1817   \LARGE\mdseries
1818   \or % sigchi
1819   \LARGE\mdseries
1820   \or % sigchi-a
1821   \mdseries
1822   \fi}

```

\@mktitle@i The version of \mktitle for most journals

```

1823 \def\@mktitle@i{\hsize=\textwidth
1824   \ACM@title@width=\hsize
1825   \ifx\@acmBadgeL@image\@empty\else
1826     \advance\@ACM@title@width by -\@ACM@badge@width

```

```

1827 \advance\@ACM@title@width by -\@ACM@badge@skip
1828 \fi
1829 \ifx\@acmBadgeR@image\@empty\else
1830 \advance\@ACM@title@width by -\@ACM@badge@width
1831 \advance\@ACM@title@width by -\@ACM@badge@skip
1832 \fi
1833 \setbox\mktitle@bx=\vbox{\noindent\@titlefont
1834 \ifx\@acmBadgeL@image\@empty\else
1835 \raisebox{-0.5\baselineskip}{\z@\z@}{\href{\@acmBadgeL@url}{%
1836 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
1837 \hskip\@ACM@badge@skip
1838 \fi
1839 \parbox[t]{\@ACM@title@width}{\raggedright
1840 \@titlefont\noindent
1841 \@title
1842 \ifx\@subtitle\@empty\else
1843 \par\noindent{\@subtitlefont\@subtitle}
1844 \fi}%
1845 \ifx\@acmBadgeR@image\@empty\else
1846 \hskip\@ACM@badge@skip
1847 \raisebox{-0.5\baselineskip}{\z@\z@}{\href{\@acmBadgeR@url}{%
1848 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
1849 \fi
1850 \par\bigskip}}%

```

\mktitle@ii The version of \mktitle for TOG. Since v1.06, this is subsumed by the \mktitle@i macro

\mktitle@iii The version of \mktitle for SIG proceedings. Note that since the title is centered, we leave space for the left badge even if only the right badge is defined.

```

1851 \def\mktitle@iii{\hsize=\textwidth
1852 \setbox\mktitle@bx=\vbox{\@titlefont\centering
1853 \@ACM@title@width=\hsize
1854 \if@ACM@badge
1855 \advance\@ACM@title@width by -2\@ACM@badge@width
1856 \advance\@ACM@title@width by -2\@ACM@badge@skip
1857 \parbox[b]{\@ACM@badge@width}{\strut
1858 \ifx\@acmBadgeL@image\@empty\else
1859 \raisebox{-0.5\baselineskip}{\z@\z@}{\href{\@acmBadgeL@url}{%
1860 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
1861 \fi}%
1862 \hskip\@ACM@badge@skip
1863 \fi
1864 \parbox[t]{\@ACM@title@width}{\centering\@titlefont
1865 \@title
1866 \ifx\@subtitle\@empty\else
1867 \par\noindent{\@subtitlefont\@subtitle}
1868 \fi
1869 }%
1870 \if@ACM@badge

```

```

1871      \hskip\@ACM@badge@skip
1872      \parbox[b]{\@ACM@badge@width}{\strut
1873        \ifx\@acmBadgeR@image\@empty\else
1874          \raisebox{-.5\baselineskip}{\z@\z@{\href{\@acmBadgeR@url}}{
1875            \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}
1876        \fi}%
1877      \fi
1878      \par\bigskip}}%

\@mktitle@iv The version of \@mktitle for sigchi-a
1879 \def\@mktitle@iv{\hsize=\textwidth
1880   \setbox\mktitle@bx=\vbox{\raggedright\leftskip5pc\@titlefont
1881     \noindent\leavevmode\leaders\hrule height 2pt\hfill\kern0pt\par
1882     \noindent\@title
1883     \ifx\@subtitle\@empty\else
1884       \par\noindent\@subtitlefont\@subtitle
1885     \fi
1886     \par\bigskip}}%

\@ACM@addtoaddress This macro adds an item to the address using the following rules:

1. If we start a paragraph, add the item
2. Otherwise, add a comma and the item
3. However, the comma is deleted if it is at the end of a line. We use the magic
   \cleaders trick for this.

1887 \newbox\@ACM@commabox
1888 \def\@ACM@addtoaddress#1{%
1889   \ifvmode\else
1890     \if@ACM@affiliation@obeypunctuation\else
1891       \setbox\@ACM@commabox=\hbox{, }%
1892       \unskip\cleaders\copy\@ACM@commabox\hskip\wd\@ACM@commabox
1893     \fi\fi
1894     #1}

\institution Theoretically we can define the macros for \affiliation inside the \@mkauthors-style
\position commands. However, this would lead to a strange error if an author uses them outside
\department \affiliation. Of course we can make them produce an error message, but...
\streetaddress 1895 \def\streetaddress#1{\unskip\ignorespaces}
\city 1896 \def\postcode#1{\unskip\ignorespaces}
\state 1897 \if@ACM@journal
\postcode 1898 \def\position#1{\unskip\ignorespaces}
\country 1899 \def\institution#1{\unskip~#1\ignorespaces}
1900 \def\city#1{\unskip\ignorespaces}
1901 \def\state#1{\unskip\ignorespaces}
1902 \newcommand\department[2][0]{\unskip\ignorespaces}
1903 \def\country#1{\if@ACM@affiliation@obeypunctuation\else, \fi#1\ignorespaces}
1904 \else

```

```

1905 \def\position#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}%
1906 \def\institution#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}%
1907 \newcommand\department[2][0]{\if@ACM@affiliation@obexpunctuation
1908   #2\else#2\par\fi}%
1909 % \def\streetaddress#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}%
1910 \let\city\@ACM@addtoaddress
1911 \let\state\@ACM@addtoaddress
1912 % \def\postcode#1{\if@ACM@affiliation@obexpunctuation#1\else\unskip\space#1\fi}%
1913 \let\country\@ACM@addtoaddress
1914 \fi

\@mkauthors Typesetting the authors
1915 \def\@mkauthors{\begingroup
1916   \hsize=\textwidth
1917   \ifcase\ACM@format@nr
1918     \relax % manuscript
1919     \@mkauthors@i
1920   \or % acmsmall
1921     \@mkauthors@i
1922   \or % acmlarge
1923     \@mkauthors@i
1924   \or % acmtog
1925     \@mkauthors@i
1926   \or % sigconf
1927     \@mkauthors@iii
1928   \or % siggraph
1929     \@mkauthors@iii
1930   \or % sigplan
1931     \@mkauthors@iii
1932   \or % sigchi
1933     \@mkauthors@iii
1934   \or % sigchi-a
1935     \@mkauthors@iv
1936   \fi
1937 \endgroup
1938 }

\@authorfont Somehow different conferences use different fonts for author names. Why?
1939 \def\@authorfont{\Large\sffamily}

\@affiliationfont Font for affiliations
1940 \def\@affiliationfont{\normalsize\normalfont}

Adjusting fonts for different formats
1941 \ifcase\ACM@format@nr
1942 \relax % manuscript
1943 \or % acmsmall
1944   \def\@authorfont{\Large\sffamily}
1945   \def\@affiliationfont{\small\normalfont}

```

```

1946 \or % acmlarge
1947 \or % acmtog
1948 \def\@authorfont{\LARGE\sffamily}
1949 \def\@affiliationfont{\large}
1950 \or % sigconf
1951 \def\@authorfont{\LARGE}
1952 \def\@affiliationfont{\large}
1953 \or % siggraph
1954 \def\@authorfont{\normalsize\normalfont}
1955 \def\@affiliationfont{\normalsize\normalfont}
1956 \or % sigplan
1957 \def\@authorfont{\Large\normalfont}
1958 \def\@affiliationfont{\normalsize\normalfont}
1959 \or % sigchi
1960 \def\@authorfont{\bfseries}
1961 \def\@affiliationfont{\mdseries}
1962 \or % sigchi-a
1963 \def\@authorfont{\bfseries}
1964 \def\@affiliationfont{\mdseries}
1965 \fi

```

\@typeset@author@line At this point we have \@currentauthors and \@currentaffiliations. We typeset them in the journal style

```

1966 \def\@typeset@author@line{%
1967 \andify\@currentauthors\par\noindent
1968 \@currentauthors\def\@currentauthors{}%
1969 \ifx\@currentaffiliations\@empty\else
1970 \andify\@currentaffiliations
1971 \unskip, {\@currentaffiliations}\par
1972 \fi
1973 \def\@currentaffiliations{}}

```

\@mkauthors@i This version is used in most journal formats. Note that \and between authors with the same affiliation becomes \_and\_:

```

1974 \def\@mkauthors@i{%
1975 \def\@currentauthors{}%
1976 \def\@currentaffiliations{}%
1977 \global\let\and\@typeset@author@line
1978 \def\@author##1{%
1979 \ifx\@currentauthors\@empty
1980 \gdef\@currentauthors{\@authorfont\MakeTextUppercase{##1}}%
1981 \else
1982 \g@addto@macro{\@currentauthors}{\and\MakeTextUppercase{##1}}%
1983 \fi
1984 \gdef\and{}}%
1985 \def\email##1##2{%
1986 \def\affiliation##1##2{%
1987 \def\@tempa{##2}\ifx\@tempa\@empty\else
1988 \ifx\@currentaffiliations\@empty

```

```

1989 \gdef\@currentaffiliations{%
1990 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
1991 \setkeys{@ACM@affiliation@}{##1}%
1992 \@affiliationfont##2}%
1993 \else
1994 \g@addto@macro{\@currentaffiliations}{\and
1995 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
1996 \setkeys{@ACM@affiliation@}{##1}##2}%
1997 \fi
1998 \fi
1999 \global\let\and\@typeset@author@line%
2000 \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par\medskip
2001 \noindent\addresses\@typeset@author@line
2002 \par\medskip}%
2003 }

```

`\mkauthors@ii` The `\mkauthors@ii` command was the version used in `acmtog`. It is no longer necessary.

`\author@bx` The box to put an individual author in  
2004 `\newbox\author@bx`

`\author@bx@wd` The width of the author box  
2005 `\newdimen\author@bx@wd`

`\author@bx@sep` The separation between author boxes  
2006 `\newskip\author@bx@sep`  
2007 `\author@bx@sep=1pc\relax`

`\@typeset@author@bx` Typesetting the box with authors. Note that in `sigchi-a` the box is not centered.

```

2008 \def\@typeset@author@bx{\bgroup\hsize=\author@bx@wd\def\and{\par}%
2009 \global\setbox\author@bx=\vtop{\if@ACM@sigchiamode\else\centering\fi
2010 \@authorfont\@currentauthors\par\@affiliationfont
2011 \@currentaffiliation}\egroup
2012 \box\author@bx\hspace{\author@bx@sep}%
2013 \gdef\@currentauthors{}}%
2014 \gdef\@currentaffiliation{}}

```

`\mkauthors@iii` The `sigconf` version. Here we use a centered design with each author in a separate box.  
2015 `\def\mkauthors@iii{%`

First, we need to determine the design of the author strip. The boxes are separated by `\author@bx@sep` plus two `\author@bx@sep` margins. This means that each box must be of width  $(\text{textwidth} - \text{author@bx@sep})/N - \text{author@bx@sep}$ , where  $N$  is the number of boxes per row.

```

2016 \author@bx@wd=\textwidth\relax
2017 \advance\author@bx@wd by -\author@bx@sep\relax
2018 \ifnum\@ACM@authorsperrrow>0\relax
2019 \divide\author@bx@wd by \@ACM@authorsperrrow\relax

```

```

2020 \else
2021   \ifcase\num@authorgroups
2022   \relax % 0?
2023   \or % 1=one author per row
2024   \or % 2=two authors per row
2025     \divide\author@bx@wd by \num@authorgroups\relax
2026   \or % 3=three authors per row
2027     \divide\author@bx@wd by \num@authorgroups\relax
2028   \or % 4=two authors per row (!)
2029     \divide\author@bx@wd by 2\relax
2030   \else % three authors per row
2031     \divide\author@bx@wd by 3\relax
2032   \fi
2033 \fi
2034 \advance\author@bx@wd by -\author@bx@sep\relax
Now, parsing of \addresses:
2035 \gdef\@currentauthors{}%
2036 \gdef\@currentaffiliation{}%
2037 \def\@author##1{\ifx\@currentauthors\@empty
2038   \gdef\@currentauthors{\par##1}%
2039 \else
2040   \g@addto@macro\@currentauthors{\par##1}%
2041 \fi
2042 \gdef\and{}}%
2043 \def\email##1##2{\ifx\@currentaffiliation\@empty
2044   \gdef\@currentaffiliation{\nolinkurl{##2}}%
2045 \else
2046   \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
2047 \fi}%
2048 \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
2049   \gdef\@currentaffiliation{%
2050     \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2051     \setkeys{@ACM@affiliation@}{##1}##2}%
2052 \else
2053   \g@addto@macro\@currentaffiliation{\par
2054     \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2055     \setkeys{@ACM@affiliation@}{##1}##2}%
2056 \fi
2057 \global\let\and\@typeset@author@bx
2058 }%

```

Actual typesetting is done by the \and macro:

```

2059 \hspace=\textwidth
2060 \global\setbox\mktitle@bx=\vbox{\noindent
2061   \box\mktitle@bx\par\medskip\leavevmode
2062   \lineskip=1pc\relax\centering\hspace*{-1em}%
2063   \addresses\let\and\@typeset@author@bx\and\par\bigskip}}

```

\@mkauthors@iv The sigchi-a version. We put authors in the main text with no more than 2 authors per line, unless overridden.



```
2064 \def\mkauthors@iv{%
```

First, we need to determine the design of the author strip. The boxes are separated by `\author@bx@sep` plus two `\author@bx@sep` margins. This means that each box must be of width  $(\text{textwidth} - \text{author@bx@sep})/N - \text{author@bx@sep}$ , where  $N$  is the number of boxes per row.

```
2065 \author@bx@wd=\columnwidth\relax
2066 \advance\author@bx@wd by -\author@bx@sep\relax
2067 \ifnum\@ACM@authorsprow>0\relax
2068 \divide\author@bx@wd by \@ACM@authorsprow\relax
2069 \else
2070 \ifcase\num@authorgroups
2071 \relax % 0?
2072 \or % 1=one author per row
2073 \else % 2=two authors per row
2074 \divide\author@bx@wd by 2\relax
2075 \fi
2076 \fi
2077 \advance\author@bx@wd by -\author@bx@sep\relax
```

Now, parsing of `\addresses`:

```
2078 \gdef\@currentauthors{}%
2079 \gdef\@currentaffiliation{}%
2080 \def\@author##1{\ifx\@currentauthors\empty
2081 \gdef\@currentauthors{\par##1}%
2082 \else
2083 \g@addto@macro\@currentauthors{\par##1}%
2084 \fi
2085 \gdef\and{}}%
2086 \def\email##1##2{\ifx\@currentaffiliation\empty
2087 \gdef\@currentaffiliation{\nolinkurl{##2}}%
2088 \else
2089 \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
2090 \fi}%
2091 \def\affiliation##1##2{\ifx\@currentaffiliation\empty
2092 \gdef\@currentaffiliation{%
2093 \setkeys{@ACM@affiliation@}{obexpunctuation=false}%
2094 \setkeys{@ACM@affiliation@}{##1}##2}%
2095 \else
2096 \g@addto@macro\@currentaffiliation{\par
2097 \setkeys{@ACM@affiliation@}{obexpunctuation=false}%
2098 \setkeys{@ACM@affiliation@}{##1}##2}%
2099 \fi
2100 \global\let\and\@typeset@author@bx}%
2101 %
```

Actual typesetting is done by the `\and` macro

```
2102 \bgroup\hsize=\columnwidth
2103 \par\raggedright\leftskip=\z@
2104 \lineskip=1pc\noindent
2105 \addresses\let\and\@typeset@author@bx\and\par\bigskip\egroup}
```

`\mkauthorsaddresses` Typesetting authors' addresses in the footnote style

```

2106 \def\mkauthorsaddresses{%
2107   \ifnum\num@authors>1\relax
2108   Authors' \else Author's \fi
2109   \ifnum\num@authorgroups>1\relax
2110   addresses: \else address: \fi
2111   \bgroup
2112   \def\streetaddress##1{\unskip\@addpunct, ##1}%
2113   \def\postcode##1{\unskip\@addpunct, ##1}%
2114   \def\position##1{\unskip\ignorespaces}%
2115   \def\institution##1{\unskip\@addpunct, ##1}%
2116   \def\city##1{\unskip\@addpunct, ##1}%
2117   \def\state##1{\unskip\@addpunct, ##1}%
2118   \renewcommand\department[2][0]{\unskip\@addpunct, ##2}%
2119   \def\country##1{\unskip\@addpunct, ##1}%
2120   \def\and{\unskip\@addpunct; }%
2121   \def\author##1{##1}%
2122   \def\email##1##2{\unskip\@addpunct, \nolinkurl{##2}}%
2123   \addresses
2124   \egroup}

```

`\setaddresses` This is an amsart macro that we do not need.

```

2125 \def\setaddresses{}

```

`\authornotemark` Adding a footnote mark to authors. This version adds a “normal” footnote mark.

```

2126 \def\authornotemark{\g@addto@macro\currentauthors{\footnotemark\relax}}

```

`\@authornotemark` Adding a footnote mark to authors with a given number

```

2127 \def\@authornotemark#1{\g@addto@macro\currentauthors{\footnotemark[#1]}}

```

`\mkteasers` Typesetting the teasers

```

2128 \def\mkteasers{%
2129   \ifx\@teaserfigures\@empty\else
2130     \def\@teaser##1{\par\bigskip\bgroup
2131       \captionsetup{type=figure}##1\egroup\par}
2132     \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par
2133       \noindent\@teaserfigures\par\medskip}%
2134     \fi}

```

`\mkabstract` Typesetting the abstract

```

2135 \def\mkabstract{\bgroup
2136   \ifx\@abstract\@empty\else
2137     {\phantomsection\addcontentsline{toc}{section}{Abstract}%
2138     \if@ACM@journal
2139       \everypar{\setbox\z@=\lastbox\everypar{}}\small
2140     \else
2141       \section*{Abstract}%
2142     \fi
2143     \ignorespaces\@abstract\par}%
2144   \fi\egroup}

```

`\mkbibcitation` Print the bibcitation format

```
2145 \def\mkbibcitation{\bgroup
2146 \def\@pages@word{\ifnum\getrefnumber{TotPages}=1\relax page\else pages\fi}%
2147 \def\footnotemark{}}%
2148 \def\{\unskip}, \ignorespaces}%
2149 \def\footnote{\ClassError{\@classname}{Please do not use footnotes
2150     inside a \string\title{} or \string\author{} command! Use
2151     \string\titlenote{} or \string\authornote{} instead!}}%
2152 \def\@article@string{\ifx\@acmArticle\@empty{\ } \else,
2153     Article~\@acmArticle\ }fi}%
2154 \par\medskip\small\noindent{\bfseries ACM Reference Format:}\par\nobreak
2155 \noindent\authors. \@acmYear. \@title
2156 \ifx\@subtitle\@empty. \else: \@subtitle. \fi
2157 \if@ACM@nonacm\else
2158     % The 'nonacm' option disables 'printacmref' by default,
2159     % and the present \mkbibcitation definition is never used
2160     % in this case. The conditional remains useful if the user
2161     % explicitly sets \settopmatter{printacmref=true}.
2162     \if@ACM@journal
2163         \textit{\@journalNameShort}
2164         \@acmVolume, \@acmNumber \@article@string (\@acmPubDate),
2165         \ref{TotPages}~\@pages@word.
2166     \else
2167         In \textit{\@acmBooktitle}%
2168         \ifx\@acmEditors\@empty\textit{.}\else
2169             \andify\@acmEditors\textit{, }\@acmEditors~\@editorsAbbrev.%
2170         \fi\
2171         ACM, New York, NY, USA%
2172         \@article@string\unskip, \ref{TotPages}~\@pages@word.
2173     \fi
2174 \fi
2175 \ifx\@acmDOI\@empty\else\@formatdoi{\@acmDOI}\fi
2176 \par\egroup}
```

`\@printendtopmatter` End the top matter

```
2177 \def\@printendtopmatter{\par\bigskip}
```

`\@setthanks` We redefine `\setthanks` using `\long`

```
2178 \def\@setthanks{\long\def\thanks##1{\par##1\@addpunct.}\thankses}
```

`\@setauthorsaddresses`

```
2179 \def\@setauthorsaddresses{\@authorsaddresses\unskip\@addpunct.}
```

### 3.15 Headers and Footers

We use `fancyhdr` for our headers and footers:

```
2180 \RequirePackage{fancyhdr}
```

`\ACM@linecount@bx` This is the box displayed in review mode

```
2181 \if@ACM@review
2182   \newsavebox{\ACM@linecount@bx}
2183   \newlength\ACM@linecount@bxht
2184   \newcount\ACM@linecount
2185   \ACM@linecount\@ne\relax
2186   \def\ACM@mk@linecount{%
2187     \savebox{\ACM@linecount@bx}[4em][t]{\parbox[t]{4em}{%
2188       \setlength{\ACM@linecount@bxht}{0pt}%
2189       \loop{\color{red}\scriptsize\the\ACM@linecount}\
2190       \global\advance\ACM@linecount by \@ne
2191       \addtolength{\ACM@linecount@bxht}{\baselineskip}%
2192       \ifdim\ACM@linecount@bxht<\textheight\repeat
2193       {\color{red}\scriptsize\the\ACM@linecount}\hfill
2194       \global\advance\ACM@linecount by \@ne}}
2195 \fi
```

`\ACM@linecountL` How to display the box on the left

```
2196 \def\ACM@linecountL{%
2197   \if@ACM@review
2198     \ACM@mk@linecount
2199     \begin{picture}(0,0)%
2200       \put(-26,-22){\usebox{\ACM@linecount@bx}}%
2201     \end{picture}%
2202   \fi}
```

`\ACM@linecountR` How to display the box on the right

```
2203 \def\ACM@linecountR{%
2204   \if@ACM@review
2205     \ACM@mk@linecount
2206     \begin{picture}(0,0)%
2207       \put(20,-22){\usebox{\ACM@linecount@bx}}%
2208     \end{picture}%
2209   \fi}
```

`\ACM@timestamp` The timestamp system

```
2210 \if@ACM@timestamp
2211   % Subtracting 30 from \time gives us the effect of rounding down despite
2212   % \numexpr rounding to nearest
2213   \newcounter{ACM@time@hours}
2214   \setcounter{ACM@time@hours}{\numexpr (\time - 30) / 60 \relax}
2215   \newcounter{ACM@time@minutes}
2216   \setcounter{ACM@time@minutes}{\numexpr \time - \theACM@time@hours * 60 \relax}
2217   \newcommand\ACM@timestamp{%
2218     \footnotesize%
2219     \ifx\@acmSubmissionID\@empty\relax\else
2220       Submission ID: \@acmSubmissionID.{ }%
2221     \fi
2222     \the\year-\two@digits{\the\month}-\two@digits{\the\day}{ }%
```

```

2223     \two@digits{\theACM@time@hours}:\two@digits{\theACM@time@minutes}{. }%
2224     Page \thepage\ of \startPage--\pageref*{TotPages}.%
2225 }
2226 \fi

\@shortauthors Even if the author redefined \@shortauthors, we do not print it in the headers when in
anonymous mode:
2227 \def\@shortauthors{%
2228     \if@ACM@anonymous
2229         Anon.
2230         \ifx\@acmSubmissionID\empty\else Submission Id: \@acmSubmissionID\fi
2231     \else\shortauthors\fi}

\@headfootfont The font to typeset header and footer text.
2232 \def\@headfootfont{\sffamily}

standardpagestyle The page style for all pages but the first one The page style for all pages but the first one
2233 \fancypagestyle{standardpagestyle}{%
2234     \fancyhf{}%
2235     \renewcommand{\headrulewidth}{\z@}%
2236     \renewcommand{\footrulewidth}{\z@}%
2237     \def\@acmArticlePage{%
2238         \ifx\@acmArticle\empty%
2239             \if@ACM@printfolios\thepage\fi%
2240         \else%
2241             \@acmArticle\if@ACM@printfolios:\thepage\fi%
2242         \fi%
2243     }
2244     \ifcase\ACM@format@nr
2245     \relax % manuscript
2246     \fancyhead[LE]{\ACM@linecountL\if@ACM@printfolios\thepage\fi}%
2247     \fancyhead[RO]{\if@ACM@printfolios\thepage\fi}%
2248     \fancyhead[RE]{\@shortauthors}%
2249     \fancyhead[LO]{\ACM@linecountL\shorttitle}%
2250     \if@ACM@nonacm\else%
2251         \fancyfoot[RO,LE]{\footnotesize Manuscript submitted to ACM}
2252     \fi%
2253     \or % acmsmall
2254     \fancyhead[LE]{\ACM@linecountL\@headfootfont\@acmArticlePage}%
2255     \fancyhead[RO]{\@headfootfont\@acmArticlePage}%
2256     \fancyhead[RE]{\@headfootfont\@shortauthors}%
2257     \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2258     \if@ACM@nonacm\else%
2259         \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2260             \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2261     \fi%
2262     \or % acmlarge
2263     \fancyhead[LE]{\ACM@linecountL\@headfootfont
2264         \@acmArticlePage\quad\textbullet\quad\@shortauthors}%

```

```

2265 \fancyhead[LO]{\ACM@linecountL}%
2266 \fancyhead[RO]{\@headfootfont
2267 \shorttitle\quad\textbullet\quad\@acmArticlePage}%
2268 \if@ACM@nonacm\else%
2269 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2270 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2271 \fi%
2272 \or % acmtog
2273 \fancyhead[LE]{\ACM@linecountL\@headfootfont
2274 \@acmArticlePage\quad\textbullet\quad\@shortauthors}%
2275 \fancyhead[LO]{\ACM@linecountL}%
2276 \fancyhead[RE]{\ACM@linecountR}%
2277 \fancyhead[RO]{\@headfootfont
2278 \shorttitle\quad\textbullet\quad\@acmArticlePage\ACM@linecountR}%
2279 \if@ACM@nonacm\else%
2280 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2281 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2282 \fi%
2283 \else % Proceedings
2284 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2285 \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2286 \fancyhead[RE]{\@headfootfont\@shortauthors\ACM@linecountR}%
2287 \if@ACM@nonacm\else%
2288 \fancyhead[LE]{\ACM@linecountL\@headfootfont\acmConference@shortname,
2289 \acmConference@date, \acmConference@venue}%
2290 \fancyhead[RO]{\@headfootfont\acmConference@shortname,
2291 \acmConference@date, \acmConference@venue\ACM@linecountR}%
2292 \fi%
2293 \fi
2294 \if@ACM@sigchiamode
2295 \fancyheadoffset[L]{\dimexpr(\marginparsep+\marginparwidth)}%
2296 \fi
2297 \if@ACM@timestamp
2298 \fancyfoot[LO,RE]{\ACM@timestamp}
2299 \fi
2300 }
2301 \pagestyle{standardpagestyle}

\@folio@wd Folio blob width, height, offsets and max number
\@folio@ht
\@folio@voffset
\@folio@max
2302 \newdimen\@folio@wd
2303 \@folio@wd=\z@
2304 \newdimen\@folio@ht
2305 \@folio@ht=\z@
2306 \newdimen\@folio@voffset
2307 \@folio@voffset=\z@
2308 \def\@folio@max{1}
2309 \ifcase\ACM@format@nr
2310 \relax % manuscript
2311 \or % acmsmall
2312 \@folio@wd=45.75pt\relax

```

```

2313 \@folio@ht=1.25in\relax
2314 \@folio@voffset=.2in\relax
2315 \def\@folio@max{8}
2316 \or % acmlarge
2317 \@folio@wd=43.25pt\relax
2318 \@folio@ht=79pt\relax
2319 \@folio@voffset=.55in\relax
2320 \def\@folio@max{10}
2321 \fi

```

`\@folioblob` The macro to typeset the folio blob.

```

2322 \def\@folioblob{\@tempcnta=0\@acmArticleSeq\relax
2323 \ifnum\@tempcnta=0\relax\else
First, we calculate \@acmArticleSeq modulo \@folio@max
2324 \loop
2325 \ifnum\@tempcnta>\@folio@max\relax
2326 \advance\@tempcnta by - \@folio@max
2327 \repeat
2328 \advance\@tempcnta by -1\relax
2329 \@tempdima=\@folio@ht\relax
2330 \multiply\@tempdima by \the\@tempcnta\relax
2331 \advance\@tempdima by -\@folio@voffset\relax
2332 \begin{picture}(0,0)
2333 \makebox[\z@]{\raisebox{-\@tempdima}{%
2334 \rlap{%
2335 \raisebox{-0.45\@folio@ht}{\z@}\z@}{%
2336 \rule{\@folio@wd}{\@folio@ht}}}%
2337 \parbox{\@folio@wd}{%
2338 \centering
2339 \textcolor{white}{\LARGE\sffamily\bfseries\@acmArticle}}}}
2340 \end{picture}\fi}
2341

```

`firstpagestyle` The page style for the first page only.

```

2342 \fancypagestyle{firstpagestyle}{%
2343 \fancyhf{}%
2344 \renewcommand{\headrulewidth}{\z@}%
2345 \renewcommand{\footrulewidth}{\z@}%
2346 \ifcase\ACM@format@nr
2347 \relax % manuscript
2348 \fancyhead[L]{\ACM@linecountL}%
2349 \fancyfoot[R0,LE]{\if@ACM@printfolios\small\thepage\fi}%
2350 \if@ACM@nonacm\else%
2351 \fancyfoot[RE,LO]{\footnotesize Manuscript submitted to ACM}%
2352 \fi%
2353 \or % acmsmall
2354 \if@ACM@nonacm\else%
2355 \fancyfoot[R0,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2356 \@acmNumber, Article \@acmArticle. Publication date:

```

```

2357     \@acmPubDate.}%
2358     \fi%
2359     \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2360     \fancyhead[LO]{\ACM@linecountL}%
2361     \fancyhead[RO]{\@folioblob}%
2362     \fancyheadoffset[RO,LE]{0.6\@folio@wd}%
2363 \or % acmlarge
2364     \if@ACM@nonacm\else%
2365     \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2366     \@acmNumber, Article \@acmArticle. Publication date:
2367     \@acmPubDate.}%
2368     \fi%
2369     \fancyhead[RO]{\@folioblob}%
2370     \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2371     \fancyhead[LO]{\ACM@linecountL}%
2372     \fancyheadoffset[RO,LE]{1.4\@folio@wd}%
2373 \or % acmtog
2374     \if@ACM@nonacm\else%
2375     \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2376     \@acmNumber, Article \@acmArticle. Publication date:
2377     \@acmPubDate.}%
2378     \fi%
2379     \fancyhead[L]{\ACM@linecountL}%
2380     \fancyhead[R]{\ACM@linecountR}%
2381 \else % Conference proceedings
2382     \fancyhead[L]{\ACM@linecountL}%
2383     \fancyhead[R]{\ACM@linecountR}%
2384     \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2385 \fi
2386 \if@ACM@timestamp
2387     \ifnum\ACM@format@nr=0\relax % Manuscript
2388     \fancyfoot[LO,RE]{\ACM@timestamp\quad
2389     \if@ACM@nonacm\else
2390     \footnotesize Manuscript submitted to ACM
2391     \fi}
2392 \else
2393     \fancyfoot[LO,RE]{\ACM@timestamp}
2394 \fi
2395 \fi
2396 }

```

\ACM@restore@pagestyle The following code by Ross Moore protects against changes by the totpages package:

```

2397 \let\ACM@ps@plain\ps@plain
2398 \let\ACM@ps@myheadings\ps@myheadings
2399 \let\ACM@ps@headings\ps@headings
2400 \def\ACM@restore@pagestyle{%
2401     \let\ps@plain\ACM@ps@plain
2402     \let\ps@myheadings\ACM@ps@myheadings
2403     \let\ps@headings\ACM@ps@headings}
2404 \AtBeginDocument{\ACM@restore@pagestyle}

```



### 3.16 Sectioning

\ACM@NRadjust Ross Moore's macro.

Initially \ACM@sect@format@ just passes through its #1 argument unchanged. When a sectioning macro such as \section occurs, the \ACM@NRadjust redefines \ACM@sect@format@ to expand into the styling commands; e.g., \@secfont. Then \Sectionformat is temporarily redefined to produce \realSectionformat{\ACM@sect@format{#1}}{#2}, which ultimately becomes \Sectionformat{\@secfont{#1}}{#2}. This is done to allow \Sectionformat to be variable, as may be needed in particular circumstances. Its current expansion is saved as \realSectionformat which is used with the modified 1st argument, then \Sectionformat is reverted to its former expansion.

To style the section-number, the line #1{} is used at the end of \ACM@NRadjust. This imposes style-changing commands for fonts and sizes, but any \MakeUppercase acts on just the {}. It's a bit hacky, by essentially assuming that only numbers occur here, not letters to be case-changed. (This should be acceptable in a class-file, as it ought to be possible to change the case elsewhere, if that was ever desired.) Also, it can result in \@adddotafter being called too soon, so a slight adjustment is made, via \ACM@adddotafter, which now tests whether its argument is empty. But the coding has to allow for other packages to have also patched \@adddotafter.

```
2405 \def\ACM@NRadjust#1{%
2406   \begingroup
2407   \expandafter\ifx\csname Sectionformat\endcsname\relax
2408     % do nothing when \Sectionformat is unknown
2409     \def\next{\endgroup #1}%
2410   \else
2411     \def\next{\endgroup
2412       \let\realSectionformat\Sectionformat
2413       \def\ACM@sect@format@{#1}%
2414       \let\Sectionformat\ACM@NR@adjustedSectionformat
2415       %% next lines added 2018-06-17 to ensure section number is styled
2416       \let\real@adddotafter\@adddotafter
2417       \let\@adddotafter\ACM@adddotafter
2418       #1{}% imposes the styles, but nullifies \MakeUppercase
2419       \let\@adddotafter\real@adddotafter
2420     }%
2421   \fi \next
2422 }
```

\ACM@NR@adjustedSectionformat

```
2423 \def\ACM@NR@adjustedSectionformat#1#2{%
2424   \realSectionformat{\ACM@sect@format{#1}}{#2}%
2425   \let\Sectionformat\realSectionformat}
2426 \DeclareRobustCommand{\ACM@sect@format}{\ACM@sect@format@}
2427 \def\ACM@sect@format@null#1{#1}
2428 \let\ACM@sect@format@\ACM@sect@format@null
```

```

2429 \AtBeginDocument{%
2430   \expandafter\ifx\csname LTX@adddotafter\endcsname\relax
2431   \let\LTX@adddotafter\@adddotafter
2432   \fi
2433 }

```

\ACM@adddotafter

```

2434 \def\ACM@adddotafter#1{\ifx\relax#1\relax\else\LTX@adddotafter{#1}\fi}

```

Sectioning is different for different levels

```

2435 \renewcommand\section{\@startsection{section}{1}{\z@}%
2436   {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2437   {.25\baselineskip}%
2438   {\ACM@NRadjust\@secfont}}
2439 \renewcommand\subsection{\@startsection{subsection}{2}{\z@}%
2440   {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2441   {.25\baselineskip}%
2442   {\ACM@NRadjust\@subsecfont}}
2443 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{\z@}%
2444   {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2445   {-3.5\p@}%
2446   {\ACM@NRadjust{\@subsubsecfont\@adddotafter}}}}
2447 \renewcommand\paragraph{\@startsection{paragraph}{4}{\parindent}%
2448   {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2449   {-3.5\p@}%
2450   {\ACM@NRadjust{\@parfont\@adddotafter}}}}
2451 \renewcommand\part{\@startsection{part}{9}{\z@}%
2452   {-10\p@ \@plus -4\p@ \@minus -2\p@}%
2453   {4\p@}%
2454   {\ACM@NRadjust\@parfont}}

```

\section@raggedright Special version of \raggedright compatible with \MakeUppercase

```

2455 \def\section@raggedright{\@rightskip\@flushglue
2456   \rightskip\@rightskip
2457   \leftskip\z@skip
2458   \parindent\z@}

```

\@secfont Fonts for sections etc. are different for different formats.

```

\@subsecfont 2459 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
\@subsubsecfont 2460 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
\@parfont 2461 \def\@subsubsecfont{\sffamily\itshape}
2462 \def\@parfont{\itshape}
2463 \setcounter{secnumdepth}{3}
2464 \ifcase\ACM@format@nr
2465 \relax % manuscript
2466 \or % acmsmall
2467 \or % acmlarge
2468 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
2469 \def\@subsecfont{\sffamily\large\section@raggedright}

```

```

2470 \or % acmtog
2471 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
2472 \def\@subsecfont{\sffamily\large\section@raggedright}
2473 \or % sigconf
2474 \def\@secfont{\bfseries\Large\section@raggedright\MakeTextUppercase}
2475 \def\@subsecfont{\bfseries\Large\section@raggedright}
2476 \or % siggraph
2477 \def\@secfont{\sffamily\bfseries\Large\section@raggedright\MakeTextUppercase}
2478 \def\@subsecfont{\sffamily\bfseries\Large\section@raggedright}
2479 \or % sigplan
2480 \def\@secfont{\bfseries\Large\section@raggedright}
2481 \def\@subsecfont{\bfseries\section@raggedright}
2482 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{\z@}%
2483   {-0.75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2484   {.25\baselineskip}%
2485   {\@subsubsecfont}}
2486 \def\@subsubsecfont{\bfseries\section@raggedright}
2487 \renewcommand\paragraph{\@startsection{paragraph}{4}{\z@}%
2488   {-0.5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2489   {-3.5\p@}%
2490   {\@parfont\@addspaceafter}}
2491 \def\@parfont{\bfseries\itshape}
2492 \renewcommand\subparagraph{\@startsection{subparagraph}{5}{\z@}%
2493   {-0.5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2494   {-3.5\p@}%
2495   {\@subparfont\@addspaceafter}}
2496 \def\@subparfont{\itshape}
2497 \or % sigchi
2498 \setcounter{secnumdepth}{1}
2499 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
2500 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
2501 \or % sigchi-a
2502 \setcounter{secnumdepth}{0}
2503 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
2504 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
2505 \fi

```

\@adddotafter Add punctuation after a sectioning command

```
2506 \def\@adddotafter#1{#1\@addpunct{.}}
```

\@addspaceafter Add space after a sectioning command

```
2507 \def\@addspaceafter#1{#1\@addpunct{\enspace}}
```

### 3.17 TOC lists

\@dotsep Related to the \tableofcontents are all the horizontal fillers. Base  $\LaTeX$  defines \@dottedtocline, which we should not disable. Yet, this command expects \@dotsep to be defined but leaves this to the class implementation. Since amsart does not provide this, we copy the standard variant from article here.

2508 \providecommand\*\@dotsep{4.5}

### 3.18 Theorems

\@acmplainbodyfont The font to typeset the body of the acmplain theorem style.

2509 \def\@acmplainbodyfont{\itshape}

\@acmplainindent The amount to indent the acmplain theorem style.

2510 \def\@acmplainindent{\parindent}

\@acmplainheadfont The font to typeset the head of the acmplain theorem style.

2511 \def\@acmplainheadfont{\scshape}

\@acmplainnotefont The font to typeset the note of the acmplain theorem style.

2512 \def\@acmplainnotefont{\@empty}

Customization of the acmplain theorem style:

2513 \ifcase\ACM@format@nr

2514 \relax % manuscript

2515 \or % acmsmall

2516 \or % acmlarge

2517 \or % acmtog

2518 \or % sigconf

2519 \or % siggraph

2520 \or % sigplan

2521 \def\@acmplainbodyfont{\itshape}

2522 \def\@acmplainindent{\z@}

2523 \def\@acmplainheadfont{\bfseries}

2524 \def\@acmplainnotefont{\normalfont}

2525 \or % sigchi

2526 \or % sigchi-a

2527 \fi

acmplain The acmplain theorem style

2528 \newtheoremstyle{acmplain}%

2529 {.5\baselineskip\@plus.2\baselineskip

2530 \@minus.2\baselineskip}% space above

2531 {.5\baselineskip\@plus.2\baselineskip

2532 \@minus.2\baselineskip}% space below

2533 {\@acmplainbodyfont}% body font

2534 {\@acmplainindent}% indent amount

2535 {\@acmplainheadfont}% head font

2536 {.}% punctuation after head

2537 {.5em}% spacing after head

2538 {\thmname{#1}\thmnumber{ #2}\thmnote{ {\@acmplainnotefont( #3)}}}% head spec

\@acmdefinitionbodyfont The font to typeset the body of the acmdefinition theorem style.

2539 \def\@acmdefinitionbodyfont{\normalfont}

`\acmdefinitionindent` The amount to indent the `acmdefinition` theorem style.  
2540 `\def\acmdefinitionindent{\parindent}`

`\acmdefinitionheadfont` The font to typeset the head of the `acmdefinition` theorem style.  
2541 `\def\acmdefinitionheadfont{\itshape}`

`\acmdefinitionnotefont` The font to typeset the note of the `acmdefinition` theorem style.  
2542 `\def\acmdefinitionnotefont{\@empty}`

Customization of the `acmdefinition` theorem style:

2543 `\ifcase\ACM@format@nr`  
2544 `\relax % manuscript`  
2545 `\or % acmsmall`  
2546 `\or % acmlarge`  
2547 `\or % acmtog`  
2548 `\or % sigconf`  
2549 `\or % siggraph`  
2550 `\or % sigplan`  
2551 `\def\acmdefinitionbodyfont{\normalfont}`  
2552 `\def\acmdefinitionindent{\z@}`  
2553 `\def\acmdefinitionheadfont{\bfseries}`  
2554 `\def\acmdefinitionnotefont{\normalfont}`  
2555 `\or % sigchi`  
2556 `\or % sigchi-a`  
2557 `\fi`

`acmdefinition` The `acmdefinition` theorem style

2558 `\newtheoremstyle{acmdefinition}%`  
2559 `{.5\baselineskip\@plus.2\baselineskip`  
2560 `\@minus.2\baselineskip}% space above`  
2561 `{.5\baselineskip\@plus.2\baselineskip`  
2562 `\@minus.2\baselineskip}% space below`  
2563 `{\acmdefinitionbodyfont}% body font`  
2564 `{\acmdefinitionindent}% indent amount`  
2565 `{\acmdefinitionheadfont}% head font`  
2566 `{.}% punctuation after head`  
2567 `{.5em}% spacing after head`  
2568 `{\thmname{#1}\thmnumber{ #2}\thmnote{ {\acmdefinitionnotefont(#3)}}}% head spec`

Make `acmplain` the default theorem style.

2569 `\theoremstyle{acmplain}`

Delay defining the theorem environments until after other packages have been loaded. In particular, the `cleveref` package must be loaded before the theorem environments are defined in order to show the correct environment name (see <https://github.com/borisveytsman/acmart/issues/138>). The `acmthm` option is used to suppress the definition of any theorem environments. Also, to avoid obscure errors arising from these environment definitions conflicting with environments defined by

the user or by user-loaded packages, we only define environments that have not yet been defined.

```

2570 \AtEndPreamble{%
2571   \if@ACM@acmthm
2572   \theoremstyle{acmplain}
2573   \@ifundefined{theorem}{%
2574     \newtheorem{theorem}{Theorem}[section]
2575   }{}
2576   \@ifundefined{conjecture}{%
2577     \newtheorem{conjecture}[theorem]{Conjecture}
2578   }{}
2579   \@ifundefined{proposition}{%
2580     \newtheorem{proposition}[theorem]{Proposition}
2581   }{}
2582   \@ifundefined{lemma}{%
2583     \newtheorem{lemma}[theorem]{Lemma}
2584   }{}
2585   \@ifundefined{corollary}{%
2586     \newtheorem{corollary}[theorem]{Corollary}
2587   }{}
2588   \theoremstyle{acmdefinition}
2589   \@ifundefined{example}{%
2590     \newtheorem{example}[theorem]{Example}
2591   }{}
2592   \@ifundefined{definition}{%
2593     \newtheorem{definition}[theorem]{Definition}
2594   }{}
2595   \fi
2596   \theoremstyle{acmplain}
2597 }

```

\@proofnamefont The font to typeset the proof name.

```

2598 \def\@proofnamefont{\scshape}

```

\@proofindent Whether or not to indent proofs.

```

2599 \def\@proofindent{\indent}

```

Customization of the proof environment.

```

2600 \ifcase\ACM@format@nr
2601 \relax % manuscript
2602 \or % acmsmall
2603 \or % acmlarge
2604 \or % acmtog
2605 \or % sigconf
2606 \or % siggraph
2607 \or % sigplan
2608 \def\@proofnamefont{\itshape}
2609 \def\@proofindent{\noindent}
2610 \or % sigchi

```

```

2611 \or % sigchi-a
2612 \fi

```

`\proof` We want some customization of the proof environment.

```

2613 \renewenvironment{proof}[1][\proofname]{\par
2614   \pushQED{\qed}%
2615   \normalfont \topsep6\p@\@plus6\p@\relax
2616   \trivlist
2617   \item[\@proofindent\hskip\labelsep
2618     {\@proofnamefont #1\@addpunct{.}}]\ignorespaces
2619 }{%
2620   \popQED\endtrivlist\@endpefalse
2621 }

```

### 3.19 Acknowledgments

`\acks` This is a comment-like structure

```

2622 \specialcomment{acks}{%
2623   \begingroup
2624   \section*{Acknowledgments}
2625   \phantomsection\addcontentsline{toc}{section}{Acknowledgments}
2626 }{%
2627   \endgroup
2628 }

```

`\grantsponsor` We just typeset the name of the sponsor

```

2629 \def\grantsponsor#1#2#3{#2}

```

`\grantnum`

```

2630 \newcommand\grantnum[3][\]{#3%
2631   \def\@tempa{#1}\ifx\@tempa\@empty\else\space(\url{#1})\fi}

```

### 3.20 Conditional typesetting

We use the comment package for conditional typesetting:

```

2632 \AtEndPreamble{%
2633   \if@ACM@screen
2634     \includecomment{screenonly}
2635     \excludecomment{printonly}
2636   \else
2637     \excludecomment{screenonly}
2638     \includecomment{printonly}
2639   \fi
2640   \if@ACM@anonymous
2641     \excludecomment{anonsuppress}
2642     \excludecomment{acks}
2643   \else
2644     \includecomment{anonsuppress}
2645   \fi}

```

### 3.21 Additional bibliography commands

`\showeprint` The command `\showeprint` has two arguments: the (optional) prefix and the eprint number. Right now the only prefix we understand is the (lowercase) word ‘arxiv’ (see <http://arxiv.org/hypertex/bibstyles/>).

```
2646 \newcommand\showeprint[2][arxiv]{%
2647   \def\@tempa{#1}%
2648   \ifx\@tempa\@empty\def\@tempa{arxiv}\fi
2649   \def\@tempb{arxiv}%
2650   \ifx\@tempa\@tempb
2651     arXiv:\href{http://arxiv.org/abs/#2}{#2}\else arXiv:#2%
2652   \fi}
```

### 3.22 End of Class

```
2653 \normalsize\normalfont\frenchspacing
2654 </class>
```



## References

- [1] UK T<sub>E</sub>X Users Group. UK list of T<sub>E</sub>X frequently asked questions. <http://www.tex.ac.uk>, 2016.
- [2] Michael Downes and Barbara Beeton. *The amsart, amsproc, and amsbook document classes*. American Mathematical Society, August 2004. <http://www.ctan.org/pkg/amslatex>.
- [3] Cristophe Fiorio. *algorithm2e.sty—package for algorithms*, October 2015. <http://www.ctan.org/pkg/algorithm2e>.
- [4] Rogério Brito. *The algorithms bundle*, August 2009. <http://www.ctan.org/pkg/algorithms>.
- [5] Carsten Heinz, Brooks Moses, and Jobst Hoffmann. *The Listings Package*, June 2015. <http://www.ctan.org/pkg/listings>.
- [6] Simon Fear. *Publication quality tables in L<sup>A</sup>T<sub>E</sub>X*, April 2005. <http://www.ctan.org/pkg/booktabs>.
- [7] Association for Computing Machinery. *ACM Visual Identity Standards*, 2007. <http://identitystandards.acm.org>.
- [8] Axel Sommerfeldt. *The subcaption package*, April 2013. <http://www.ctan.org/pkg/subcaption>.
- [9] Boris Veytsman, Bern Schandl, Lee Netherton, and C. V. Radhakrishnan. *A package to create a nomenclature*, September 2005. <http://www.ctan.org/pkg/nomencl>.
- [10] Nicola L. C. Talbot. *User Manual for glossaries.sty v4.25*, June 2016. <http://www.ctan.org/pkg/subcaption>.
- [11] David Carlisle. *The textcase package*, October 2004. <http://www.ctan.org/pkg/textcase>.

## Change History

1.48	General: Added prologue option to xcolor . . . . .	42	\if@ACM@authorversion: Added macro . . . . .	32
	Bib code cleanup (Zack Weinberg)	30	\maketitle: Added special case of authorversion . . . . .	69
	Documentation update (siggraph) .	30		
1.49	General: New journal: DTRAP . . . . .	30	v1.04	
1.53	General: New journals: PACMCGIT, TIOT, TDSCI . . . . .	30	General: Updated bibliography for siggraph . . . . .	30
	Rearranged docs . . . . .	30	\acmArticleSeq: Name change by Matthew Fluet . . . . .	60
1.54	General: Moved footnote stuff before hyperref call (Ross Moore) . . . . .	30	\acmDOI: Name change by Matthew Fluet . . . . .	60
			\acmISBN: Name change by Matthew Fluet . . . . .	60
v1.00	General: First released version . . . . .	30	v1.05	
v1.01	General: Changed hyperref colors in screen mode (closes <a href="https://github.com/borisveytsman/acmart/issues/1">https://github.com/borisveytsman/acmart/issues/1</a> ) . . . . .	30	General: Added processing doi numbers for acmsiggraph and doi numbers for sigproc.bib . . . . .	30
	Defined ACM colors . . . . .	30	Patched \setcitestyle command; closes <a href="https://github.com/borisveytsman/acmart/issues/19">https://github.com/borisveytsman/acmart/issues/19</a> . . . . .	30
	Explicitly put draft option (closes <a href="https://github.com/borisveytsman/acmart/issues/4">https://github.com/borisveytsman/acmart/issues/4</a> ) . . . . .	33	v1.06	
	Set headheight to 1pc for all formats (closes <a href="https://github.com/borisveytsman/acmart/issues/5">https://github.com/borisveytsman/acmart/issues/5</a> ) . . . . .	30	\@ACM@badge@skip: Added macro . .	60
v1.02	General: Added TOPS and TSC (closes <a href="https://github.com/borisveytsman/acmart/issues/12">https://github.com/borisveytsman/acmart/issues/12</a> ) . . . . .	30	\@ACM@badge@width: Added macro .	60
	Documentation changes (closes <a href="https://github.com/borisveytsman/acmart/issues/13">https://github.com/borisveytsman/acmart/issues/13</a> ) . . . . .	30	\@ACM@title@width: Added macro .	60
v1.03	\@formatdoi: Added macro . . . . .	66	\@mktitle@i: Added processing badges . . . . .	74
	General: Added anon suppress environment . . . . .	30	Made generic . . . . .	74
	Added authorversion option (closes <a href="https://github.com/borisveytsman/acmart/issues/9">https://github.com/borisveytsman/acmart/issues/9</a> ) . . . . .	30	\@mktitle@ii: Now this macro is obsolete . . . . .	75
			\@mktitle@iii: Added processing badges . . . . .	75
			Made more generic . . . . .	75
			\@mktitle@iv: Made more generic .	76
			\@printtopmatter: Added processing badges . . . . .	72
			\@subtitlefont: Added macro . . . .	74
			\@titlefont: Added macro . . . . .	73
			\acmBadgeL: Added macro . . . . .	61
			\acmBadgeR: Added macro . . . . .	61
			\if@ACM@badge: Added macro . . . .	60
			v1.07	
			\maketitle: Corrected a bug with abstract footnotes . . . . .	69
			Corrected a bug with permission and footnotes order . . . . .	69

v1.08	General: SIGPLAN reformatting by Matthew Fluet . . . . .	30	\bibliographystyle: Redefined macro . . . . .	41
	Typos corrected (Tobias Pape) . . .	30	\bibstyle@acmauthoryear: Added macro . . . . .	37
v1.09	General: Revert SIGPLAN caption rules . . . . .	30	\bibstyle@acmnumeric: Added macro . . . . .	37
v1.10	General: Changes of ‘licensedothergov’ wording . . . . .	64	\if@ACM@printfolios: Added macro	62
	\maketitle: Corrected a bug with doi in manuscript and author version, <a href="https://github.com/borisveytsman/acmart/issues/36">https://github.com/borisveytsman/acmart/issues/36</a> . . . . .	69	standardpagestyle: Added headers for sigs . . . . .	85
	standardpagestyle: Reversed folios location . . . . .	85	Expanded headers for sigchi-a . . .	85
v1.11	General: Customization of ACM theorem styles and proof environment by Matthew Fluet . . . . .	30	Suppressed folios if sig . . . . .	85
v1.12	\@marginfigure: Now centering by default . . . . .	47	v1.14	General: \citestyle updates (Matthew Fluet) . . . . .
	\@marginfigure: Now centering by default . . . . .	47		Patched \citestyle . . . . .
	\@parfont: Moved to \section@raggedright . . . . .	90		\bibstyle@acmauthoryear: Moved def of \bibstyle@acmauthoryear before use . . . . .
	General: Added graceful behavior when libertine fonts are absent . .	45		\bibstyle@acmnumeric: Moved def of \bibstyle@numeric before use . .
	Documentation updates . . . . .	30	v1.15	\@ACM@addtoaddress: Added macro
	\copyrightpermissionfootnoterule: Added macro . . . . .	44		\@mkauthors@iii: New authors system . . . . .
	\descriptionlabel: Redefined . . . .	49		\@shortauthors: Introduced macro .
	\footnoterule: Made shorter . . . . .	44		\@typeset@author@bx: Moved to separate macro . . . . .
	\if@ACM@natbib@override: Added macro . . . . .	32		\acks: Added macro . . . . .
	\if@ACM@newfonts: Added macro . .	45		\affiliation: Added code for author groups . . . . .
	\maketitle: Moved thankses to copyrightpermission box . . . . .	69		\author: Added code for author groups . . . . .
	\section@raggedright: Introduced macro . . . . .	90		\city: Added macro . . . . .
v1.13	\@mpfootnotetext: Made minipage footnotes centered . . . . .	40		\country: Added macro . . . . .
	General: Font adjustments for acmsmall . . . . .	77		\department: Added macro . . . . .
	Increased font size for ACM Large .	34		\grantnum: Added macro . . . . .
	Print bibliographic information by default for the proceedings . . . . .	62		\grantsponsor: Added macro . . . .
				\if@insideauthorgroup: Introduced macro . . . . .
				\institution: Added macro . . . . .
				\num@authorgroups: Renamed . . . .
				\orcid: Introduced macro . . . . .
				\position: Added macro . . . . .
				\postcode: Added macro . . . . .
				\state: Added macro . . . . .
				\streetaddress: Added macro . . . .
				standardpagestyle: Better handling of anonymous mode . . . . .
			v1.16	\@headfootfont: Added macro . . . .

General: Formatting header/footer (Matthew Fluet) . . . . .	30	v1.21	\showeprint: Added macro . . . . .	96
standardpagestyle: Customize header/footer text font . . . . .	85	v1.22	General: More bibliography changes for Aptara . . . . .	30
v1.17		v1.23	General: Add PACMPL journal option . . . . .	30
\@makefnmark: Redefined . . . . .	40	v1.24	General: Add IMWUT journal option . . . . .	49
\@mkauthors: TOG now uses the same authors block as other journals . . . . .	77	v1.25	General: Updated PACMPL . . . . .	49
\@mkauthors@ii: Deleted . . . . .	79	v1.26	General: Corrected \shortcite bug . . . . .	30
\@mkbibcitation: Added \nobreak . . . . .	83		Documentation typos fixed (thanks to Stephen Spencer) . . . . .	30
Changed format for sigs . . . . .	83	v1.27	\if@ACM@printccs: Typo corrected . . . . .	61
General: Slightly decreased margins for sigs . . . . .	42	v1.28	General: Corrected option natbib behavior . . . . .	37
\acmArticle: The default is now numerical . . . . .	59		Got rid of warnings in pdf keywords . . . . .	40
\acmMonth: The default must be numerical. Closes #50. . . . .	60		\ccsdesc@parse: Change from \to to \textrightarrow (Matteo Riondato) . . . . .	63
\acmNumber: The default is now numerical . . . . .	59	v1.29	\@mkabstract: Removed spurious indentation (John Wickerson) . . . . .	82
\acmVolume: The default is now numerical . . . . .	59		General: Increased head to 13pt . . . . .	42
\acmYear: The default is now numerical . . . . .	60		\ccsdesc@parse: Add spacing after bullet and around rightarrow; semicolon separators no longer in bold/italic (John Wickerson) . . . . .	63
\description: Decreased indent . . . . .	49		standardpagestyle: Corrected printfolios (Matthew Fluet) . . . . .	85
\grantnum: Added url . . . . .	95	v1.30	General: Added \frenchspacing . . . . .	96
\grantsponsor: Renamed . . . . .	95		Bibtex style now recognizes https:// in doi . . . . .	30
\if@ACM@printacmref: Renamed from \if@ACM@printbib . . . . .	62		Switched to T1: looks like libertine has problems with \l in OT1 . . . . .	46
standardpagestyle: Added paper title to sigs . . . . .	85		Updated IMWUT and PACMPL . . . . .	49
v1.18			\department: Added optional parameter . . . . .	76
\@mkauthors@i: Now we andify affiliations . . . . .	78	v1.31	\@additionalaffiliation: Added macro . . . . .	58
\@typeset@author@line: Added macro . . . . .	78		\@mkbibcitation: Disabled linebreak . . . . .	83
General: Natbib is now the default for all formats . . . . .	30		\@startsection: Added \tochangmeasure . . . . .	37
v1.19			Redefined macro . . . . .	39
\@mkabstract: Include 'Abstract' in PDF bookmarks (Matthew Fluet) . . . . .	82			
General: Include 'Abstract', 'Acknowledgements', and 'References' in PDF bookmarks (Matthew Fluet) . . . . .	30			
Include 'References' in PDF bookmarks (Matthew Fluet) . . . . .	35			
\acks: Include 'Acknowledgements' in PDF bookmarks (Matthew Fluet) . . . . .	95			
v1.20				
\@mkabstract: Deleted spurious space . . . . .	82			
General: Bug fixes for bst . . . . .	30			

\@textbottom: Redefined . . . . .	45	\department: Added obeypunctuation code . . . . .	76
General: Documentation changes . . .	30	\if@ACM@affiliation@obeypunctuation: Added macro . . . . .	58
\acmMonth: The default now is the cur- rent month (Matteo Riondato) . . .	60	\if@ACM@authordraft: Added macro	33
\acmYear: The default now is the cur- rent year (Matteo Riondato) . . .	60	\if@ACM@natbib@override: Deleted macro . . . . .	32
\additionalaffiliation: Added macro . . . . .	58	\if@ACM@timestamp: Added macro (Michael D. Adams) . . . . .	32
\l@section: Redefined macro . .	40	\institution: Added obeypunctua- tion code . . . . .	76
\l@subsection: Redefined macro	40	firstpagestyle: Added right linecount for two-column formats	87
v1.32		Added timestamp (Michael D. Adams) . . . . .	87
\@formatdoi: New doi format . . . . .	66	\maketitle: Fixed the bug with figures on top and bottom of the title page, thanks to David Epstein . . . . .	69
General: Added POMACS journal op- tion . . . . .	30	\position: Added obeypunctuation code . . . . .	76
Format siggraph is now obsolete .	30	\postcode: Added obeypunctuation code . . . . .	76
v1.33		\state: Added obeypunctuation code	76
\@ACM@addtoaddress: Added obey- punctuation code . . . . .	76	\streetaddress: Added obeypunctua- tion code . . . . .	76
\@mkauthors@i: Added obeypunctua- tion code . . . . .	78	standardpagestyle: Added right linecount for two-column formats	85
\@mkauthors@iii: Added obeypunctua- tion code . . . . .	79	Added timestamp (Michael D. Adams) . . . . .	85
\@mkauthors@iv: Added obeypunctua- tion code . . . . .	80	v1.34	
\@subtitlefont: Added \normalsize . . . . .	74	\@mkbibcitation: Deleted DOI from doi numbers . . . . .	83
General: Added acmart-preload-hook	30	\ACM@linecount@bx: Rulers now are continuous . . . . .	84
Added cmap and glyptounicode .	45	\ACM@linecountL: Rulers now are continuous . . . . .	84
BibTeX comma before articleno bug corrected . . . . .	30	\ACM@linecountR: Rulers now are continuous . . . . .	84
BibTeX crossref bug corrected . .	30	\maketitle: Added date to the bibstrip in conf proceedings . . . . .	69
BibTeX numpages bug corrected .	30	Deleted ‘DOI’ from doi numbers .	69
Documentation updates . . . . .	30	Rearranged bibstrip . . . . .	69
Moved \citename definition for non-natbib bibliography, so a pack- age may redefine it . . . . .	41	The \terms command is now obso- lete . . . . .	69
Switched to Type 1 fonts for liber- tine even if OTF-capable engine is used (Kai Mindermann) . . . . .	46	\terms: The \terms command now just produces a warning . . . . .	61
\ACM@linecountL: Renamed macro .	84	v1.35	
\ACM@linecountR: Added macro . .	84	General: BibTeX bug fixed: et al. . . .	30
\ACM@timestamp: Added current page number . . . . .	84		
Added macro (Michael D. Adams) .	84		
Added submission id . . . . .	84		
\acmSubmissionID: Added macro . .	60		
\city: Added obeypunctuation code	76		
\country: Added obeypunctuation code . . . . .	76		

If the copyright is set to usgov or rightsretained, the price is sup- pressed . . . . .	64	Added Ross Moore code for glyph- tounicode . . . . .	45
\@bibstyle@acmauthoryear: Square brackets for author-year style . . .	37	Bibliography changes . . . . .	30
v1.36		\ACM@linecount@bx: Work around a bug in xcolor: looks like cmyk col- ors in boxes do not work . . . . .	84
\@ACM@authorsperrrow: Added macro	62	\ccdesc@parse@finish: Added macro . . . . .	63
\@mkauthors@iii: Added authorsper- row override . . . . .	79	\city: We now do not print this even in SIG . . . . .	76
\@mkauthors@iv: Added authorsper- row override . . . . .	80	\country: Fixed bugs with extra spaces . . . . .	76
General: Added PACMHCI journal op- tions . . . . .	49	\l@section: Redefined macro . .	39
Added the possibility to adjust num- ber of author boxes per row in con- ference formats . . . . .	30	\postcode: We now do not print this even in SIG . . . . .	76
\if@ACM@authordraft: Corrected typo, thanks to bargteil . . . . .	33	\state: We now do not print this even in SIG . . . . .	76
v1.37		\streetaddress: We now do not print this even in SIG . . . . .	76
General: Reduce list indentation (Matthew Fluet) . . . . .	48	v1.41	
Set \normalparindent; Reduce list indentation (Matthew Fluet) . . . .	30	General: Added new badges . . . . .	30
\description: Reduce list indentation (Matthew Fluet) . . . . .	49	v1.42	
\descriptionlabel: Reduce list in- dentation (Matthew Fluet) . . . . .	49	General: Deleted ACM badges . . . . .	30
\normalparindent: Set \normalparindent (Matthew Fluet) . . . . .	44	v1.43	
v1.38		\@startsection: Added \makeatletter . . . . .	39
General: Increase default font size for SIGPLAN . . . . .	30, 34	\country: Added comma before coun- try for journals . . . . .	76
v1.39		v1.44	
\@authornotemark: Added macro . .	82	\@acmBooktitle: Added macro . . . .	56
\authornotemark: Added macro . . .	59	\@acmEditors: Added macro . . . . .	56
v1.40		\@editorsAbbrev: Added macro . . .	56
\@copyrightowner: Added new copy- right version: licensedcagov . . . .	65	\@folioblob: Suppress the blob if ac- mArticleSeq is empty . . . . .	87
\@copyrightpermission: Added new copyright version: licensedcagov . .	66	\@mkbibcitation: If the paper has just one page, use ‘page’ instead of ‘pages’ . . . . .	83
\@mkauthors@i: Switched to MakeTex- tUppercase . . . . .	78	General: Added package refcount . . .	30
\@parfont: Switched to MakeTextUp- percase . . . . .	90	Deleted package cleveref . . . . .	30
General: Added ‘textcase’ package . .	35	Put theorem defs in a separate style	30
Added heightrounded to geometry	42	\ACM@restore@pagestyle: Added macro . . . . .	88
Added new copyright version: li- censedcagov . . . . .	30	\acmArticle: The default is now empty . . . . .	59
Added package cleveref . . . . .	30	\acmArticleSeq: Now acmArticle might be empty . . . . .	60
		\acmBooktitle: Added macro . . . . .	56
		\editor: Added macro . . . . .	56
		\if@ACM@acmthm: Added macro . . . .	31

\maketitle: Empty DOI or ISBN are not printed (by Michael Ekstrand)	69	General: \citeyear no longer behaves like \citeyearpar	41
v1.45		Code prettying (Michael D. Adams)	30
\@folioblob: Switched \bfseries \sffamily to \sffamily \bfseries	87	Initial support for Biblatex (Daniel Thomas)	30
\@parfont: Switched \bfseries \sffamily to \sffamily \bfseries	90	Misc entries in the bibliography no longer produce a separate date	30
\@titlefont: Switched \bfseries \sffamily to \sffamily \bfseries	73	Typos fixed (Jamie Davis)	30
v1.46		\ACM@timestamp: Formatting change (Michael D. Adams)	84
\@mkauthorsaddresses: Introduced macro	82	\if@ACM@review: Review mode now switches on folios	31
\@mkbibcitation: Added subtitle	83	\maketitle: Added acmart and version info to pdfcreator tag	69
\@printendtopmatter: Made it \par \bigskip uniformly	83	Added language and doctitle attributes to PDF (Andreas Reicherger)	69
\@printtopmatter: Deleted rule	72	Suppressed empty DOI (Serguei Mokhov)	69
\@setauthorsaddresses: Introduced macro	83	v1.50	
General: Added etoolbox	30	\@copyrightpermission: New copyright statements for iw3c2w3[g]	66
Bst file bug fixes: label width is calculated correctly	30	v1.51	
Delayed hypersetup since journal options may change screen mode	40	General: Corrected the bug with price suppression	64
PACM now set screen to true	49	Suppress price if the copyright is set to iw3c2w3 or iw3c2w3g	64
Restore theorem defs to class file	30	XeTeX now uses OTF fonts (Joachim Breitner)	46
\ACM@linecount@bx: Rearranged the code to get rid of spurious underfull messages (Benjamin Byholm)	84	firstpagestyle: We now use journal abbreviation for footers	87
\author: Started counting authors	57	standardpagestyle: We now use journal abbreviation for footers	85
\authorsaddresses: Introduced macro	58	v1.52	
\country: Corrected spacing for institution	76	\@copyrightowner: Rewording of licenses	65
\if@ACM@acmthm: Modified description	31	\@copyrightpermission: Another rewording of copyright statements for iw3c2w3[g]	66
\liningnums: Workaround for compatibility with fontspec	46	v1.53	
\maketitle: Added authors' addresses	69	General: Added PACMCGIT, TIOT, TD-SCI	49
Thanks go before authors' addresses	69	v1.54	
\num@authors: Introduced macro	56	\@mkbibcitation: Bug corrected (Ross Moore)	83
v1.47		\@shortauthors: Added submission id in anonymous mode	85
General: New journal: THRI	30	General: Added Ross's patch for sectioning	90
v1.48		Deleted indent for subsubsection	90
\@headfootfont: Deleted unnecessary switch (Michael D. Adams)	85		
\@mkabstract: Removed spurious indentation if abstract is followed by an empty line	82		

XeTeX now uses T1 encoding . . .	46	\ACM@NRadjust: Added macro . . . . .	89
\ACM@adddotafter: Added macro . .	90	\author: Added submission id in	
\ACM@NR@adjustedSectionformat:		anonymous mode . . . . .	57
Added macro . . . . .	89	\if@ACM@nonacm: Added macro . . . .	32



## Index

Numbers written in *italic* refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; numbers in *roman* refer to the code lines where the entry is used.

Symbols		
\\$ . . . . .	1649, 1653	\@ACM@sigchiamodefalses . . . . . 150
\@ 1403, 1415, 1418, 1421, 1426, 1506, 1527, 1540		\@ACM@sigchiamodetrue 170
\@authornotemark . . . . . 1204, 1217		\@ACM@timestamptrue 121
\@par . . . . . 329, 386		\@ACM@title@width . . . . . 1234,
\@ACM@addtoaddress . . . . . 1887, 1910, 1911, 1913		1824, 1826, 1827, 1830, 1831, 1839, 1853, 1855, 1856, 1864
\@ACM@authorsperrrow . . . . . 1275, 2018, 2019, 2067, 2068		\@DeclareACMFormat . . . . . 38, 39, 40, 41, 42, 43, 44, 45, 46, 47
\@ACM@badge@skip . . . . . 1235, 1750, 1827, 1831, 1837, 1846, 1856, 1862, 1871		\@M . . . . . 329, 368, 386, 395
\@ACM@badge@width . . . . . 1232, 1749, 1754, 1826, 1830, 1836, 1848, 1855, 1857, 1860, 1872, 1875		\@abstract 1254, 2136, 2143
\@ACM@badgefalse . . . 1231		\@acmArticle . . . 1210, 1213, 1648, 2152, 2153, 2238, 2241, 2260, 2270, 2281, 2339, 2356, 2366, 2376
\@ACM@badgetrue 1237, 1242		\@acmArticlePage . . . 2237, 2254, 2255, 2264, 2267, 2274, 2278
\@ACM@commabox . . . . . 1887, 1891, 1892		\@acmArticleSeq 1212, 2322
\@ACM@journalfalse . . . 161, 163, 165, 167, 169		\@acmBadgeL@image . . . . . 1244, 1246, 1747, 1749, 1825, 1834, 1836, 1858, 1860
\@ACM@journaltrue . . . . . 153, 155, 157, 159		\@acmBadgeL@url . 1243, 1245, 1748, 1835, 1859
\@ACM@labelwidth . . . . . 730, 733, 741, 746, 772		\@acmBadgeR@image . . . . . 1239, 1241, 1752, 1754, 1829, 1845, 1848, 1873, 1875
\@ACM@manuscriptfalse 148		\@acmBadgeR@url . 1238, 1240, 1753, 1847, 1874
\@ACM@manuscripttrue 146		\@acmBooktitle . . . . . 1084, 1638, 2167
\@ACM@newfontfalse . . . . . 631, 634, 637		\@acmDOI . . 1228, 1640, 1643, 1650, 1654, 2175
\@ACM@newfonttrue . 628		\@acmEditors 1089, 1090, 1091, 1094, 2168, 2169
\@ACM@printacmreffalse . . . . . 85		\@acmISBN . . . . . 1226, 1652
\@ACM@printfoliotrue 68		\@acmMonth 1216, 1218, 1648
\@ACM@reviewtrue . . . 122		\@acmNumber . . . . 1208, 2164, 2260, 2270, 2281, 2356, 2366, 2376
\@ACM@screentrue . . . . . 854, 883, 889, 895, 901		\@acmPrice 1222, 1649, 1653
		\@acmPubDate . . . 1218, 2164, 2260, 2270, 2281, 2357, 2367, 2377
		\@acmSubmissionID . . . . . 1113, 1114, 1129, 1130, 1224, 2219, 2220, 2230
		\@acmVolume . . . . 1206, 2164, 2259, 2269, 2280, 2355, 2365, 2375
		\@acmYear . . . . . 1214, 1221, 1559, 1648, 2155
		\@acmdefinitionbodyfont . . . . . 2539, 2551, 2563
		\@acmdefinitionheadfont . . . . . 2541, 2553, 2565
		\@acmdefinitionindent . . . . . 2540, 2552, 2564
		\@acmdefinitionnotefont . . . . . 2542, 2554, 2568
		\@acmownedfalse . 1354, 1357, 1360, 1366, 1370, 1373, 1376, 1379, 1385, 1388, 1392
		\@acmownedtrue . . . . . 1341, 1350, 1382
		\@acmplainbodyfont . . . . . 2509, 2521, 2533
		\@acmplainheadfont . . . . . 2511, 2523, 2535
		\@acmplainindent . . . . . 2510, 2522, 2534
		\@acmplainnotefont . . . . . 2512, 2524, 2538
		\@adddotafter . . . . . 2416, 2417, 2419, 2431, 2446, 2450, 2506
		\@additionalaffiliation . . . . . 1155, 1156

\@addpunct . . . . .	2112, 2113, 2115, 2116, 2117, 2118, 2119, 2120, 2122, 2178, 2179, 2506, 2507, 2618	\@concepts . . . . .	1312, 1322, 1664, 1666, 1687	2175, 2219, 2230, 2512, 2542, 2631, 2648
\@addspaceafter . . . .	2490, 2495, 2507	\@copyrightowner . . .	1397, 1624	\@endfloatbox . . . . .
\@affiliationfont . .	1940, 1945, 1949, 1952, 1955, 1958, 1961, 1964, 1992, 2010	\@copyrightpermission . . . . .	1435, 1616	\@endpfalse . . . . .
\@afterheading . .	360, 1695	\@copyrightyear . . . .	1558, 1624, 1626	\@endwidefloatbox . . . . .
\@afterindentfalse .	306, 1694	\@currbox . . . . .	711, 712, 713	\@finalstrut . . . . .
\@afterindenttrue . .	304	\@currentaffiliation . . . . .	2011, 2014, 2036, 2043, 2044, 2046, 2048, 2049, 2053, 2079, 2086, 2087, 2089, 2091, 2092, 2096	\@float . . . . .
\@article@string . . .	2152, 2164, 2172	\@currentaffiliations . . . . .	1969, 1970, 1971, 1973, 1976, 1988, 1989, 1994	\@flushglue . . . . .
\@author . . . . .	1112, 1117, 1122, 1978, 2037, 2080, 2121	\@currentauthors . . . . .	1967, 1968, 1975, 1979, 1980, 1982, 2010, 2013, 2035, 2037, 2038, 2040, 2078, 2080, 2081, 2083, 2126, 2127	\@fnsymbol . . . . .
\@authorfont . . . . .	1939, 1944, 1948, 1951, 1954, 1957, 1960, 1963, 1980, 2010	\@currentlabel . . . . .	413, 427	\@folio@ht . . . . .
\@authornotemark . . .	1196, 1202, 2126	\@dblarg . . . . .	315	\@folio@max . . . . .
\@authornotes . . . . .	1193, 1197, 1592	\@dblfloat . . . . .	695	\@folio@voffset . . . . .
\@authorsaddresses . .	1172, 1600, 2179	\@department . . . . .	1159, 1160	\@folio@wd . . . . .
\@auxout . . . . .	492	\@dotsep . . . . .	2508	\@folioblob . . . . .
\@begindocumenthook .	488	\@editorsAbbrev . . . . .	1088, 1093, 2169	\@footnotemark . . . . .
\@botnum . . . . .	1582	\@empty . . . . .	172, 319, 1079, 1090, 1110, 1113, 1127, 1129, 1134, 1135, 1141, 1293, 1294, 1300, 1307, 1312, 1596, 1600, 1640, 1649, 1652, 1653, 1654, 1664, 1669, 1719, 1747, 1752, 1825, 1829, 1834, 1842, 1845, 1858, 1866, 1873, 1883, 1969, 1979, 1987, 1988, 2037, 2043, 2048, 2080, 2086, 2091, 2129, 2152, 2156, 2168,	\@footnotemark@nolink . . . . .
\@citestyle . . . . .	238			\@footnotetext . . . . .
\@classname . . . . .	25, 27, 35, 51, 53, 54, 59, 61, 62, 67, 70, 71, 76, 78, 79, 84, 90, 91, 96, 98, 99, 104, 106, 107, 112, 114, 115, 120, 124, 125, 136, 141, 194, 629, 632, 635, 855, 884, 890, 896, 902, 1064, 1066, 1154, 1249, 1259, 1261, 1262, 1265, 1267, 1268, 1271, 1273, 1274, 1276, 1277, 2149			\@footnotetext@nolink . . . . .
\@clubpenalty . . . . .	374			\@for . . . . .
				\@formatdoi . . . . .
				\@fps . . . . .
				\@fpsadddefault . . . . .
				\@gobble . . . . .
				\@hangfrom . . . . .
				\@headfootfont . . . . .
				\@ifnextchar . . . . .
				\@ifnotempty . . . . .
				\@ifnum . . . . .
				\@ifstar . . . . .
				\@ifundefined . . . . .
				\@iiiparbox . . . . .
				\@input . . . . .
				\@insideauthorgroupfalse . . . . .
				\@insideauthorgroupttrue . . . . .

\@journalCode	778, 855, 884, 890, 896, 902, 1064	\@m	..... 317	863, 867, 871, 875,	
		\@makefnmark	... 408,	882, 888, 894, 900,	
\@journalCode@nr	...		<u>433, 1584, 1589, 1593</u>	906, 910, 917, 921,	
	..... 778, 836, 1069	\@makefntext	.....	929, 935, 939, 943,	
\@journalName	.....		.. <u>408, 417, 430, 1595</u>	947, 951, 955, 959,	
	838, 842, 846, 850,	\@marginfigure	. 687, <u>688</u>	963, 967, 971, 975,	
	857, 861, 865, 869,	\@marginable	.. 690, <u>691</u>	979, 983, 987, 991,	
	873, 877, 880, 886,	\@minipagefalse	. 608, <u>707</u>	995, 998, 1002,	
	892, 898, 904, 908,	\@minus	... 2436, 2440,	1009, 1014, 1018,	
	912, 915, 919, 923,		2444, 2448, 2452,	1022, 1026, 1030,	
	925, 927, 931, 933,		2483, 2488, 2493,	1034, 1038, 1042,	
	937, 941, 945, 949,		2530, 2532, 2560, 2562	1046, 1050, 1054,	
	953, 957, 961, 965,	\@mkabstract	.. 1662, <u>2135</u>	1058, 1062, 1072, 1648	
	969, 973, 977, 981,	\@mkauthors	<u>1585, 1587, 1915</u>	\@permissionCodeTwo	
	985, 989, 993, 997,	\@mkauthors@i	.. 1919,	..... 1010, 1073	
	1000, 1004, 1007,		<u>1921, 1923, 1925, 1974</u>	\@plus	.. 395, 403, 612,
	1012, 1016, 1020,	\@mkauthors@ii	.... <u>2004</u>		2436, 2440, 2444,
	1024, 1028, 1032,	\@mkauthors@iii	. 1927,		2448, 2452, 2483,
	1036, 1040, 1044,		<u>1929, 1931, 1933, 2015</u>		2488, 2493, 2529,
	1048, 1052, 1056,	\@mkauthors@iv	<u>1935, 2064</u>		2531, 2559, 2561, 2615
	1060, 1070, 1071, 1636	\@mkauthorsaddresses		\@printcopyrightfalse	
\@journalNameShort	.		..... <u>1173, 2106</u>		..... 1353, 1365
	... 839, 843, 847,	\@mkbibcitation	<u>1682, 2145</u>	\@printcopyrighttrue	
	852, 858, 862, 866,	\@mkteasers	... <u>1585, 2128</u>		..... 1337, 1349
	870, 874, 878, 881,	\@mktitle	..... <u>1585, 1759</u>	\@printendtopmatter	
	887, 893, 899, 905,	\@mktitle@i	.... 1762,		..... 1693, <u>2177</u>
	909, 913, 916, 920,		<u>1764, 1766, 1768, 1823</u>	\@printpermissionfalse	
	928, 934, 938, 942,	\@mktitle@ii	..... <u>1851</u>		..... 1352
	946, 950, 954, 958,	\@mktitle@iii	.. 1770,	\@printpermissiontrue	
	962, 966, 970, 974,		<u>1772, 1774, 1776, 1851</u>		... 1339, 1348, 1364
	978, 982, 986, 990,	\@mktitle@iv	.. <u>1778, 1879</u>	\@printtopmatter	...
	994, 1001, 1005,	\@mpargs	..... 611		..... 1586, <u>1718</u>
	1008, 1013, 1017,	\@mparswitchfalse	.. 573	\@proofindent	.....
	1021, 1025, 1029,	\@mpfootins	.....		... <u>2599, 2609, 2617</u>
	1033, 1037, 1041,		<u>422, 423, 603, 604, 606</u>	\@proofnamefont	....
	1045, 1049, 1053,	\@mpfootnotetext	... <u>421</u>		... <u>2598, 2608, 2618</u>
	1057, 1061, 1071,	\@ne	. 240, 244, 248, 250,	\@received	. <u>1291, 1294,</u>
	2163, 2259, 2269,		<u>478, 2185, 2190, 2194</u>		1295, 1297, 1300,
	2280, 2355, 2365, 2375	\@nil	..... 259		1301, 1303, 1307, 1308
\@keywords	.....	\@nobreakfalse	. 362, 402	\@rightskip	... 2455, 2456
	1251, 1669, 1675, 1688	\@noskipsecfalse	... 366	\@saveabstract	<u>1253, 1254</u>
\@latex@error	..... 282	\@noskipsectrue	.... 363	\@saveteaser	.. <u>1561, 1562</u>
\@empty	..... <u>1256, 2136</u>	\@pages@word	.....	\@secCNTformat	. 322, 379
\@listI	..... 754, 758		... 2146, 2165, 2172	\@secfont	..... 2438, <u>2459</u>
\@listi	..... 751, 758	\@par	..... 1598, 1604	\@secpenalty	..... 311
\@listii	..... 759	\@parboxrestore	.... 426	\@sect	..... 315, 316
\@listiii	..... 762	\@parfont	. <u>2450, 2454, 2459</u>	\@setaddresses	.... <u>2125</u>
\@listiv	..... 764	\@permissionCodeOne		\@setauthorsaddresses	
\@listv	..... 766		..... 840,		..... 1604, <u>2179</u>
\@listvi	..... 768		<u>844, 848, 853, 859,</u>	\@setthanks	... 1598, <u>2179</u>

\@shortauthors . . . .	\@tempc . 260, 261, 263,	\acks . . . . . 2622
. . . . 2227, 2248,	265, 267, 269, 271, 273	\acks (environment) . . . . 22
2256, 2264, 2274, 2286	\@tempcnta . 2322, 2323,	\ACM@adddotafter . . . .
\@sidebar . . . . . 684, 685	2325, 2326, 2328, 2330	. . . . . 2417, 2434
\@specialsection . . .	\@tempdima . . . . .	\acm@copyrightinput 1343
1665, 1671, 1673, 1697	2329, 2330, 2331, 2333	\acm@copyrightmode .
\@ssect . . . . . 314, 380	\@tempskipa . . . . .	. . . . 1343, 1351,
\@startPage . . . . 1247,	303, 305, 306, 311,	1356, 1359, 1363,
1719, 1720, 1722, 2224	324, 325, 356, 357,	1369, 1372, 1375,
\@startsection . . . .	359, 371, 372, 381, 382	1378, 1381, 1384,
. . 300, 392, 2435,	\@textbottom . . . . . 612	1387, 1391, 1398, 1436
2439, 2443, 2447,	\@textsuperscript . .	\ACM@fontsize . . . .
2451, 2482, 2487, 2492	. . . . 433, 1584, 1589	128, 172, 175, 177,
\@starttoc . . . . . 392	\@texttop . . . . . 613	179, 181, 183, 185,
\@subparfont . . 2495, 2496	\@thefnmark . 414, 428,	187, 189, 191, 194, 195
\@subsecfont . . 2442, 2459	433, 1584, 1589, 1594	\ACM@format . . . . 32, 136
\@subsubsecfont 2446, 2459	\@title . . 1176, 1686,	\ACM@format@nr 32, 136,
\@subtitle . 1096, 1185,	1841, 1865, 1882, 2155	140, 145, 151, 173,
1842, 1843, 1866,	\@titlefont 1781, 1833,	444, 513, 578, 663,
1867, 1883, 1884, 2156	1840, 1852, 1864, 1880	715, 1698, 1726,
\@subtitelfont . . . .	\@titlenotes . . . . .	1760, 1782, 1803,
1802, 1843, 1867, 1884	1174, 1178, 1181, 1590	1917, 1941, 2244,
\@subtitlenotes . . . .	\@tochangmeasure 333, 346	2309, 2346, 2387,
1183, 1187, 1190, 1591	\@toclevel . . . . . 317	2464, 2513, 2543, 2600
\@svsec . 319, 322, 328, 343	\@tocline . . 405, 406, 407	\ACM@linecount . . . .
\@svsechd . . . 341, 369, 389	\@topnum . . . . . 1580	. . . . 2184, 2185,
\@teaser . . . . . 1562, 2130	\@typeset@author@bx	2189, 2190, 2193, 2194
\@teaserfigures . . . .	. . . . . 2008,	\ACM@linecount@bx . .
1560, 1562, 2129, 2133	2057, 2063, 2100, 2105	. . . 2181, 2200, 2207
\@tempa . . . . . 214,	\@typeset@author@line	\ACM@linecount@bxht
215, 217, 219, 221,	1966, 1977, 1999, 2001	2183, 2188, 2191, 2192
223, 225, 227, 229,	\@undefined . . . . 488, 648	\ACM@linecountL . . . .
231, 233, 235, 237,	\@width . . . . . 592, 599	. . . . 2196, 2246,
239, 241, 243, 245,	\@xp . . . . . 399, 400	2249, 2254, 2257,
247, 249, 251, 253,	\@xsect . . . . 354, 355, 391	2263, 2265, 2273,
255, 257, 259, 262,	\@z . . . . . 246	2275, 2285, 2288,
264, 266, 268, 270,	\\ . . . . . 509, 1113,	2348, 2359, 2360,
272, 1133, 1134,	1624, 1629, 1644,	2370, 2371, 2379, 2382
1292, 1293, 1987,	1649, 1653, 2148, 2189	\ACM@linecountR . . . .
2631, 2647, 2648, 2650	\{ . . . . . 222	2203, 2276, 2278,
\@tempb . . . . 215, 217,	\} . . . . . 222	2286, 2291, 2380, 2383
219, 221, 223, 225,	\_ . . . . 1087, 1318, 1328,	\ACM@mk@linecount . .
227, 229, 231, 233,	1624, 1626, 1649,	. . . 2186, 2198, 2205
235, 237, 239, 241,	2152, 2153, 2170, 2224	\ACM@NR@adjustedSectionformat
243, 245, 247, 249,		. . . . . 2414, 2423
251, 253, 255, 257,		\ACM@NRadjust . . . .
262, 264, 266, 268,		. . . . 2405, 2438,
270, 272, 2649, 2650		2442, 2446, 2450, 2454
\@tempboxa . . . . . 611		\ACM@ps@headings . . .
		. . . . . 2399, 2403

\ACM@ps@myheadings .	1196, 1202, 1204,	\authorsaddresses 13, 1172
..... 2398, 2402	2001, 2063, 2105, 2123	
\ACM@ps@plain . 2397, 2401	\addtolength ... 739,	<b>B</b>
\ACM@restore@pagestyle	740, 741, 745, 746, 2191	\baselineskip .....
..... 2397	\addvspace .....	..... 1614, 1835,
\ACM@sect@format ...	\advance .....	1847, 1859, 1874,
..... 2424, 2426	760, 763, 765,	2191, 2436, 2437,
\ACM@sect@format@ ..	767, 769, 1105,	2440, 2441, 2444,
... 2413, 2426, 2428	1107, 1826, 1827,	2448, 2483, 2484,
\ACM@sect@format@null	1830, 1831, 1855,	2488, 2493, 2529,
..... 2427, 2428	1856, 2017, 2034,	2530, 2531, 2532,
\ACM@timestamp .....	2066, 2077, 2190,	2559, 2560, 2561, 2562
2210, 2298, 2388, 2393	2194, 2326, 2328, 2331	\begin . 20, 2199, 2206, 2332
\acmArticle .... 14, 1210	\affiliation .....	\beginingroup .... 326,
\acmArticleSeq . 14, 1212	1148, 1986, 2048, 2091	369, 383, 392, 477,
\acmBadgeL .....	\and .....	1576, 1915, 2406, 2623
15, 1242	1094, 1122,	\bfseries .. 770, 1610,
\acmBadgeR .....	1123, 1138, 1144,	1784, 1786, 1788,
15, 1237	1977, 1982, 1984,	1792, 1794, 1796,
\acmBooktitle ... 8, 1084	1994, 1999, 2008,	1798, 1800, 1960,
\acmConference .. 8, 1074	2042, 2057, 2063,	1963, 2154, 2339,
\acmConference@date	2085, 2100, 2105, 2120	2459, 2460, 2474,
1077, 1620, 2289, 2291	\andify .....	2475, 2477, 2478,
\acmConference@name	1677,	2480, 2481, 2486,
... 1076, 1085, 1086	1678, 1967, 1970, 2169	2491, 2499, 2500,
\acmConference@shortname	anonsuppress (environ-	2503, 2504, 2523, 2553
..... 1075,	ment) .....	\bgroup . 685, 688, 691,
1079, 1080, 1086,	21	696, 1156, 1664,
1087, 1620, 2288, 2290	\AtBeginDocument ...	1669, 2008, 2102,
\acmConference@venue	. 68, 85, 481, 489,	2111, 2130, 2135, 2145
1078, 1620, 2289, 2291	731, 1361, 1367,	\bibfont ..... 212
\acmdefinition .... 2558	1389, 1393, 2404, 2429	\bibliofont ..... 212
\acmDOI .....	\AtEndDocument .... 1306	\bibliographystyle . 487
15, 1228	\AtEndPreamble ....	\bibsection .....
\acmISBN .....	. 457, 649, 2570, 2632	208
14, 1226	\author .....	\bibstyle 236, 238, 280, 492
\acmJournal .....	9,	\bibstyle@acmauthoryear
7, 1068	1104, 1573, 1574, 2150	..... 286
\acmMonth .....	\author@bx 2004, 2009, 2012	\bibstyle@acmnumeric 292
14, 1216	\author@bx@sep ....	\bigskip .. 1308, 1744,
\acmNumber .....	..... 2006, 2012,	1850, 1878, 1886,
14, 1208	2017, 2034, 2066, 2077	2063, 2105, 2130, 2177
\acmplain .....	\author@bx@wd .....	\box 712, 1728, 1730, 1732,
2528	..... 2005, 2008,	1734, 1736, 1738,
\acmPrice ... 14, 1222,	2016, 2017, 2019,	1740, 1742, 1744,
1361, 1367, 1389, 1393	2025, 2027, 2029,	2000, 2012, 2061, 2132
\acmSubmissionID 14, 1224	2031, 2034, 2065,	<b>C</b>
\acmVolume .....	2066, 2068, 2074, 2077	\c@footnote ..... 1579
14, 1206	\authornote .....	\c@secnumdepth ....
\acmYear .....	. 13, 1155, 1194, 2151	318, 332, 336, 345, 349
14, 1214	\authornotemark . 13, 1200	
\addcontentsline 210,	\authors .....	
335, 348, 2137, 2625	1115, 1118, 1123,	
\additionalaffiliation	1677, 1679, 1685, 2155	
..... 10, 1155		
\addpenalty .....		
311		
\addresses .....		
1110, 1112, 1117,		
1122, 1151, 1169,		

<code>\captionsetup</code> . . . . .	<code>\columnwidth</code> . . . . .	425, 723, 724, 725, 726,
. . . 655, 657, 659,	592, 696, 2065, 2102	754, 759, 762, 764,
661, 670, 672, 675,	<code>\contentsnamefont</code> . . . . .	766, 768, 838, 839,
678, 685, 688, 691, 2131	<code>\copy</code> . . . . .	840, 842, 843, 844,
<code>\ccdesc@parse@finish</code> 1335	<code>\copyright</code> . . . . .	846, 847, 848, 850,
<code>\ccsdesc</code> . . . . . 15, 1313	<code>\copyrightpermissionfootnoterule</code>	852, 853, 857, 858,
<code>\ccsdesc@parse</code> 1314, 1315	. . . . . 591	859, 861, 862, 863,
<code>\ccsdesc@parse@end</code> .	<code>\copyrightyear</code> . . . . . 16, 1558	865, 866, 867, 869,
. . . . . 1314, 1335	<code>\country</code> 11, 1165, 1895, 2119	870, 871, 873, 874,
<code>\ccsdesc@parse@finish</code>	<code>\csname</code> . . . . .	875, 877, 878, 880,
. . . . . 1334, 1335	280, 331, 333, 337,	881, 882, 886, 887,
CCSXML (environment) . . . 15	344, 346, 350, 379,	888, 892, 893, 894,
<code>\centering</code> 396, 429, 508,	399, 400, 414, 428,	898, 899, 900, 904,
689, 692, 1852,	1317, 1318, 1320,	905, 906, 908, 909,
1864, 2009, 2062, 2338	1321, 1322, 1323,	910, 912, 913, 915,
<code>\cite</code> . . . . . 470, 471, 482, 486	1324, 1327, 1329,	916, 917, 919, 920,
<code>\citeA</code> . . . . . 476	1690, 1692, 2407, 2430	921, 923, 925, 927,
<code>\citealt</code> . . . . . 475	<code>\CurrentOption</code> . . . . . 129,	928, 929, 931, 933,
<code>\citeANP</code> . . . . . 472	130, 131, 132, 133, 134	934, 935, 937, 938,
<code>\citeauthor</code> . . . . . 472		939, 941, 942, 943,
<code>\citeN</code> . . . . . 470	<b>D</b>	945, 946, 947, 949,
<code>\citename</code> . . . . . 483	<code>\day</code> . . . . . 2222	950, 951, 953, 954,
<code>\citeNN</code> . . . . . 473	<code>\DeclareNewFootnote</code>	955, 957, 958, 959,
<code>\citeNP</code> . . . . . 475	. . . . . 595, 597	961, 962, 963, 965,
<code>\citem</code> . . . . . 471	<code>\DeclareOptionX</code> . . . . .	966, 967, 969, 970,
<code>\citestyle</code> . . . . . 23, 278, 298	. . . . . 38, 129,	971, 973, 974, 975,
<code>\citeyear</code> . . . . . 474	130, 131, 132, 133, 134	977, 978, 979, 981,
<code>\citeyearNP</code> . . . . . 474	<code>\DeclareRobustCommand</code>	982, 983, 985, 986,
<code>\citeyearpar</code> . . . . . 473, 486	. . . . . 476, 2426	987, 989, 990, 991,
<code>\city</code> . . . . . 11, 1162, 1895, 2116	<code>\DeclareTextFontCommand</code>	993, 994, 995, 997,
<code>\ClassError</code> . . . . .	. . . . . 650	998, 1000, 1001,
. . . 35, 1066, 1154,	<code>\def</code> 25, 38, 128, 175, 177,	1002, 1004, 1005,
1262, 1268, 1274, 2149	179, 181, 183, 185,	1007, 1008, 1009,
<code>\ClassInfo</code> . . . . .	187, 189, 191, 215,	1010, 1012, 1013,
. . . 136, 194, 1064,	217, 219, 221, 223,	1014, 1016, 1017,
1259, 1261, 1265,	225, 227, 229, 231,	1018, 1020, 1021,
1267, 1271, 1273, 1276	233, 235, 237, 239,	1022, 1024, 1025,
<code>\ClassWarning</code> . . . . .	240, 241, 242, 243,	1026, 1028, 1029,
. . . 27, 141, 629,	244, 245, 246, 247,	1030, 1032, 1033,
632, 635, 1249, 1277	248, 249, 251, 253,	1034, 1036, 1037,
<code>\cleaders</code> . . . . . 1892	255, 257, 258, 262,	1038, 1040, 1041,
<code>\clubpenalty</code> . . . . . 368, 374	264, 266, 268, 270,	1042, 1044, 1045,
<code>\CodelineIndex</code> . . . . . 17	272, 300, 316, 341,	1046, 1048, 1049,
<code>\Collect@Body</code> . . . . . 684,	355, 379, 380, 389,	1050, 1052, 1053,
687, 690, 1253, 1561	392, 405, 406, 407,	1054, 1056, 1057,
<code>\color</code> . . . . . 1612, 2189, 2193	408, 410, 421, 433,	1058, 1060, 1061,
<code>\color@begingroup</code> 416, 429	438, 439, 440, 441,	1062, 1068, 1069,
<code>\color@endbox</code> . . . . . 710	487, 591, 598, 600,	1070, 1071, 1072,
<code>\color@endgroup</code> . . . . .	612, 685, 688, 691,	1073, 1084, 1088,
. . . . . 419, 432, 609	696, 698, 702, 705,	1089, 1090, 1096,

1133, 1155, 1156,	2409, 2411, 2413,	123, 147, 260, 281,
1157, 1158, 1159,	2423, 2427, 2434,	310, 317, 320, 332,
1160, 1171, 1172,	2455, 2459, 2460,	336, 340, 345, 349,
1174, 1175, 1183,	2461, 2462, 2468,	361, 373, 388, 464,
1184, 1193, 1194,	2469, 2471, 2472,	480, 486, 488, 603,
1206, 1208, 1210,	2474, 2475, 2477,	642, 660, 1086,
1212, 1214, 1216,	2478, 2480, 2481,	1092, 1106, 1113,
1218, 1222, 1224,	2486, 2491, 2496,	1116, 1120, 1121,
1226, 1228, 1238,	2499, 2500, 2503,	1129, 1132, 1137,
1239, 1240, 1241,	2504, 2506, 2507,	1140, 1143, 1150,
1243, 1244, 1245,	2509, 2510, 2511,	1168, 1180, 1189,
1246, 1247, 1249,	2512, 2521, 2522,	1195, 1203, 1260,
1251, 1254, 1256,	2523, 2524, 2539,	1266, 1272, 1283,
1279, 1291, 1292,	2540, 2541, 2542,	1286, 1296, 1299,
1316, 1335, 1395,	2551, 2552, 2553,	1302, 1307, 1326,
1397, 1434, 1435,	2554, 2598, 2599,	1330, 1331, 1567,
1558, 1560, 1562,	2608, 2609, 2629,	1585, 1596, 1600,
1571, 1584, 1589,	2631, 2647, 2648, 2649	1601, 1608, 1615,
1598, 1604, 1697,	\define@boolkey ....	1618, 1619, 1625,
1718, 1759, 1781,	49, 57, 65, 74, 82,	1630, 1637, 1642,
1802, 1823, 1851,	94, 102, 110, 118,	1645, 1646, 1649,
1879, 1888, 1895,	1153, 1257, 1263, 1269	1651, 1652, 1653,
1896, 1898, 1899,	\define@choicekey ..	1654, 1664, 1669,
1900, 1901, 1903,	..... 32, 778, 1342	1672, 1721, 1747,
1905, 1906, 1909,	\define@cmdkey .... 1275	1752, 1825, 1829,
1912, 1915, 1939,	\definecolor .....	1834, 1842, 1845,
1940, 1944, 1945,	... 496, 497, 498,	1858, 1866, 1873,
1948, 1949, 1951,	499, 500, 501, 502, 503	1883, 1889, 1890,
1952, 1954, 1955,	\department .....	1903, 1904, 1905,
1957, 1958, 1960,	. 11, 1159, 1895, 2118	1906, 1908, 1909,
1961, 1963, 1964,	\description .....	1912, 1969, 1981,
1966, 1968, 1973,	\descriptionlabel 770, 773	1987, 1993, 2009,
1974, 1975, 1976,	\dimexpr .. 694, 712, 2295	2020, 2030, 2039,
1978, 1985, 1986,	\divide 2019, 2025, 2027,	2045, 2052, 2069,
1987, 2008, 2015,	2029, 2031, 2068, 2074	2073, 2082, 2088,
2037, 2043, 2048,	\do .....	2095, 2108, 2110,
2064, 2080, 2086,	\DocInput .....	2129, 2136, 2140,
2091, 2106, 2112,	\documentclass .....	2146, 2152, 2156,
2113, 2114, 2115,	\dots .....	2157, 2166, 2168,
2116, 2117, 2119,		2175, 2219, 2230,
2120, 2121, 2122,	<b>E</b>	2231, 2240, 2250,
2125, 2126, 2127,	\edef 129, 130, 131, 132, 317	2258, 2268, 2279,
2128, 2130, 2135,	\editor .....	2283, 2287, 2323,
2145, 2146, 2147,	9, 1090	2350, 2354, 2364,
2148, 2149, 2152,	\egroup .....	2374, 2381, 2389,
2177, 2178, 2179,	610,	2392, 2410, 2434,
2186, 2196, 2203,	686, 689, 692, 703,	2631, 2636, 2643, 2651
2227, 2232, 2237,	709, 1166, 1666,	\email .....
2308, 2315, 2320,	1675, 2011, 2105,	9, 1167,
2322, 2400, 2405,	2124, 2131, 2144, 2176	1985, 2043, 2086, 2122
	\else ... 52, 60, 69, 77,	\emph .....
	89, 97, 105, 113,	1636, 1638

<code>\empty</code> . . . . .	2238	<code>\fancyhead</code> .	2246, 2247,	1569, 1574, 1575,
<code>\EnableCrossrefs</code> . . . .	19		2248, 2249, 2254,	1585, 1587, 1599,
<code>\end</code> . . . . .	22, 2201, 2208, 2340		2255, 2256, 2257,	1605, 1606, 1607,
<code>\end@dblfloat</code> . . . . .	701		2263, 2265, 2266,	1613, 1616, 1617,
<code>\end@float</code> . . . . .	703		2273, 2275, 2276,	1621, 1622, 1627,
<code>\endcsname</code> . . . . .	279,		2277, 2285, 2286,	1639, 1644, 1649,
	280, 331, 333, 337,		2288, 2290, 2348,	1653, 1654, 1655,
	344, 346, 350, 379,		2359, 2360, 2361,	1656, 1657, 1658,
	399, 400, 414, 428,		2369, 2370, 2371,	1659, 1667, 1668,
	1317, 1318, 1320,		2379, 2380, 2382, 2383	1674, 1676, 1683,
	1321, 1322, 1323,	<code>\fancyheadoffset</code> . . .		1717, 1723, 1751,
	1324, 1327, 1329,		. . . . .	2295, 2362, 2372
	1690, 1692, 2407, 2430	<code>\fancyhf</code> . . . . .	2234, 2343	1779, 1801, 1822,
<code>\enddescription</code> . . . .	777	<code>\fancypagestyle</code>	2233, 2342	1828, 1832, 1838,
<code>\endgroup</code> . . . . .	330, 369,	<code>\fi</code> . . . . .	54, 62, 71, 79, 91,	1844, 1849, 1861,
	387, 402, 1660,		99, 107, 115, 125,	1863, 1868, 1876,
	1937, 2409, 2411, 2627		144, 149, 171, 192,	1877, 1885, 1893,
<code>\endlist</code> . . . . .	775, 777		193, 204, 216, 218,	1903, 1905, 1906,
<code>\endminipage</code> . . . . .	600		220, 222, 224, 226,	1908, 1909, 1912,
<code>\endtrivlist</code> . . . . .	2620		228, 230, 232, 234,	1914, 1936, 1965,
<code>\enspace</code> . . . . .	2507		236, 238, 240, 242,	1972, 1983, 1997,
environments:			244, 246, 248, 250,	1998, 2009, 2032,
<code>abstract</code> . . . . .	18		252, 254, 256, 258,	2033, 2041, 2047,
<code>acks</code> . . . . .	22		263, 265, 267, 269,	2056, 2075, 2076,
<code>anonsuppress</code> . . . .	21		271, 273, 274, 283,	2084, 2090, 2099,
<code>CCSXML</code> . . . . .	15		285, 299, 301, 307,	2108, 2110, 2134,
<code>marginfigure</code> . . . .	20		312, 317, 323, 334,	2142, 2144, 2146,
<code>marginable</code> . . . . .	20		338, 347, 351, 353,	2153, 2156, 2170,
<code>printonly</code> . . . . .	21		376, 377, 390, 401,	2173, 2174, 2175,
<code>screenonly</code> . . . . .	21		420, 456, 466, 484,	2195, 2202, 2209,
<code>sidebar</code> . . . . .	20		486, 490, 493, 511,	2221, 2226, 2230,
<code>teaserfigure</code> . . . .	18		575, 589, 607, 625,	2231, 2239, 2241,
<code>\everypar</code>	309, 364, 375, 2139		644, 647, 653, 680,	2242, 2246, 2247,
<code>\excludecomment</code> .	1311,		681, 700, 704, 729,	2252, 2261, 2271,
	2635, 2637, 2641, 2642		1063, 1081, 1087,	2282, 2284, 2292,
<code>\ExecuteOptionsX</code> . . .			1095, 1109, 1114,	2293, 2296, 2299,
	48, 56, 64, 73, 81,		1119, 1124, 1125,	2321, 2340, 2349,
	93, 101, 109, 117, 127		1130, 1131, 1139,	2352, 2358, 2368,
<code>\expandafter</code>	259, 261,		1145, 1146, 1147,	2378, 2384, 2385,
	489, 611, 1317,		1152, 1170, 1182,	2391, 2394, 2395,
	1318, 1320, 1321,		1192, 1199, 1205,	2421, 2432, 2434,
	1327, 1329, 2407, 2430		1221, 1262, 1268,	2505, 2527, 2557,
			1274, 1288, 1289,	2595, 2612, 2631,
			1298, 1304, 1305,	2639, 2645, 2648, 2652
<b>F</b>			1309, 1325, 1332,	<code>\firstpagestyle</code> . . . .
<code>\familydefault</code> . . . .	652		1333, 1355, 1358,	2342
<code>\fancyfoot</code> . . . . .	2251,		1362, 1368, 1371,	<code>\floatname</code> . . . . .
	2259, 2269, 2280,		1374, 1377, 1380,	683
	2284, 2298, 2349,		1383, 1386, 1390,	<code>\footnote</code> . . . . .
	2351, 2355, 2365,		1394, 1433, 1557,	2149
	2375, 2384, 2388, 2393			<code>\footnotemark</code>
				441, 1176,
				1185, 2126, 2127, 2147
				<code>\footnoterule</code> . . . . .
				598



\footnotesep . . .	418, 431	\global . . . . .		\if@ACM@badge . . . . .	
\footnotesize . . . . .		363, 366, 402, 422,		1230, 1745, 1854, 1870	
. 424, 2218, 2251,		711, 1105, 1107,		\if@ACM@journal .	138,
2259, 2269, 2280,		1108, 1149, 1580,		656, 1284, 1602,	
2284, 2351, 2355,		1582, 1679, 1680,		1619, 1635, 1647,	
2365, 2375, 2384, 2390		1977, 1999, 2000,		1670, 1897, 2138, 2162	
\footnotetext . .	1179,	2009, 2057, 2060,		\if@ACM@manuscript .	
1181, 1188, 1191, 1198		2100, 2132, 2190, 2194		. . . . .	137,
\footnotetextauthorsaddress		\grantnum . . . . .	22, 2630	201, 1281, 1618, 1628	
. . . . .	1597, 1603	\grantsponsor . .	22, 2629	\if@ACM@natbib . . . . .	
\footnotetextcopyrightpermission				. . .	94, 206, 297, 469
. . . . .	1608	<b>H</b>		\if@ACM@natbib@override	
\footrulewidth 2236, 2345		\hbox . 433, 1584, 1589, 1891		. . . . .	94
\format . . . . .	32	\headrulewidth 2235, 2344		\if@ACM@newfonts 627, 638	
\frenchspacing . . . .	2653	\hfill . . . . .	1881, 2193	\if@ACM@nonacm . .	82,
\fulltextwidth . . . .		\href . 1748, 1753, 1835,		1608, 1646, 2157,	
. . . . .	693, 696, 712	1847, 1859, 1874, 2651		2250, 2258, 2268,	
		\hrule . . . . .	592, 599, 1881	2279, 2287, 2350,	
		\hsize . . . . .	425,	2354, 2364, 2374, 2389	
<b>G</b>		1583, 1823, 1824,		\if@ACM@printacmref	
\g@addto@macro . . . .		1851, 1853, 1879,		. . . . .	1263, 1681
1094, 1122, 1123,		1916, 2008, 2059, 2102		\if@ACM@printccs . . . . .	
1138, 1144, 1151,		\hskip . . . . .	328,	. . . . .	1257, 1663
1169, 1176, 1178,		342, 372, 385, 389,		\if@ACM@printfolios	
1181, 1185, 1187,		1750, 1837, 1846,		. . . . .	1269,
1190, 1196, 1197,		1862, 1871, 1892, 2617		2239, 2241, 2246,	
1202, 1204, 1297,		\hspace . . . . .	1446,	2247, 2284, 2349, 2384	
1303, 1322, 1329,		1457, 1466, 1491,		\if@ACM@review . . . . .	
1562, 1566, 1568,		1503, 1524, 2012, 2062		. 65, 2181, 2197, 2204	
1982, 1994, 2040,		\Huge . . . . .	1790, 1792,	\if@ACM@screen 49, 458, 2633	
2046, 2053, 2083,		1794, 1796, 1798, 1800		\if@ACM@sigchiamode	
2089, 2096, 2126, 2127		\hypersetup . . . . .		. . . . .	139,
\gdef . . . . .	1075,	. . 459, 465, 467, 1684		409, 651, 695, 701,	
1076, 1077, 1078,				1585, 1587, 2009, 2294	
1080, 1084, 1091,		<b>I</b>		\if@ACM@timestamp . .	
1093, 1112, 1115,		\if . . . . .	260	110, 2210, 2297, 2386	
1117, 1118, 1128,		\if@ACM@acmthm . 57, 2571		\if@acmowned . . . . .	1340
1136, 1142, 1254,		\if@ACM@affiliation@obeyrules		\if@acm@new . . . . .	398, 491
1278, 1295, 1301,		. . . . .	1153,	\if@insideauthorgroup	
1318, 1320, 1321,		1890, 1903, 1905,		. . . . .	1102, 1106
1327, 1720, 1980,		1906, 1907, 1909, 1912		\if@nobreak . . . . .	308
1984, 1989, 2013,		\if@ACM@anonymous 102,		\if@noskipsec . .	301, 365
2014, 2035, 2036,		1111, 1121, 1126,		\if@printcopyright .	
2038, 2042, 2044,		1150, 1168, 1177,		. . . . .	1336, 1623
2049, 2078, 2079,		1186, 1195, 1565,		\if@printpermission	
2081, 2085, 2087, 2092		1572, 1601, 2228, 2640		. . . . .	1338, 1616
\geometry . . . . .		\if@ACM@authordraft		\ifcase . . . . .	
515, 518, 525, 532,		. . . . .	118, 504, 1609	151, 173, 444, 513,	
539, 546, 553, 560, 567		\if@ACM@authorversion		578, 663, 715, 836,	
\getrefnumber . . . . .	2146	. . . . .	74, 1615, 1631	1218, 1398, 1436,	

1698, 1726, 1760, 1782, 1803, 1917, 1941, 2021, 2070, 2244, 2309, 2346, 2464, 2513, 2543, 2600	2238, 2407, 2430, 2434, 2631, 2648, 2650	\LARGE ..... 1784, 1786, 1788, 1811, 1813, 1815, 1817, 1819, 1948, 1951, 2339
\ifcsname ..... 279	\ifxetex ..... 640	\Large 1939, 1957, 2474, 2475, 2477, 2478, 2480
\ifdim 305, 325, 357, 382, 2192	\ignorespaces ..... ... 378, 418, 431, 1157, 1158, 1160, 1171, 1895, 1896, 1898, 1899, 1900, 1901, 1902, 1903, 2114, 2143, 2148, 2618	\large ..... 1610, 1944, 1949, 1952, 2468, 2469, 2471, 2472
\IfFileExists 629, 632, 635	\immediate ..... 400, 492	\lastbox ..... 367, 2139
\IfInteger ..... 1276	\includecomment ..... ... 2634, 2638, 2644	\leaders ..... 1881
\ifNAT@numbers ..... 486	\includegraphics ... ... 1749, 1754, 1836, 1848, 1860, 1875	\leavevmode 301, 1881, 2061
\ifnum ..... 140, 145, 317, 318, 332, 336, 345, 349, 1330, 1331, 1351, 1356, 1359, 1363, 1369, 1372, 1375, 1378, 1381, 1384, 1387, 1391, 1574, 2018, 2067, 2107, 2109, 2146, 2323, 2325, 2387	\indent ..... 2599	\leftmargin ..... 754, 759, 762, 764, 766, 768
\ifPDFTeX ..... 615	\input ..... 616	\leftmargini ... 738, 739, 740, 741, 754, 755
\ifvmode ..... 1889	\InputIfFileExists .. 26	\leftmarginii .. 744, 745, 746, 747, 759, 760
\ifvoid ..... 603	\institution ..... . 11, 1158, 1895, 2115	\leftmarginiii ..... ... 747, 748, 762, 763
\ifx ..... 172, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 262, 264, 266, 268, 270, 272, 488, 1079, 1086, 1090, 1110, 1113, 1127, 1129, 1134, 1135, 1141, 1201, 1293, 1294, 1300, 1307, 1317, 1326, 1596, 1600, 1640, 1649, 1652, 1653, 1654, 1664, 1669, 1719, 1747, 1752, 1825, 1829, 1834, 1842, 1845, 1858, 1866, 1873, 1883, 1969, 1979, 1987, 1988, 2037, 2043, 2048, 2080, 2086, 2091, 2129, 2136, 2152, 2156, 2168, 2175, 2219, 2230,	\interfootnotelinepenalty ..... 412	\leftmarginiv ..... ... 748, 749, 764, 765
	\interlinepenalty .. ..... 329, 386, 412	\leftmarginv ..... ... 749, 750, 766, 767
	\item ..... 2617	\leftmarginvi 750, 768, 769
	\itshape .. 1620, 2461, 2462, 2491, 2496, 2509, 2521, 2541, 2608	\leftskip . 1880, 2103, 2457
	<b>J</b>	\let ..... 236, 238, 250, 252, 254, 280, 319, 434, 435, 470, 471, 472, 473, 474, 475, 478, 482, 613, 648, 697, 758, 773, 777, 1161, 1162, 1163, 1164, 1165, 1312, 1577, 1578, 1593, 1594, 1595, 1598, 1604, 1679, 1680, 1910, 1911, 1913, 1977, 1999, 2057, 2063, 2100, 2105, 2397, 2398, 2399, 2401, 2402, 2403, 2412, 2414, 2416, 2417, 2419, 2425, 2428, 2431
	\jobname ..... 397, 400	\libertineLF ..... 650
	<b>K</b>	\lineskip ..... 2062, 2104
	\kern 591, 592, 598, 599, 1881	\linespacing ... 395, 396
	\keywords ..... 15, 1251	\liningnums ..... 648
	<b>L</b>	\list ..... 771
	\l@section ..... 405	
	\l@subsection .. 405, 406	
	\l@subsubsection ... 407	
	\labelenumi ..... 723	
	\labelenumii ..... 724	
	\labelenumiii ..... 725	
	\labelenumiv ..... 726	
	\labelsep ..... 732, 740, 745, 755, 760, 763, 765, 767, 769, 2617	
	\labelwidth . 755, 760, 763, 765, 767, 769, 772	

<code>\listisep</code> . . .	752, 753, 757	<code>\NAT@aysep</code> . . . . .	267	<code>\newtheoremstyle</code> . . .	
<code>\listparindent</code> . . . .	756	<code>\NAT@citetp</code> . . . . .	478	. . . . .	2528, 2558
<code>\LoadClass</code> . . . . .	195	<code>\NAT@close</code> . . . . .		<code>\newwrite</code> . . . . .	399
<code>\long</code> . . . . .	410,	216, 218, 220, 222, 265		<code>\next</code> . . . .	2409, 2411, 2421
421, 685, 688, 691,		<code>\NAT@cmprs</code> . .	244, 246, 248	<code>\nobreak</code> . . . . .	358, 2154
1254, 1256, 1562, 2178		<code>\NAT@cmt</code> . . . . .	271	<code>\noindent</code> . . . . .	408,
<code>\loop</code> . . . . .	2189, 2324	<code>\NAT@ctype</code> . . . . .	478	1308, 1595, 1700,	
<code>\LTX@adddotafter</code> . . .		<code>\NAT@find@eq</code> . . . . .	259	1702, 1704, 1706,	
. . . . .	2431, 2434	<code>\NAT@fullfalse</code> . . . .	478	1725, 1746, 1833,	
		<code>\NAT@longnamestrue</code> .	256	1840, 1843, 1867,	
		<code>\NAT@merge</code> . .	250, 252, 254	1881, 1882, 1884,	
<b>M</b>		<code>\NAT@nmfmt</code> . . . . .	258	1967, 2000, 2001,	
<code>\makeatletter</code> . . . . .	392	<code>\NAT@numbersfalse</code> . .	230	2060, 2104, 2132,	
<code>\makebox</code> . . . . .	1610, 2333	<code>\NAT@numberstrue</code> 232, 234		2133, 2154, 2155, 2609	
<code>\makelabel</code> . . . . .	773	<code>\NAT@open</code> . . . . .	216,	<code>\nolinkurl</code> . . . . .	2044,
<code>\MakeTextUppercase</code> .		218, 220, 222, 263, 478		2046, 2087, 2089, 2122	
. . . .	1980, 1982,	<code>\NAT@partrue</code> . . . . .	478	<code>\normalcolor</code> . . . . .	605
2459, 2468, 2471,		<code>\NAT@rem@eq</code> . . . . .	261	<code>\normalfont</code> 433, 1308,	
2474, 2477, 2499, 2503		<code>\NAT@sep</code> 224, 226, 228, 273		1589, 1940, 1945,	
<code>\maketitle</code> . . . . .	19, 1571	<code>\NAT@sort</code> . . .	240, 242, 248	1954, 1955, 1957,	
<code>\MakeUppercase</code> . . . .	2418	<code>\NAT@superfalse</code> . . . .	232	1958, 2524, 2539,	
<code>\marginfigure</code> . . . . .	687	<code>\NAT@supertrue</code> . . . .	234	2551, 2554, 2615, 2653	
<code>marginfigure</code> (environ-		<code>\NAT@swafalse</code> . . . . .	477	<code>\normalparindent</code> . . .	590
ment) . . . . .	20	<code>\NAT@up</code> . . . . .	258	<code>\normalsize</code> 1802, 1940,	
<code>\marginpar</code> . . . . .	410,	<code>\NAT@yrsep</code> . . . . .	269	1954, 1955, 1958, 2653	
686, 689, 692, 1746		<code>\NeedsTeXFormat</code> . . . . .	1	<code>\num@authorgroups</code> . .	
<code>\marginparsep</code> . .	694, 2295	<code>\newblock</code> . . . . .	479	. . . . .	1098,
<code>\marginparwidth</code> .	694, 2295	<code>\newbox</code> . .	1570, 1887, 2004	1107, 1574, 2021,	
<code>\margintable</code> . . . . .	690	<code>\newcommand</code> .	286, 292,	2025, 2027, 2070, 2109	
<code>margintable</code> (environ-		485, 1074, 1148,		<code>\num@authors</code> . . . . .	
ment) . . . . .	20	1200, 1237, 1242,		. . .	1100, 1105, 2107
<code>\mbox</code> . . . . .	258	1292, 1313, 1902,		<code>\number</code> . . . . .	317
<code>\mdseries</code> . . . . .		1907, 2217, 2630, 2646		<code>\numberline</code> . . . .	337, 350
1805, 1807, 1809,		<code>\newcount</code> .	1098, 1100, 2184	<code>\numexpr</code> .	2212, 2214, 2216
1813, 1815, 1817,		<code>\newcounter</code> . . .	2213, 2215		
1819, 1821, 1961, 1964		<code>\newdimen</code> . . .	693, 730,	<b>O</b>	
<code>\medskip</code> . .	1700, 1702,	2005, 2302, 2304, 2306		<code>\onehalfspacing</code> . . . .	203
1704, 1706, 2000,		<code>\newenvironment</code> . . . .		<code>\openout</code> . . . . .	400
2002, 2061, 2133, 2154		. . . . .	687, 690, 1561	<code>\or</code> . . . . .	154, 156, 158,
<code>\mktitle@bx</code> . . . .	1570,	<code>\newfloat</code> . . . . .	682	160, 162, 164, 166,	
1728, 1730, 1732,		<code>\newif</code> . . . . .	137, 138,	168, 176, 178, 180,	
1734, 1736, 1738,		139, 627, 1102,		182, 184, 186, 188,	
1740, 1742, 1744,		1230, 1336, 1338, 1340		190, 446, 447, 448,	
1833, 1852, 1880,		<code>\newlength</code> . . . . .		449, 450, 451, 453,	
2000, 2060, 2061, 2132		1232, 1234, 1235, 2183		454, 517, 524, 531,	
<code>\month</code> . . . . .	1217, 2222	<code>\newsavebox</code> . . . . .	2182	538, 545, 552, 559,	
<code>\moveleft</code> . . . . .	711	<code>\newskip</code> . . . . .	752, 2006	566, 580, 581, 582,	
<code>\multiply</code> . . . . .	2330	<code>\newtheorem</code> . . . . .		584, 585, 586, 587,	
		2574, 2577, 2580,		588, 665, 666, 667,	
<b>N</b>		2583, 2586, 2590, 2593		668, 669, 671, 674,	
<code>\NAT@setcites</code> . . . .	276				

677, 717, 718, 719,	2363, 2373, 2466,	2130, 2131, 2132,
720, 721, 722, 727,	2467, 2470, 2473,	2133, 2143, 2154,
728, 841, 845, 849,	2476, 2479, 2497,	2176, 2177, 2178, 2613
856, 860, 864, 868,	2501, 2515, 2516,	\paragraph 1712, 2447, 2487
872, 876, 879, 885,	2517, 2518, 2519,	\parbox 508, 1839, 1857,
891, 897, 903, 907,	2520, 2525, 2526,	1864, 1872, 2187, 2337
911, 914, 918, 922,	2545, 2546, 2547,	\parindent 576, 590, 739,
924, 926, 930, 932,	2548, 2549, 2550,	1598, 1604, 1614,
936, 940, 944, 948,	2555, 2556, 2602,	2447, 2458, 2510, 2540
952, 956, 960, 964,	2603, 2604, 2605,	\parskip ..... 576, 1614
968, 972, 976, 980,	2606, 2607, 2610, 2611	\part ..... 2451
984, 988, 992, 996,	\orcid ..... 9, 1171	\PassOptionsToClass
999, 1003, 1006,	\outer@nobreak .... 708	..... 133, 134
1011, 1015, 1019,		\pdfgentounicode ... 624
1023, 1027, 1031,	<b>P</b>	\pdfglyphtounicode .
1035, 1039, 1043,	\p@ ..... 403,	..... 617, 618,
1047, 1051, 1055,	576, 583, 591, 592,	619, 620, 621, 622, 623
1059, 1218, 1219,	598, 599, 2436,	\pdfstringdefDisableCommands
1220, 1399, 1401,	2440, 2444, 2445,	..... 437
1404, 1406, 1407,	2448, 2449, 2452,	\phantomsection ....
1409, 1411, 1413,	2453, 2483, 2488,	.... 210, 2137, 2625
1416, 1419, 1422,	2489, 2493, 2494, 2615	\popQED ..... 2620
1424, 1427, 1430,	\PackageError ..... 54, 62, 71, 79,	\position ... 11, 1157,
1437, 1448, 1459,	91, 99, 107, 115, 125	1161, 1162, 1163,
1467, 1473, 1479,	\PackageInfo ..... 51, 53, 59, 61, 67,	1164, 1165, 1895, 2114
1493, 1505, 1512,	70, 76, 78, 84, 90,	\postcode ..... 11, 1164, 1895, 2113
1526, 1533, 1539,	96, 98, 104, 106,	printonly (environment) 21
1546, 1551, 1701,	112, 114, 120, 124,	\ProcessOptionsX ... 135
1703, 1705, 1707,	855, 884, 890, 896, 902	\proof ..... 2613
1709, 1711, 1713,	\PageIndex ..... 16	\proofname ..... 2613
1715, 1729, 1731,	\pageref ..... 2224	\protect ..... 337, 350
1733, 1735, 1737,	\pagestyle ..... 2301	\protected@edef ....
1739, 1741, 1743,	\par . 302, 358, 394, 601,	..... 322, 413, 427
1763, 1765, 1767,	706, 1308, 1598,	\providecommand ....
1769, 1771, 1773,	1604, 1616, 1620,	..... 479, 483, 2508
1775, 1777, 1785,	1666, 1675, 1700,	\ProvidesClass ..... 5
1787, 1789, 1791,	1702, 1704, 1706,	\ProvidesFile ..... 3
1793, 1795, 1797,	1728, 1730, 1732,	\ps@headings .. 2399, 2403
1799, 1806, 1808,	1744, 1843, 1850,	\ps@myheadings 2398, 2402
1810, 1812, 1814,	1867, 1878, 1881,	\ps@plain ..... 2397, 2401
1816, 1818, 1820,	1884, 1886, 1905,	\pushQED ..... 2614
1920, 1922, 1924,	1906, 1908, 1909,	\put ..... 2200, 2207
1926, 1928, 1930,	1967, 1971, 2000,	
1932, 1934, 1943,	2002, 2008, 2010,	<b>Q</b>
1946, 1947, 1950,	2038, 2040, 2046,	\qed ..... 2614
1953, 1956, 1959,	2053, 2061, 2063,	\quad ..... 379, 2264,
1962, 2023, 2024,	2081, 2083, 2089,	2267, 2274, 2278, 2388
2026, 2028, 2072,	2096, 2103, 2105,	
2253, 2262, 2272,		
2311, 2316, 2353,		

<b>R</b>		
\raggedright . . . . .	212, 213, 216, 218,	1880, 1891, 2000,
... 1839, 1880, 2103	220, 222, 224,	2009, 2060, 2132, 2139
\raisebox . . . . .	226, 228, 278,	\setcitestyle . . . . .
1610, 1835, 1847,	652, 770, 1104,	... 23, 213, 287, 293
1859, 1874, 2333, 2335	1167, 1563, 1579,	\setcopyright . . 16, 1395
\real@adddotafter . .	2118, 2235, 2236,	\setcounter . . . . 1588,
... 2416, 2419	2344, 2345, 2435,	1661, 1722, 2214,
\realSectionFormat .	2439, 2443, 2447,	2216, 2463, 2498, 2502
... 2412, 2424, 2425	2451, 2482, 2487, 2492	\setkeys . . . . . 38,
\received . . . . . 18, 1292	\renewenvironment . .	143, 1068, 1279,
\RecordChanges . . . . . 18	. 684, 771, 1253, 2613	1395, 1990, 1991,
\ref . . . . . 2165, 2172	\repeat . . . . . 2192, 2327	1995, 1996, 2050,
\refname . . . . . 209, 210	\RequirePackage . . . .	2051, 2054, 2055,
\refstepcounter . . . . 321	... 30, 31, 196,	2093, 2094, 2097, 2098
\relax . . . . . 140,	197, 198, 199, 200,	\setlength 576, 577, 583,
145, 152, 174, 259,	202, 205, 207, 436,	590, 732, 733, 738,
260, 303, 322, 324,	494, 495, 505, 512,	744, 747, 748, 749,
328, 342, 356, 371,	593, 614, 626, 639,	750, 1233, 1236, 2188
381, 389, 400, 445,	641, 643, 645, 646,	\settopmatter . 18, 88,
514, 579, 613, 664,	654, 1310, 1315, 2180	1279, 1280, 1282,
716, 837, 1099,	\reset@font . . . . 411, 424	1285, 1287, 1290, 2161
1101, 1105, 1107,	\reversemarginpar . . 574	\setTrue . . . . . 393
1200, 1201, 1317,	\rightskip . . . . . 2456	\SetWatermarkColor . 507
1326, 1351, 1356,	\rlap . . . . . 2334	\SetWatermarkFontSize 506
1359, 1363, 1369,	\rule . . . . . 418, 431, 2336	\SetWatermarkText . . 508
1372, 1375, 1378,		\sfdefault . . . . . 652
1381, 1384, 1387,		\sffamily . . . . .
1391, 1398, 1436,	<b>S</b>	1784, 1786, 1788,
1593, 1594, 1699,	\savebox . . . . . 2187	1790, 1792, 1794,
1727, 1761, 1783,	screenonly (environ-	1798, 1939, 1944,
1804, 1918, 1942,	ment) . . . . . 21	1948, 2232, 2339,
2007, 2016, 2017,	\scriptsize . . . 2189, 2193	2459, 2460, 2461,
2018, 2019, 2022,	\scshape . . . . . 2511, 2598	2468, 2469, 2471,
2025, 2027, 2029,	\section . . . . . 209,	2472, 2477, 2478,
2031, 2034, 2062,	1708, 1710, 1714,	2499, 2500, 2503, 2504
2065, 2066, 2067,	1716, 2141, 2435, 2624	\shortauthors 19, 1127,
2068, 2071, 2074,	\section@raggedright	1128, 1135, 1136,
2077, 2107, 2109,	... 2455, 2459,	1138, 1141, 1142,
2126, 2146, 2185,	2460, 2468, 2469,	1144, 1678, 1680, 2231
2214, 2216, 2219,	2471, 2472, 2474,	\shortcite . . . . . 482, 485
2245, 2310, 2312,	2475, 2477, 2478,	\shorttitle . . . . 2249,
2313, 2314, 2317,	2480, 2481, 2486,	2257, 2267, 2278, 2285
2318, 2319, 2322,	2499, 2500, 2503, 2504	\showeprint . . . . . 2646
2323, 2325, 2328,	\SectionFormat . . . .	\sidebar . . . . . 682
2329, 2330, 2331,	2408, 2412, 2414, 2425	sidebar (environment) . 20
2347, 2387, 2407,	\SelectFootnoteRule	\skip . . . . . 604
2430, 2434, 2465,	... 594, 596	\small . . 411, 686, 689,
2514, 2544, 2601, 2615	\setbox . . . . . 367, 422,	692, 1308, 1700,
\removelastskip . . . . 394	711, 1833, 1852,	1702, 1704, 1706,
		1945, 2139, 2154, 2349

[illegible]