

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

Boris Veytsman<sup>†</sup>

2020/11/15, v1.75

## 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	20
2.5	Figures and tables	20
2.6	Descriptions of images	22
2.7	Theorems	22
2.8	Online-only and offline-only material	22
2.9	Note about anonymous mode	23
2.10	Acknowledgments	23
2.11	Bibliography	24
2.12	Colors	27
2.13	Other notable packages and typographic remarks	28
2.14	Disabled or forbidden commands	28
2.15	Notes for wizards	29
2.16	Currently supported publications	29
2.17	A note about sigchi-a format	31

---

\*©2016–2020, 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>33</b>
3.1	Identification	33
3.2	Preload hook	33
3.3	Options	33
3.4	Setting switches	37
3.5	Loading the base class and package	38
3.6	Citations	39
3.7	Paper size and paragraphing	47
3.8	Fonts	50
3.9	Image descriptions	51
3.10	Floats	52
3.11	Lists	54
3.12	Top-matter data	56
3.13	Concepts system	70
3.14	Copyright system	71
3.15	Maketitle hook	76
3.16	Typesetting top matter	77
3.17	Headers and Footers	93
3.18	Sectioning	99
3.19	TOC lists	102
3.20	Theorems	102
3.21	Balancing columns	105
3.22	Acknowledgments	106
3.23	Conditional typesetting	106
3.24	Additional bibliography commands	106
3.25	End of Class	107

# 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  $\text{\TeX}$  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  $\text{\LaTeX}$  package.

This package uses only free  $\text{\TeX}$  packages and fonts included in  $\text{\TeX}$ Live, Mik $\text{\TeX}$  and other popular  $\text{\TeX}$  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, Lawrence Christopher Angrave, Dirk Beyer, Andrew Black, Joachim Breitner, Benjamin Byholm, John Collins, Nils Anders Danielsson, Michael Ekstrand, Matthew Fluet, Paolo G. Giarrusso, Ben Greenman, Enrico Gregorio, Jamie Davis, Jason Hemann, Peter Kemp, Luis Leiva, Ben Liblit, Rholais Lii, LianTze Lim, Kuldeep S. Meel, Kai Mindermann, Frank Mittelbach, Serguei Mokhov, Ross Moore, John Owens, Joel Nider, Scott Pakin, Tobias Pape, Henning Pohl, Philip Quinn, Mathias Rav, Andreas Reichinger, Matteo Riondato, Craig Rodkin, Bernard Rous, Feras Saad, Kerry A. Seitz, Jr., David Shamma, Gabriel Scherer, Kartik Singhal, Stephen Spencer, Shin Hwei Tan, Daniel Thomas, Shari Trewin, 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  $\text{\TeX}$  Users Group. The world-wide  $\text{\TeX}$  Users Group is at <https://tug.org/>; please consider joining us if you use  $\text{\TeX}$  regularly.

### 2.1 Installation

Most probably, you already have this package installed in your favorite  $\text{\TeX}$  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://>

---

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

[github.com/borisveytsman/acmart](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.

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>
- *balance*, <http://www.ctan.org/pkg/balance>
- *booktabs*, <http://www.ctan.org/pkg/booktabs>
- *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>
- *hyperxmp*, <http://www.ctan.org/pkg/hyperxmp>
- *iftex*, <http://www.ctan.org/pkg/iftex>
- *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.

Starting in 2020, ACM retired formats `sigchi` and `sigchi-a`. SIGCHI conferences now use `sigconf` format for their publications. If a file uses `sigchi` format, a warning is issued, and the format is automatically switched to `sigconf`. Format `sigchi-a` can be used for non-ACM documents only (see Section 2.17).

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.

Two samples in the `samples` directory, `manuscript` and `acmsmall-submission`, show manuscripts formatted for submission to ACM.

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 Bib<sub>T</sub><sub>E</sub>X style is based on `natbib`. In most cases you do not need to set it. See Section 2.11.

Table 1: The possible values for the format option

Value	Meaning
<code>manuscript</code>	A manuscript. This is the default.
<code>acmsmall</code>	Small single-column format. Used for CIE, CSUR, JACM, JDIQ, JEA, JERIC, JETC, PACMCGIT, PACMHCI, PACMPL, TAAS, TACCESS, TACO, TALG, TALLIP (formerly TALIP), TCPS, TDS, TEAC, TECS, TELO, 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, TQC, TRETS, TSAS, TSC, TSLP and TWEB, including special issues.
<code>acmlarge</code>	Large single-column format. Used for DTRAP, HEALTH, IMWUT, JOCCH, POMACS and TAP, including special issues.
<code>acmtog</code>	Large double-column format. Used for TOG, including annual conference Technical Papers.
<code>sigconf</code>	Proceedings format for most ACM conferences (with the exceptions listed below) and all ICPS volumes.
<code>sigplan</code>	Proceedings format for SIGPLAN conferences.

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.

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`.

The option `balance` determines whether the last page in the two column mode has balanced columns. By default it is `true`; however, it may lead to problems for some documents. Set it to `false` if you encounter compilation errors. Note that for one page documents `\balance` command might cause problems.

The option `urlbreakonhyphens` determines whether URLs can be split between lines after hyphens. By default it is `true`. Set it to `false` to disallow these breaks.

## 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.

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 2.11)
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 2.7
balance	true	Whether to balance the last page in two column mode
urlbreakonhyphens	true	Whether to break urls on hyphens



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,

```
\acmJournal{TOMS}
```

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

`\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)}
```

An ACM paper should have either `\acmJournal` or `\acmConference` command. If it has both (or more) commands, the last one takes precedence. Note that if you have the command `\acmConference` in a journal format like `acmsmall`, the class will use conference format for bibstrip and reference citation formatting. In the samples directory there is a file `sample-acmsmall-conf.tex` with the example of this usage.

`\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:

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

Do *not* use the  $\LaTeX$  `\and` macro or commas, or `\\` between the authors! Each author deserves his or her own `\author` command. An attempt to list several authors or their e-mails in one command leads to a warning or an error. This is not a bug, but the expected behavior.

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.

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

The fields `\institution`, `\city` and `\country` are mandatory. If they are not provided, an error or a warning is issued. Currently the absence of `\country` produces an error; ACM may change this in the future.

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
Sonnenallee 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 2.10).

`\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{}`. Please note that authors' addresses are mandatory for journal articles.

`\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.

`\acmVolume` 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.

`\acmArticleSeq` 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.

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

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

`\acmPrice` 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 <i>after</i> the <code>\setcopyright</code> command. Also, the command <code>\acmPrice{}</code> suppresses the printing of the price.
<code>\acmISBN</code>	<p>Book-like volumes have ISBN numbers attached to them. The macro <code>\acmISBN{&lt;ISBN&gt;}</code> sets it. Normally it is set by the typesetter, for example,</p> <pre>\acmISBN{978-1-4503-3916-2}</pre> <p>Setting it to the empty string, as <code>\acmISBN{}</code>, suppresses printing the ISBN.</p>
<code>\acmDOI</code>	<p>The macro <code>\acmDOI{&lt;DOI&gt;}</code> sets the DOI of the article, for example,</p> <pre>\acmDOI{10.1145/9999997.9999999}</pre> <p>It is normally set by the typesetter. Setting it to the empty string, as <code>\acmDOI{}</code>, suppresses the DOI.</p>
<code>\acmBadgeR</code> <code>\acmBadgeL</code>	<p>Some conference articles get special distinctions, for example, the artifact evaluation for PPOPP 2016 (see <a href="http://ctuning.org/ae/ppopp2016.html">http://ctuning.org/ae/ppopp2016.html</a>). These articles display special badges supplied by the conference organizers. This class provides commands to add these badges: <code>\acmBadgeR[&lt;url&gt;]{&lt;graphics&gt;}</code> and <code>\acmBadgeL[&lt;url&gt;]{&lt;graphics&gt;}</code>. The first command puts the badge to the right of the title, and the second one—to the left. The arguments have the following meaning: <code>[&lt;url&gt;]</code>, if provided, sets the link to the badge authority in the screen version, while <code>{&lt;graphics&gt;}</code> 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 <code>ae-logo.pdf</code>, the command is</p> <pre>\acmBadgeR[http://ctuning.org/ae/ppopp2016.html]{ae-logo}</pre>
<code>\startPage</code>	<p>The macro <code>\startPage{&lt;page&gt;}</code> sets the first page of the article in a journal or book. It is used by the typesetter.</p>
<code>\terms</code> <code>\keywords</code>	<p>The command <code>\keywords{&lt;keyword, keyword,...&gt;}</code> sets keywords for the article. They must be separated by commas, for example,</p> <pre>\keywords{wireless sensor networks, media access control, multi-channel, radio interference, time synchronization}</pre>
CCSXML <code>\ccsdesc</code>	<p>ACM publications are classified according to the ACM Computing Classification Scheme (CCS). CCS codes are used both in the typeset version of the publications <i>and</i> in the metadata in various databases. Therefore you need to provide both TeX commands and XML metadata with the paper.</p> <p>The tool at <a href="http://dl.acm.org/ccs.cfm">http://dl.acm.org/ccs.cfm</a> can be used to generate CCS codes. After you select the topics, click on “Generate CCS codes” to get results like the following:</p> <pre>\begin{CCSXML} &lt;ccs2012&gt; &lt;concept&gt; &lt;concept_id&gt;10010520.10010553.10010562&lt;/concept_id&gt; &lt;concept_desc&gt;Computer systems organization~Embedded systems&lt;/concept_desc&gt;</pre>



```

    <concept_significance>500</concept_significance>
  </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`.

CCS Concepts and user-defined keywords are required for all articles over two pages in length, and are optional for one- and two-page articles (or abstracts).

`\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. This command must be placed in the preamble, before `\begin{document}`.

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

Table 3: Parameters for the `\setcopyright` command

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

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.

`abstract`      The environment `abstract` must *precede* the `\maketitle` command. Again, this is different from the standard  $\LaTeX$ . Putting `abstract` after `\maketitle` will trigger an error.

`teaserfigure`      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 `teaserfigure` is used for these figures. This environment must be used *before* `\maketitle`, for example,

```
\begin{teaserfigure}
  \includegraphics[width=\textwidth]{sampleteaser}
  \caption{This is a teaser}
  \label{fig:teaser}
\end{teaserfigure}
```

`\settopmatter`      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 `\settopmatter{<settings>}`. The settings and their meanings are listed in Table 4. For example,

```
\settopmatter{printacmref=false, printccs=true, printfolios=true}
```

The parameter `authorsperrow` requires some explanation. In conference proceedings authors' information is typeset in boxes, several boxes per row (see `sample-sigconf.pdf`, `sample-sigplan.pdf`, 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,

```
\settopmatter{authorsperrow=4}
```

However, in most cases you should *not* do this and should use the default settings. Setting `authorsperrow` to 0 will revert it to the default settings.

The parameter `printacmref` specifies whether to print the ACM bibliographic entry (default), or not. Note that this entry is required for all articles over one page in length, and is optional for one-page articles (abstracts).

`\received`      The command `\received[<stage>]{<date>}` sets the history of the publication. The `[<stage>]` argument is optional; the default is Received for the first date and revised for the subsequent ones. For example,

```
\received{February 2007}
\received[revised]{March 2009}
\received[accepted]{June 2009}
```

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

`\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`.

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`.

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}
```

Tables and 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 Descriptions of images

`\Description` Some readers of ACM publications might be visually challenged. These readers might use a voice-over software to read aloud the papers. It is important to provide them a description of each image used in the paper.

The command `\Description[<short description>]{<long description>}` should be placed inside every figure, `teaserfigure` or `marginfigure` environment to provide a description of the image(s) used in the figure. Unlike `\caption`, which is used alongside the image, `\Description` is intended to be used instead of the image, for example,

```
\begin{figure}
  \centering
  \includegraphics{voltage}
  \Description{A bell-like histogram centered at $0.5\text{~V}$ with most
    measurements between $0.2\text{~V}$ and $0.8\text{~V}$}
  \caption{Histogram of the measurements of voltage}
  \label{fig:voltage}
\end{figure}
```

At present the lack of descriptions generates a warning at compilation.

## 2.7 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.

## 2.8 Online-only and offline-only material

`printonly` Some supplementary material in ACM publications is put online but not in the printed 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.

## 2.9 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.

## 2.10 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  $\{\langle sponsorID \rangle\}$  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}
```

## 2.11 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 `BibTeX` 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 `\citep` 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 BibTeX 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 several special entry types. Types `online` and `game` are used 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",
}
```

Entry types `artifactsoftware`, `artifactdataset` (with synonyms `software` and `dataset`) can be used to cite software artifacts and datasets, for example,

```
@ArtifactSoftware{R,
  title = {R: A Language and Environment for Statistical Computing},
  author = {{R Core Team}},
  organization = {R Foundation for Statistical Computing},
  address = {Vienna, Austria},
  year = {2019},
  url = {https://www.R-project.org/},
}
@ArtifactDataset{UMassCitations,
  author = {Sam Anzaroot and Andrew McCallum},
  title = {{UMass} Citation Field Extraction Dataset},
  year = 2013,
  url =
    {http://www.iesl.cs.umass.edu/data/data-umasscitationfield},
  lastaccessed = {May 27, 2019}
}
```

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”.

## 2.12 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]: ACMBBlue, 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.

## 2.13 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.

## 2.14 Disabled or forbidden commands

The goal of `acmart` package is to provide a uniform look and feel for ACM publications. Accordingly, a number of commands is forbidden or disabled in `acmart`.

You may *not* put several authors or several e-mails into a `\author` or `\email` command. This may lead to errors or warning.

You cannot change `\baselinestretch` in your document: this produces an error.

You should not abuse the command `\vspace`: this command may disturb the type-setting of ACM papers.

You should not load `amssymb` package since the package `acmart` defines the corresponding symbols itself.

## 2.15 Notes for wizards

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.

`\AtBeginMaketitle` Another hook is `\AtBeginMaketitle`. The commands in this hook are executed before `\maketitle`, for example,

```
\AtBeginMaketitle{\acmPrice{125.00}}
```

## 2.16 Currently supported publications

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

Abbreviation	Publication
CIE	ACM Computers in Entertainment
CSUR	ACM Computing Surveys
DGOV	Digital Government: Research and Practice
DTRAP	Digital Threats: Research and Practice
HEALTH	ACM Transactions on Computing for Healthcare
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
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
TDS	ACM/IMS Transactions on Data Science
TEAC	ACM Transactions on Economics and Computation
TECS	ACM Transactions on Embedded Computing Systems
TELO	ACM Transactions on Evolutionary Learning
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

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

Abbreviation	Publication
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
TQC	ACM Transactions on Quantum Computing
TRETS	ACM Transactions on Reconfigurable Technology and Systems
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

Besides the publications listed in Table 5, there is a special “publication” type FACMP, a forthcoming ACM publication, reserved for new journals which are not assigned an ISSN yet.

## 2.17 A note about sigchi-a format

Starting in Spring 2020 ACM retired SIGCHI Extended Abstract format (sigchi-a). ACM will not, under any circumstances, accept documents in this format for publication and will not offer technical support to the authors who use this template.

You may use this format in the nonacm mode only, as in

```
\documentclass[sigchi-a, nonacm]{acmart}
```

sidebar  
marginfigure  
marginfigure

This format has large margin uses for special figures and tables. 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.

The environments `figure` and `table` produce figures and tables with the width of the text column. The environments `figure*` and `table*` produce “wide” figures and tables, which take a large part of the margin.

The horizontal sizes of figures are:

1. `figure`: `\columnwidth`,
2. `marginfigure`: `\marginparwidth`,
3. `figure*`: `\fulltextwidth`.



## 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 [2020/11/15 v1.75 Typesetting articles for the Association for Computing Machinery]
```

And the driver code:

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

### 3.2 Preload hook

We preload acmart-preload-hook:

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

### 3.3 Options

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

```
29 \RequirePackage{xkeyval}
```

We use xstring to check whether user input is valid

```
30 \RequirePackage{xstring}
```

We need iftex to check the engine

```
31 \RequirePackage{iftex}
```

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@urlbreakonhyphens

```
57 \define@boolkey+{acmart.cls}[\ACM@]{urlbreakonhyphens}[true]{%
58 \if@ACM@urlbreakonhyphens
59 \PackageInfo{\@classname}{Using breaking urls on hyphens}%
60 \else
61 \PackageInfo{\@classname}{Not breaking urls on hyphens}%
62 \fi}{\PackageError{\@classname}{The option urlbreakonhyphens can be either true or
63 false}}
64 \ExecuteOptionsX{urlbreakonhyphens=true}
```

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

```
65 \define@boolkey+{acmart.cls}[\ACM@]{acmthm}[true]{%
66 \if@ACM@acmthm
67 \PackageInfo{\@classname}{Requiring acmthm}%
68 \else
69 \PackageInfo{\@classname}{Suppressing acmthm}%
70 \fi}{\PackageError{\@classname}{The option acmthm can be either true or
```

```

71     false}}
72 \ExecuteOptionsX{acmthm=true}

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

\if@ACM@authorversion Whether we use author's-version mode
82 \define@boolkey+{acmart.cls}[@ACM@]{authorversion}[true]{%
83   \if@ACM@authorversion
84     \PackageInfo{\@classname}{Using authorversion mode}%
85   \else
86     \PackageInfo{\@classname}{Not using authorversion mode}%
87   \fi}{\PackageError{\@classname}{The option authorversion can be either true or
88     false}}
89 \ExecuteOptionsX{authorversion=false}

\if@ACM@nonacm Special option for non-ACM publications using the ACM typesetting options.
90 \define@boolkey+{acmart.cls}[@ACM@]{nonacm}[true]{%
91   \if@ACM@nonacm
92     \PackageInfo{\@classname}{Using nonacm mode}%
93     \AtBeginDocument{\@ACM@printacmreffalse}%
94     % in 'nonacm' mode we disable the "ACM Reference Format"
95     % printing by default, but this can be re-enabled by the
96     % user using \settopmatter{printacmref=true}
97   \else
98     \PackageInfo{\@classname}{Not using nonacm mode}%
99   \fi}{\PackageError{\@classname}{The option nonacm can be either true or
100     false}}
101 \ExecuteOptionsX{nonacm=false}

\if@ACM@balance Whether to balance the last page
102 \define@boolkey+{acmart.cls}[@ACM@]{balance}[true]{}%
103 \PackageError{\@classname}{The option balance can be either true or
104   false}}
105 \ExecuteOptionsX{balance}

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

\if@ACM@natbib Whether we use natbib mode
106 \define@boolkey+{acmart.cls}[@ACM@]{natbib}[true]{%
107   \if@ACM@natbib

```

```

108 \PackageInfo{\@classname}{Explicitly selecting natbib mode}%
109 \else
110 \PackageInfo{\@classname}{Explicitly deselecting natbib mode}%
111 \fi}{\PackageError{\@classname}{The option natbib can be either true or
112 false}}
113 \ExecuteOptionsX{natbib=true}

\if@ACM@anonymous Whether we use anonymous mode
114 \define@boolkey+{acmart.cls}[@ACM@]{anonymous}[true]{%
115 \if@ACM@anonymous
116 \PackageInfo{\@classname}{Using anonymous mode}%
117 \else
118 \PackageInfo{\@classname}{Not using anonymous mode}%
119 \fi}{\PackageError{\@classname}{The option anonymous can be either true or
120 false}}
121 \ExecuteOptionsX{anonymous=false}

\if@ACM@timestamp Whether we use timestamp mode
122 \define@boolkey+{acmart.cls}[@ACM@]{timestamp}[true]{%
123 \if@ACM@timestamp
124 \PackageInfo{\@classname}{Using timestamp mode}%
125 \else
126 \PackageInfo{\@classname}{Not using timestamp mode}%
127 \fi}{\PackageError{\@classname}{The option timestamp can be either true or
128 false}}
129 \ExecuteOptionsX{timestamp=false}

\if@ACM@authordraft Whether we use author-draft mode
130 \define@boolkey+{acmart.cls}[@ACM@]{authordraft}[true]{%
131 \if@ACM@authordraft
132 \PackageInfo{\@classname}{Using authordraft mode}%
133 \@ACM@timestamptrue
134 \@ACM@reviewtrue
135 \else
136 \PackageInfo{\@classname}{Not using authordraft mode}%
137 \fi}{\PackageError{\@classname}{The option authordraft can be either true or
138 false}}
139 \ExecuteOptionsX{authordraft=false}

\ACM@fontsize The font size to pass to the base class
140 \def\ACM@fontsize{}
141 \DeclareOptionX{9pt}{\edef\ACM@fontsize{\CurrentOption}}
142 \DeclareOptionX{10pt}{\edef\ACM@fontsize{\CurrentOption}}
143 \DeclareOptionX{11pt}{\edef\ACM@fontsize{\CurrentOption}}
144 \DeclareOptionX{12pt}{\edef\ACM@fontsize{\CurrentOption}}

145 \DeclareOptionX{draft}{\PassOptionsToClass{\CurrentOption}{amsart}}
146 \DeclareOptionX{*}{\PassOptionsToClass{\CurrentOption}{amsart}}
147 \ProcessOptionsX
148 \ClassInfo{\@classname}{Using format \ACM@format, number \ACM@format@nr}

```

### 3.4 Setting switches

<code>\if@ACM@manuscript</code>	Whether we use manuscript mode 149 <code>\newif\if@ACM@manuscript</code>
<code>\if@ACM@journal</code>	There are two kinds of publications: journals and books 150 <code>\newif\if@ACM@journal</code>
<code>\if@ACM@journal@bibstrip</code>	Sometimes ACM wants a journal-like publication to have conference information in the bibstrip and vice versa, so we have an additional switch. 151 <code>\newif\if@ACM@journal@bibstrip</code>
<code>\if@ACM@sigchiamode</code>	The formatting of SIGCHI extended abstracts is quite unusual. We have a special switch for them. 152 <code>\newif\if@ACM@sigchiamode</code>

#### Setting up switches

```

153 \ifnum\ACM@format@nr=5\relax % siggraph
154 \ClassWarning{\@classname}{%
155   The format siggraph is now obsolete.\MessageBreak
156   I am switching to sigconf.}
157   \setkeys{acmart.cls}{format=sigconf}
158 \fi
159 \ifnum\ACM@format@nr=7\relax % sigchi
160 \ClassWarning{\@classname}{%
161   The format sigchi is now obsolete.\MessageBreak
162   I am switching to sigconf.}
163   \setkeys{acmart.cls}{format=sigconf}
164 \fi
165 \ifnum\ACM@format@nr=8\relax % sigchi
166 \ClassWarning{\@classname}{%
167   ACM SIGCHI has retired the SIGCHI-A template\MessageBreak
168   effective immediately. ACM is keeping this template\MessageBreak
169   option available to authors who are working on legacy\MessageBreak
170   documents only. ACM will not, under any circumstances,\MessageBreak
171   accept documents in this format for publication and\MessageBreak
172   will not offer technical support to the authors who use\MessageBreak
173   this template.\MessageBreak
174   ACM SIGCHI is directing Conference leaders and\MessageBreak
175   authors to publish their articles using the SIGCONF\MessageBreak
176   template call.}
177 \fi
178 \ifnum\ACM@format@nr=0\relax
179   \@ACM@manuscripttrue
180 \else
181   \@ACM@manuscriptfalse
182 \fi
183 \@ACM@sigchiamodefalse
184 \ifcase\ACM@format@nr

```

```

185 \relax % manuscript
186 \ACM@journaltrue
187 \or % acmsmall
188 \ACM@journaltrue
189 \or % acmlarge
190 \ACM@journaltrue
191 \or % acmtog
192 \ACM@journaltrue
193 \or % sigconf
194 \ACM@journalfalse
195 \or % siggraph
196 \ACM@journalfalse
197 \or % sigplan
198 \ACM@journalfalse
199 \or % sigchi
200 \ACM@journalfalse
201 \or % sigchi-a
202 \ACM@journalfalse
203 \ACM@sigchiamodetrue
204 \fi
205 \ifACM@journal
206 \ACM@journal@bibstriptrue
207 \else
208 \ACM@journal@bibstripfalse
209 \fi

```

### 3.5 Loading the base class and package

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

```

210 \ifx\ACM@fontsize\@empty
211 \ifcase\ACM@format@nr
212 \relax % manuscript
213 \def\ACM@fontsize{9pt}%
214 \or % acmsmall
215 \def\ACM@fontsize{10pt}%
216 \or % acmlarge
217 \def\ACM@fontsize{10pt}%
218 \or % acmtog
219 \def\ACM@fontsize{9pt}%
220 \or % sigconf
221 \def\ACM@fontsize{9pt}%
222 \or % siggraph
223 \def\ACM@fontsize{9pt}%
224 \or % sigplan
225 \def\ACM@fontsize{10pt}%
226 \or % sigchi
227 \def\ACM@fontsize{9pt}%
228 \or % sigchi-a
229 \def\ACM@fontsize{10pt}%

```

```

230 \fi
231 \fi
232 \ClassInfo{\@classname}{Using fontsize \ACM@fontsize}
233 \LoadClass[\ACM@fontsize, reqno]{amsart}
234 \RequirePackage{microtype}

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

    Booktabs is now the default
236 \RequirePackage{booktabs}

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

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

    We use setspace for double spacing
240 \if@ACM@manuscript
241 \RequirePackage{setspace}
242 \onehalfspacing
243 \fi

    We need textcase for better upcasing
244 \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.

```

245 \if@ACM@natbib
246 \RequirePackage{natbib}
247 \renewcommand{\bibsection}{%
248 \section*{\refname}%
249 \phantomsection\addcontentsline{toc}{section}{\refname}%
250 }
251 \renewcommand{\bibfont}{\bibliofont}
252 \renewcommand\setcitestyle[1]{
253 \@for\@tempa:=#1\do
254 {\def\@tempb{round}\ifx\@tempa\@tempb
255 \renewcommand\NAT@open{(\}\renewcommand\NAT@close{)}\fi
256 \def\@tempb{square}\ifx\@tempa\@tempb
257 \renewcommand\NAT@open{[\}\renewcommand\NAT@close{]}\fi
258 \def\@tempb{angle}\ifx\@tempa\@tempb
259 \renewcommand\NAT@open{<\}\renewcommand\NAT@close{>}\fi
260 \def\@tempb{curly}\ifx\@tempa\@tempb
261 \renewcommand\NAT@open{\{\}\renewcommand\NAT@close{\}}\fi

```

```

262 \def\@tempb{semicolon}\ifx\@tempa\@tempb
263 \renewcommand\NAT@sep{;} \fi
264 \def\@tempb{colon}\ifx\@tempa\@tempb
265 \renewcommand\NAT@sep{;} \fi
266 \def\@tempb{comma}\ifx\@tempa\@tempb
267 \renewcommand\NAT@sep{,} \fi
268 \def\@tempb{authoryear}\ifx\@tempa\@tempb
269 \NAT@numbersfalse \fi
270 \def\@tempb{numbers}\ifx\@tempa\@tempb
271 \NAT@numberstrue\NAT@superfalse \fi
272 \def\@tempb{super}\ifx\@tempa\@tempb
273 \NAT@numberstrue\NAT@supertrue \fi
274 \def\@tempb{nobibstyle}\ifx\@tempa\@tempb
275 \let\bibstyle=\@gobble \fi
276 \def\@tempb{bibstyle}\ifx\@tempa\@tempb
277 \let\bibstyle=\@citestyle \fi
278 \def\@tempb{sort}\ifx\@tempa\@tempb
279 \def\NAT@sort{\@ne} \fi
280 \def\@tempb{nosort}\ifx\@tempa\@tempb
281 \def\NAT@sort{\z@} \fi
282 \def\@tempb{compress}\ifx\@tempa\@tempb
283 \def\NAT@cmprs{\@ne} \fi
284 \def\@tempb{nocompress}\ifx\@tempa\@tempb
285 \def\NAT@cmprs{\z@} \fi
286 \def\@tempb{sort&compress}\ifx\@tempa\@tempb
287 \def\NAT@sort{\@ne}\def\NAT@cmprs{\@ne} \fi
288 \def\@tempb{mcite}\ifx\@tempa\@tempb
289 \let\NAT@merge\@ne \fi
290 \def\@tempb{merge}\ifx\@tempa\@tempb
291 \ifnum{\NAT@merge<\tw@}{\let\NAT@merge\tw@} \fi
292 \def\@tempb{elide}\ifx\@tempa\@tempb
293 \ifnum{\NAT@merge<\thr@@}{\let\NAT@merge\thr@@} \fi
294 \def\@tempb{longnamesfirst}\ifx\@tempa\@tempb
295 \NAT@longnamestrue \fi
296 \def\@tempb{nonamebreak}\ifx\@tempa\@tempb
297 \def\NAT@nmfmt#1{\mbox{\NAT@up#1}} \fi
298 \expandafter\NAT@find@eq\@tempa=\relax\@nil
299 \if\@tempc\relax\else
300 \expandafter\NAT@rem@eq\@tempc
301 \def\@tempb{open}\ifx\@tempa\@tempb
302 \xdef\NAT@open{\@tempc} \fi
303 \def\@tempb{close}\ifx\@tempa\@tempb
304 \xdef\NAT@close{\@tempc} \fi
305 \def\@tempb{aysep}\ifx\@tempa\@tempb
306 \xdef\NAT@aysep{\@tempc} \fi
307 \def\@tempb{yysep}\ifx\@tempa\@tempb
308 \xdef\NAT@yrsep{\@tempc} \fi
309 \def\@tempb{notesep}\ifx\@tempa\@tempb
310 \xdef\NAT@cmt{\@tempc} \fi
311 \def\@tempb{citesep}\ifx\@tempa\@tempb

```



```

312     \xdef\NAT@sep{\@tempc}\fi
313   \fi
314 }%
315 \NAT@@setcites
316 }
317 \renewcommand\citestyle[1]{%
318   \ifcsname bibstyle@#1\endcsname%
319   \csname bibstyle@#1\endcsname\let\bibstyle\gobble%
320   \else%
321   \@latex@error{Undefined ‘#1’ citestyle}%
322   \fi
323 }%
324 \fi

```

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

```

325 \newcommand{\bibstyle@acmauthoryear}{%
326   \setcitestyle{%
327     authoryear,%
328     open={},close={},citesep={;},%
329     aysep={},yysep={},,%
330     notesep={, }}%

```

`\bibstyle@acmnumeric` The default numeric format:

```

331 \newcommand{\bibstyle@acmnumeric}{%
332   \setcitestyle{%
333     numbers,sort&compress,%
334     open={},close={},citesep={},,%
335     notesep={, }}%

```

The default is numeric:

```

336 \if@ACM@natbib
337 \citestyle{acmnumeric}
338 \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:

```

339 \def\@startsection#1#2#3#4#5#6{%
340   \if@noskipsec \leavevmode \fi
341   \par
342   \@tempskipa #4\relax
343   \@afterindenttrue
344   \ifdim \@tempskipa <\z@
345     \@tempskipa -\@tempskipa \@afterindentfalse
346   \fi
347   \if@nobreak
348     \everypar{}%
349   \else
350     \addpenalty\@secpenalty\addvspace\@tempskipa

```

```

351 \fi
352 \@ifstar
353   {\@ssect{#3}{#4}{#5}{#6}}%
354   {\@dblarg{\@sect{#1}{#2}{#3}{#4}{#5}{#6}}}%
355 \def\@sect#1#2#3#4#5#6[#7]#8{%
356   \edef\@toclevel{\ifnum#2=\@m 0\else\number#2\fi}%
357   \ifnum #2>\c@secnumdepth
358     \let\@svsec\@empty
359   \else
360     \refstepcounter{#1}%
361     \protected@edef\@svsec{\@seccntformat{#1}\relax}%
362   \fi
363   \@tempskipa #5\relax
364   \ifdim \@tempskipa>\z@
365     \begingroup
366       #6{%
367         \@hangfrom{\hskip #3\relax\@svsec}%
368         \interlinepenalty \@M #8\@par}%
369     \endgroup
370     \csname #1mark\endcsname{#7}%
371     \ifnum #2>\c@secnumdepth \else
372       \@tochangmeasure{\csname the#1\endcsname}%
373     \fi
374     \addcontentsline{toc}{#1}{%
375       \ifnum #2>\c@secnumdepth \else
376         \protect\numberline{\csname the#1\endcsname}%
377       \fi
378       #7}%
379   \else
380     \def\@svsechd{%
381       #6{\hskip #3\relax
382         \@svsec #8}%
383       \csname #1mark\endcsname{#7}%
384       \ifnum #2>\c@secnumdepth \else
385         \@tochangmeasure{\csname the#1\endcsname\space}%
386       \fi
387       \addcontentsline{toc}{#1}{%
388         \ifnum #2>\c@secnumdepth \else
389           \protect\numberline{\csname the#1\endcsname}%
390         \fi
391         #7}%
392   \fi
393   \@xsect{#5}}
394 \def\@xsect#1{%
395   \@tempskipa #1\relax
396   \ifdim \@tempskipa>\z@
397     \par \nobreak
398     \vskip \@tempskipa
399     \@afterheading
400   \else

```

```

401 \@nobreakfalse
402 \global\@noskipsectrue
403 \everypar{%
404   \if@noskipsec
405     \global\@noskipsecfalse
406     {\setbox\z@\lastbox}%
407     \clubpenalty\@M
408     \begingroup \@svsechd \endgroup
409     \unskip
410     \@tempskipa #1\relax
411     \hskip -\@tempskipa
412   \else
413     \clubpenalty \@clubpenalty
414     \everypar{}}%
415 \fi}%
416 \fi
417 \ignorespaces}
418 \def\@seccntformat#1{\csname the#1\endcsname\quad}
419 \def\@ssect#1#2#3#4#5{%
420   \@tempskipa #3\relax
421   \ifdim \@tempskipa>\z@
422     \begingroup
423       #4{%
424         \@hangfrom{\hskip #1}%
425         \interlinepenalty \@M #5\@par}%
426     \endgroup
427   \else
428     \def\@svsechd{#4{\hskip #1\relax #5}}%
429   \fi
430   \xsect{#3}}

```

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

```

431 \def\@starttoc#1#2{\begingroup\makeatletter
432   \setTrue{#1}%
433   \par\removelastskip\vskip\z@skip
434   \@startsection{section}\@M\z@{\linespacing\@plus\linespacing}%
435     {.5\linespacing}{\centering\contentsnamefont}{#2}%
436   \@input{\jobname.#1}%
437   \if@filesn
438     \xp\newwrite\csname tf@#1\endcsname
439     \immediate\xp\openout\csname tf@#1\endcsname \jobname.#1\relax
440   \fi
441   \global\@nobreakfalse \endgroup
442   \addvspace{32\p@\@plus14\p@}%
443 }

```

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

```

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

```

```

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

\l@subsubsection The spacing in amsart is too large
446 \def\l@subsubsection{\@tocline{3}{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
447 \def\@makefnmark{\noindent\@makefnmark}

\@footnotetext In sigchi-a mode our footnotes are in the margin!
448 \if@ACM@sigchiamode
449 \long\def\@footnotetext#1{\marginpar{%
450   \reset@font\small
451   \interlinepenalty\interfootnotelinepenalty
452   \protected@edef\@currentlabel{%
453     \csname p@footnote\endcsname\@thefnmark
454   }}%
455   \color@begingroup
456     \@makefnmark{%
457       \rule{z}{\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
458     \color@endgroup}}%
459 \fi

\@mpfootnotetext We want the footnotes in minipages centered:
460 \long\def\@mpfootnotetext#1{%
461   \global\setbox\@mpfootins\vbox{%
462     \unvbox\@mpfootins
463     \reset@font\footnotesize
464     \hsize\columnwidth
465     \parboxrestore
466     \protected@edef\@currentlabel
467       {\csname p@mpfootnote\endcsname\@thefnmark}%
468     \color@begingroup\centering
469       \@makefnmark{%
470         \rule{z}{\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
471       \color@endgroup}}

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

And now, hyperref
473 \let\@footnotemark@nolink\@footnotemark
474 \let\@footnotetext@nolink\@footnotetext
475 \RequirePackage[bookmarksnumbered,unicode]{hyperref}
476 \pdfstringdefDisableCommands{%
477   \def\addtocounter#1#2{%
478     \def\unskip{}}

```

```

479 \def\textbullet{- }%
480 \def\extrightarrow{ -> }%
481 \def\footnotemark{ }%
482 }
483 \urlstyle{rm}
484 \ifcase\ACM@format@nr
485 \relax % manuscript
486 \or % acmsmall
487 \or % acmlarge
488 \or % acmtog
489 \or % sigconf
490 \or % siggraph
491 \or % sigplan
492 \urlstyle{sf}
493 \or % sigchi
494 \or % sigchi-a
495 \urlstyle{sf}
496 \fi
497 \AtEndPreamble{%
498 \if@ACM@urlbreakonhyphens
499 \def\do@url@hyp{\do{-}}%
500 \fi
501 \if@ACM@screen
502 \hypersetup{colorlinks,
503 linkcolor=ACMPurple,
504 citecolor=ACMPurple,
505 urlcolor=ACMDarkBlue,
506 filecolor=ACMDarkBlue}
507 \else
508 \hypersetup{hidelinks}
509 \fi
510 \hypersetup{pdflang={en},
511 pdfdisplaydoctitle}}
And hyperxmp
512 \RequirePackage{hyperxmp}
Bibliography mangling.
513 \if@ACM@natbib
514 \let\citeN\cite
515 \let\cite\citep
516 \let\citeANP\citeauthor
517 \let\citeNN\citeyearpar
518 \let\citeyearNP\citeyear
519 \let\citeNP\citealt
520 \DeclareRobustCommand\citeA
521 {\begingroup\NAT@swafalse
522 \let\NAT@ctype\@ne\NAT@partrue\NAT@fullfalse\NAT@open\NAT@citetp}%
523 \providecommand\newblock{}%
524 \else
525 \AtBeginDocument{%

```

```

526 \let\shortcite\cite%
527 \providecommand\citename[1]{#1}}
528 \fi
529 \newcommand\shortcite[2][]{%
530 \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:

```

531 \def\bibliographystyle#1{%
532 \ifx\@begindocumenthook\undefined\else
533 \expandafter\AtBeginDocument
534 \fi
535 {\if@filesw
536 \immediate\write\@auxout{\string\bibstyle{#1}}}%
537 \fi}}

```

Graphics and color.

```

538 \RequirePackage{graphicx}
539 \RequirePackage[prologue]{xcolor}

```

We define ACM colors according to [7]:

```

540 \definecolor[named]{ACMBlue}{cmyk}{1,0.1,0,0.1}
541 \definecolor[named]{ACMYellow}{cmyk}{0,0.16,1,0}
542 \definecolor[named]{ACMOrange}{cmyk}{0,0.42,1,0.01}
543 \definecolor[named]{ACMRed}{cmyk}{0,0.90,0.86,0}
544 \definecolor[named]{ACMLightBlue}{cmyk}{0.49,0.01,0,0}
545 \definecolor[named]{ACMGreen}{cmyk}{0.20,0,1,0.19}
546 \definecolor[named]{ACMPurple}{cmyk}{0.55,1,0,0.15}
547 \definecolor[named]{ACMDarkBlue}{cmyk}{1,0.58,0,0.21}

```

Author-draft mode or sigchi-a mode

```

548 \if@ACM@authordraft
549 \RequirePackage{draftwatermark}
550 \SetWatermarkFontSize{0.5in}
551 \SetWatermarkColor[gray]{.9}
552 \SetWatermarkText{\parbox{12em}{\centering
553 Unpublished working draft.\}
554 Not for distribution.}}
555 \else
556 \if@ACM@sigchiamode
557 \if@ACM@nonacm\else
558 \RequirePackage{draftwatermark}
559 \SetWatermarkFontSize{0.5in}
560 \SetWatermarkColor[gray]{.9}
561 \SetWatermarkText{\parbox{12em}{\centering
562 Legacy document. \}
563 Not for publication in an ACM venue}}
564 \fi
565 \fi
566 \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>.

```
567 \RequirePackage{geometry}
568 \ifcase\ACM@format@nr
569 \relax % manuscript
570   \geometry{letterpaper,head=13pt,
571     marginparwidth=6pc,heightrounded}%
572 \or % acmsmall
573   \geometry{twoside=true,
574     includeheadfoot, head=13pt, foot=2pc,
575     paperwidth=6.75in, paperheight=10in,
576     top=58pt, bottom=44pt, inner=46pt, outer=46pt,
577     marginparwidth=2pc,heightrounded
578   }%
579 \or % acmlarge
580   \geometry{twoside=true, head=13pt, foot=2pc,
581     paperwidth=8.5in, paperheight=11in,
582     includeheadfoot,
583     top=78pt, bottom=114pt, inner=81pt, outer=81pt,
584     marginparwidth=4pc,heightrounded
585   }%
586 \or % acmtog
587   \geometry{twoside=true, head=13pt, foot=2pc,
588     paperwidth=8.5in, paperheight=11in,
589     includeheadfoot, columnsep=24pt,
590     top=52pt, bottom=75pt, inner=52pt, outer=52pt,
591     marginparwidth=2pc,heightrounded
592   }%
593 \or % sigconf
594   \geometry{twoside=true, head=13pt,
595     paperwidth=8.5in, paperheight=11in,
596     includeheadfoot, columnsep=2pc,
597     top=57pt, bottom=73pt, inner=54pt, outer=54pt,
598     marginparwidth=2pc,heightrounded
599   }%
600 \or % siggraph
601   \geometry{twoside=true, head=13pt,
602     paperwidth=8.5in, paperheight=11in,
603     includeheadfoot, columnsep=2pc,
604     top=57pt, bottom=73pt, inner=54pt, outer=54pt,
605     marginparwidth=2pc,heightrounded
606   }%
607 \or % sigplan
608   \geometry{twoside=true, head=13pt,
609     paperwidth=8.5in, paperheight=11in,
610     includeheadfoot=false, columnsep=2pc,
611     top=1in, bottom=1in, inner=0.75in, outer=0.75in,
```

```

612     marginparwidth=2pc,heightrounded
613   }%
614 \or % sigchi
615   \geometry{twoside=true, head=13pt,
616     paperwidth=8.5in, paperheight=11in,
617     includeheadfoot, columnsep=2pc,
618     top=66pt, bottom=73pt, inner=54pt, outer=54pt,
619     marginparwidth=2pc,heightrounded
620   }%
621 \or % sigchi-a
622   \geometry{twoside=false, head=13pt,
623     paperwidth=11in, paperheight=8.5in,
624     includeheadfoot, marginparsep=72pt,
625     marginparwidth=170pt, columnsep=20pt,
626     top=72pt, bottom=72pt, left=314pt, right=72pt
627   }%
628   \@mparswitchfalse
629   \reversemarginpar
630 \fi

```

`\parindent` Paragraphing

```

\parskip 631 \setlength\parindent{10\p@}
632 \setlength\parskip{\z@}
633 \ifcase\ACM@format@nr
634 \relax % manuscript
635 \or % acmsmall
636 \or % acmlarge
637 \or % acmtog
638   \setlength\parindent{9\p@}%
639 \or % sigconf
640 \or % siggraph
641 \or % sigplan
642 \or % sigchi
643 \or % sigchi-a
644 \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.

```
645 \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.

```
646 \def\copyrightpermissionfootnoterule{\kern-3\p@
647   \hrule \@width \columnwidth \kern 2.6\p@}

648 \RequirePackage{manyfoot}
649 \SelectFootnoteRule[2]{copyrightpermission}
650 \DeclareNewFootnote{authorsaddresses}
651 \SelectFootnoteRule[2]{copyrightpermission}
652 \DeclareNewFootnote{copyrightpermission}
```

`\footnoterule` Tschichold's rules:

```
653 \def\footnoterule{\kern-3\p@
654   \hrule \@width 4pc \kern 2.6\p@}
```

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

```
655 \def\endminipage{%
656   \par
657   \unskip
658   \ifvoid\@mpfootins\else
659     \vskip\skip\@mpfootins
660     \normalcolor
661     \unvbox\@mpfootins
662   \fi
663   \@minipagefalse
664   \color@endgroup
665   \egroup
666   \expandafter\@iiiparbox\@mpargs{\unvbox\@tempboxa}}
```

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

```
667 \def\@textbottom{\vskip \z@ \@plus 1pt}
668 \let\@texttop\relax
```

In two-column layouts, force both columns to be the same height by inserting extra internal vertical space to fill out the page.

```
669 \ifcase\ACM@format@nr
670 \relax % manuscript
671 \or % acmsmall
672 \or % acmlarge
673 \or % acmtog
674   \flushbottom
675 \or % sigconf
676   \flushbottom
677 \or % siggraph
678   \flushbottom
679 \or % sigplan
680   \flushbottom
681 \or % sigchi
```

```

682 \flushbottom
683 \or % sigchi-a
684 \fi

```

### 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.

```

685 \ifPDFTeX
686 \input{glyphtounicode}
687 \pdfglyphtounicode{f_f}{FB00}
688 \pdfglyphtounicode{f_f_i}{FB03}
689 \pdfglyphtounicode{f_f_l}{FB04}
690 \pdfglyphtounicode{f_i}{FB01}
691 \pdfglyphtounicode{t_t}{0074 0074}
692 \pdfglyphtounicode{f_t}{0066 0074}
693 \pdfglyphtounicode{T_h}{0054 0068}
694 \pdfgentounicode=1
695 \RequirePackage{cmap}
696 \fi

```

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

```

697 \newif\if@ACM@newfonts
698 \@ACM@newfontstrue
699 \IfFileExists{libertine.sty}{\ClassWarning{\@classname}{You do not
700   have the libertine package installed. Please upgrade your
701   TeX}\@ACM@newfontsfalse}
702 \IfFileExists{zi4.sty}{\ClassWarning{\@classname}{You do not
703   have the inconsolata (zi4.sty) package installed. Please upgrade your
704   TeX}\@ACM@newfontsfalse}
705 \IfFileExists{newtxmath.sty}{\ClassWarning{\@classname}{You do not
706   have the newtxmath package installed. Please upgrade your
707   TeX}\@ACM@newfontsfalse}

```

We use Libertine throughout.

```

708 \if@ACM@newfonts
709   \RequirePackage[T1]{fontenc}
710   % Note that the order in which packages are loaded matters,
711   % and the correct order depends on the LaTeX engine used.
712   % See https://github.com/borisveytsman/acmart/issues/402
713   % and https://github.com/borisveytsman/acmart/issues/410
714   \ifxetex
715     \RequirePackage[libertine]{newtxmath}
716     \RequirePackage[tt=false]{libertine}
717     \setmonofont[StylisticSet=3]{inconsolata}
718   \else
719     \ifluatex
720       \RequirePackage[libertine]{newtxmath}

```

```

721     \RequirePackage[tt=false]{libertine}
722     \setmonofont[StylisticSet=3]{inconsolata}
723   \else
724     \RequirePackage[tt=false, type1=true]{libertine}
725     \RequirePackage[varqu]{zi4}
726     \RequirePackage[libertine]{newtxmath}
727   \fi
728 \fi
729 \fi

```

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

```

730 \let\liningnums\@undefined
731 \AtEndPreamble{%
732   \DeclareTextFontCommand{\liningnums}{\libertineLF}}

```

The SIGCHI extended abstracts are sans serif:

```

733 \if@ACM@sigchiamode
734   \renewcommand{\familydefault}{\sfdefault}
735 \fi

```

### 3.9 Image descriptions

`\if@Description@present` A local switch: whether there is a description in the given figure

```

736 \newif\if@Description@present
737 \@Description@presenttrue

```

`\if@undescribed@images` A global switch whether some images were *not* described

```

738 \newif\if@undescribed@images
739 \@undescribed@imagesfalse

```

`\Description` The `Description` macro right now just sets switches

```

740 \newcommand\Description[2][{}]{\global\@Description@presenttrue\ignorespaces}

```

The global warning

```

741 \AtEndDocument{\if@undescribed@images
742   \ClassWarningNoLine{\@classname}{Some images may lack descriptions}\fi}

```

Hooks for figures and tables. We also patch `algorithm` and `algorithm*` in case somebody uses them.

```

743 \AtBeginEnvironment{figure}{\@Description@presentfalse
744   \let\@vspace\@vspace@orig
745   \let\@vspacer\@vspacer@orig}
746 \AtBeginEnvironment{figure*}{\@Description@presentfalse
747   \let\@vspace\@vspace@orig
748   \let\@vspacer\@vspacer@orig}
749 \AtEndEnvironment{figure}{\if@Description@presentfalse
750   \global\@undescribed@imagestrue
751   \ClassWarning{\@classname}{A possible image without description}\fi}

```

```

752 \AtEndEnvironment{figure*}{\if@Description@present\else
753   \global\@undescribed@imagestrue
754   \ClassWarning{\@classname}{A possible image without description}\fi}
755 \AtBeginEnvironment{table}{\let\@vspace\@vspace@orig
756   \let\@vspacer\@vspacer@orig}
757 \AtBeginEnvironment{table*}{\let\@vspace\@vspace@orig
758   \let\@vspacer\@vspacer@orig}
759 \AtBeginEnvironment{algorithm}{\let\@vspace\@vspace@orig
760   \let\@vspacer\@vspacer@orig}
761 \AtBeginEnvironment{algorithm*}{\let\@vspace\@vspace@orig
762   \let\@vspacer\@vspacer@orig}
763 \AtBeginEnvironment{lstlisting}{\let\@vspace\@vspace@orig
764   \let\@vspacer\@vspacer@orig}
765 \AtBeginEnvironment{lstlisting*}{\let\@vspace\@vspace@orig
766   \let\@vspacer\@vspacer@orig}
767 \AtBeginEnvironment{minted}{\let\@vspace\@vspace@orig
768   \let\@vspacer\@vspacer@orig}
769 \AtBeginEnvironment{minted*}{\let\@vspace\@vspace@orig
770   \let\@vspacer\@vspacer@orig}
771 \AtBeginEnvironment{listing}{\let\@vspace\@vspace@orig
772   \let\@vspacer\@vspacer@orig}
773 \AtBeginEnvironment{listing*}{\let\@vspace\@vspace@orig
774   \let\@vspacer\@vspacer@orig}
775

```

### 3.10 Floats

We use the caption package

```

776 \RequirePackage{caption, float}
777 \captionsetup[table]{position=top}
778 \if@ACM@journal
779   \captionsetup{labelfont={sf, small},
780     textfont={sf, small}, margin=\z@}
781   \captionsetup[figure]{name={Fig.}}
782 \else
783   \captionsetup{labelfont={bf},
784     textfont={bf}, labelsep=colon, margin=\z@}
785   \ifcase\ACM@format@nr
786     \relax % manuscript
787     \or % acmsmall
788     \or % acmlarge
789     \or % acmtog
790     \or % sigconf
791     \or % siggraph
792     \captionsetup{textfont={it}}
793     \or % sigplan
794     \captionsetup{labelfont={bf},
795       textfont={normalfont}, labelsep=period, margin=\z@}
796     \or % sigchi

```

```

797 \captionsetup[figure]{labelfont={bf, small},
798   textfont={bf, small}}
799 \captionsetup[table]{labelfont={bf, small},
800   textfont={bf, small}}
801 \or % sigchi-a
802 \captionsetup[figure]{labelfont={bf, small},
803   textfont={bf, small}}
804 \captionsetup[table]{labelfont={bf, small},
805   textfont={bf, small}}
806 \fi
807 \fi

sidebar The sidebar environment:
808 \newfloat{sidebar}{}{sbar}
809 \floatname{sidebar}{Sidebar}
810 \renewenvironment{sidebar}{\Collect@Body\@sidebar}{}

\@sidebar The processing of the saved text
811 \long\def\@sidebar#1{\bgroup\let\@vspace\@vspace@orig
812 \let\@vspacer\@vspacer@orig\captionsetup{type=sidebar}%
813 \marginpar{\small#1}\egroup}

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

\@marginfigure The processing of the saved text
815 \long\def\@marginfigure#1{\bgroup
816 \let\@vspace\@vspace@orig
817 \let\@vspacer\@vspacer@orig
818 \captionsetup{type=figure}%
819 \marginpar{\@Description@presentfalse\centering
820 \small#1\if@Description@present\else
821 \global\@undescribed@imagestrue
822 \ClassWarning{\@classname}{A possible image without description}
823 \fi}%
824 \egroup}

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

\@margintable The processing of the saved text
826 \long\def\@margintable#1{\bgroup\let\@vspace\@vspace@orig
827 \let\@vspacer\@vspacer@orig\captionsetup{type=table}%
828 \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
829 \newdimen\fulltextwidth
830 \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)
831 \if@ACM@sigchiamode
832 \def\@dblfloat{\bgroup\let\@vspace\@vspace@orig
833 \let\@vspacer\@vspacer@orig\columnwidth=\fulltextwidth
834 \let\@endfloatbox\@endwidefloatbox
835 \def\@fpsaddddefault{\def\@fps{tp}}%
836 \@float}
837 \fi

\end@dblfloat And the end. Just adding a \bgroup.
838 \if@ACM@sigchiamode
839 \def\end@dblfloat{%
840 \end@float\egroup}
841 \fi

\@endwidefloatbox This is the end of a wide box—we basically move everything to the left
842 \def\@endwidefloatbox{%
843 \par\vskip\z@skip
844 \@minipagefalse
845 \outer@nobreak
846 \egroup
847 \color@endbox
848 \global\setbox\@currbox=\vbox{\moveleft
849 \dimexpr(\fulltextwidth-\textwidth)\box\@currbox}%
850 \wd\@currbox=\textwidth
851 }

```

### 3.11 Lists

```

852 \ifcase\ACM@format@nr
853 \relax % manuscript
854 \or % acmsmall
855 \or % acmlarge
856 \or % acmtog
857 \or % sigconf
858 \or % siggraph
859 \or % sigplan
860 \def\labelenumi{\theenumi.}
861 \def\labelenumii{\theenumii.}
862 \def\labelenumiii{\theenumiii.}
863 \def\labelenumiv{\theenumiv.}
864 \or % sigchi
865 \or % sigchi-a
866 \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`.

```

867 \newdimen\@ACM@labelwidth
868 \AtBeginDocument{%
869   \setlength\labelsep{4pt}
870   \setlength{\@ACM@labelwidth}{6.5pt}
871
872   %% First-level list: when beginning after the first line of an
873   %% indented paragraph or ending before an indented paragraph, labels
874   %% should not hang to the left of the preceding/following text.
875   \setlength\leftmargini{\z@}
876   \addtolength\leftmargini{\parindent}
877   \addtolength\leftmargini{2\labelsep}
878   \addtolength\leftmargini{\@ACM@labelwidth}
879
880   %% Second-level and higher lists.
881   \setlength\leftmarginii{\z@}
882   \addtolength\leftmarginii{0.5\labelsep}
883   \addtolength\leftmarginii{\@ACM@labelwidth}
884   \setlength\leftmarginiii{\leftmarginii}
885   \setlength\leftmarginiv{\leftmarginiii}
886   \setlength\leftmarginv{\leftmarginiv}
887   \setlength\leftmarginvi{\leftmarginv}
888   \@listi}
889 \newskip\listisep
890 \listisep\smallskipamount
891 \def\@listI{\leftmargin\leftmargini
892   \labelwidth\leftmargini \advance\labelwidth-\labelsep
893   \listparindent\z@
894   \topsep\listisep}
895 \let\@listi\@listI
896 \def\@listii{\leftmargin\leftmarginii
897   \labelwidth\leftmarginii \advance\labelwidth-\labelsep
898   \topsep\z@skip}
899 \def\@listiii{\leftmargin\leftmarginiii
900   \labelwidth\leftmarginiii \advance\labelwidth-\labelsep}
901 \def\@listiv{\leftmargin\leftmarginiv
902   \labelwidth\leftmarginiv \advance\labelwidth-\labelsep}
903 \def\@listv{\leftmargin\leftmarginv
904   \labelwidth\leftmarginv \advance\labelwidth-\labelsep}
905 \def\@listvi{\leftmargin\leftmarginvi
906   \labelwidth\leftmarginvi \advance\labelwidth-\labelsep}

```

`\descriptionlabel` We do not use a colon by default like `amsart` does:

```

907 \renewcommand{\descriptionlabel}[1]{\upshape\bfseries #1}

```

`\description` Make the description environment indentation consistent with that of the `itemize` and `enumerate` environments.

```

908 \renewenvironment{description}{\list{}{%
909   \labelwidth\@ACM@labelwidth
910   \let\makelabel\descriptionlabel}%
911 }{
912   \endlist
913 }
914 \let\enddescription=\endlist % for efficiency

```

### 3.12 Top-matter data

`\if@ACM@maketitle@typeset` The switch to check whether `\maketitle` is already typeset. It is initially false, and setting top matter when it is true is wrong.

```

915 \newif\if@ACM@maketitle@typeset
916 \@ACM@maketitle@typesetfalse

```

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

```

917 \define@choicekey*+{ACM}{acmJournal}[\@journalCode\@journalCode@nr]{%
918   CIE,%
919   CSUR,%
920   DGOV,%
921   DTRAP,%
922   HEALTH,%
923   IMWUT,%
924   JACM,%
925   JDIQ,%
926   JEA,%
927   JERIC,%
928   JETC,%
929   JOCCH,%
930   PACMCGIT,%
931   PACMHCI,%
932   PACMPL,%
933   POMACS,%
934   TAAS,%
935   TACCESS,%
936   TACO,%
937   TALG,%
938   TALLIP,%
939   TAP,%
940   TCPS,%
941   TDS,%
942   TEAC,%
943   TECS,%
944   TELO,%
945   THRI,%
946   TIIS,%
947   TIOT,%

```



```

948 TISSEC,%
949 TIST,%
950 TKDD,%
951 TMIS,%
952 TOCE,%
953 TOCHI,%
954 TOCL,%
955 TOCS,%
956 TOCT,%
957 TODAES,%
958 TODS,%
959 TOG,%
960 TOIS,%
961 TOIT,%
962 TOMACS,%
963 TOMM,%
964 TOMPECS,%
965 TOMS,%
966 TOPC,%
967 TOPS,%
968 TOPLAS,%
969 TOS,%
970 TOSEM,%
971 TOSN,%
972 TQC,%
973 TRETs,%
974 TSAS,%
975 TSC,%
976 TSLP,%
977 TWEB,%
978 FACMP%
979 }{%
980 \ifcase\@journalCode@nr
981 \relax % CIE
982 \def\@journalName{ACM Computers in Entertainment}%
983 \def\@journalNameShort{ACM Comput. Entertain.}%
984 \def\@permissionCodeOne{1544-3574}%
985 \or % CSUR
986 \def\@journalName{ACM Computing Surveys}%
987 \def\@journalNameShort{ACM Comput. Surv.}%
988 \def\@permissionCodeOne{0360-0300}%
989 \or % DGOV
990 \def\@journalName{Digital Government: Research and Practice}%
991 \def\@journalNameShort{Digit. Gov. Res. Pract.}%
992 \def\@permissionCodeOne{2639-0175}%
993 \or % DTRAP
994 \def\@journalName{Digital Threats: Research and Practice}%
995 \def\@journalNameShort{Digit. Threat. Res. Pract.}%
996 \def\@permissionCodeOne{2576-5337}%
997 \or % HEALTH

```

```

998 \def\@journalName{ACM Transactions on Computing for Healthcare}%
999 \def\@journalNameShort{ACM Trans. Comput. Healthcare}%
1000 \def\@permissionCodeOne{2637-8051}%
1001 \or % IMWUT
1002 \def\@journalName{Proceedings of the ACM on Interactive, Mobile,
1003     Wearable and Ubiquitous Technologies}%
1004 \def\@journalNameShort{Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.}%
1005 \def\@permissionCodeOne{2474-9567}%
1006 \@ACM@screentrue
1007 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1008 \or % JACM
1009 \def\@journalName{Journal of the ACM}%
1010 \def\@journalNameShort{J. ACM}%
1011 \def\@permissionCodeOne{0004-5411}%
1012 \or % JDIQ
1013 \def\@journalName{ACM Journal of Data and Information Quality}%
1014 \def\@journalNameShort{ACM J. Data Inform. Quality}%
1015 \def\@permissionCodeOne{1936-1955}%
1016 \or % JEA
1017 \def\@journalName{ACM Journal of Experimental Algorithmics}%
1018 \def\@journalNameShort{ACM J. Exp. Algor.}%
1019 \def\@permissionCodeOne{1084-6654}%
1020 \or % JERIC
1021 \def\@journalName{ACM Journal of Educational Resources in Computing}%
1022 \def\@journalNameShort{ACM J. Edu. Resources in Comput.}%
1023 \def\@permissionCodeOne{1073-0516}%
1024 \or % JETC
1025 \def\@journalName{ACM Journal on Emerging Technologies in Computing Systems}%
1026 \def\@journalNameShort{ACM J. Emerg. Technol. Comput. Syst.}%
1027 \def\@permissionCodeOne{1550-4832}%
1028 \or % JOCCH
1029 \def\@journalName{ACM Journal on Computing and Cultural Heritage}%
1030 \def\@journalNameShort{ACM J. Comput. Cult. Herit.}%
1031 \or % PACMCGIT
1032 \def\@journalName{Proceedings of the ACM on Computer Graphics and Interactive Techniques}%
1033 \def\@journalNameShort{Proc. ACM Comput. Graph. Interact. Tech.}%
1034 \def\@permissionCodeOne{2577-6193}%
1035 \@ACM@screentrue
1036 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1037 \or % PACMHCI
1038 \def\@journalName{Proceedings of the ACM on Human-Computer Interaction}%
1039 \def\@journalNameShort{Proc. ACM Hum.-Comput. Interact.}%
1040 \def\@permissionCodeOne{2573-0142}%
1041 \@ACM@screentrue
1042 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1043 \or % PACMPL
1044 \def\@journalName{Proceedings of the ACM on Programming Languages}%
1045 \def\@journalNameShort{Proc. ACM Program. Lang.}%
1046 \def\@permissionCodeOne{2475-1421}%
1047 \@ACM@screentrue

```

```

1048 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1049 \or % POMACS
1050 \def\@journalName{Proceedings of the ACM on Measurement and Analysis of Computing Systems}%
1051 \def\@journalNameShort{Proc. ACM Meas. Anal. Comput. Syst.}%
1052 \def\@permissionCodeOne{2476-1249}%
1053 \@ACM@screentru
1054 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1055 \or % TAAS
1056 \def\@journalName{ACM Transactions on Autonomous and Adaptive Systems}%
1057 \def\@journalNameShort{ACM Trans. Autonom. Adapt. Syst.}%
1058 \def\@permissionCodeOne{1556-4665}%
1059 \or % TACCESS
1060 \def\@journalName{ACM Transactions on Accessible Computing}%
1061 \def\@journalNameShort{ACM Trans. Access. Comput.}%
1062 \def\@permissionCodeOne{1936-7228}%
1063 \or % TACO
1064 \def\@journalName{ACM Transactions on Architecture and Code Optimization}%
1065 \def\@journalNameShort{ACM Trans. Arch. Code Optim.}%
1066 \or % TALG
1067 \def\@journalName{ACM Transactions on Algorithms}%
1068 \def\@journalNameShort{ACM Trans. Algor.}%
1069 \def\@permissionCodeOne{1549-6325}%
1070 \or % TALLIP
1071 \def\@journalName{ACM Transactions on Asian and Low-Resource Language Information Processing}%
1072 \def\@journalNameShort{ACM Trans. Asian Low-Resour. Lang. Inf. Process.}%
1073 \def\@permissionCodeOne{2375-4699}%
1074 \or % TAP
1075 \def\@journalName{ACM Transactions on Applied Perception}%
1076 \or % TCPS
1077 \def\@journalName{ACM Transactions on Cyber-Physical Systems}%
1078 \or % TDS
1079 \def\@journalName{ACM/IMS Transactions on Data Science}%
1080 \def\@journalNameShort{ACM/IMS Trans. Data Sci.}%
1081 \def\@permissionCodeOne{2577-3224}%
1082 \or % TEAC
1083 \def\@journalName{ACM Transactions on Economics and Computation}%
1084 \or % TECS
1085 \def\@journalName{ACM Transactions on Embedded Computing Systems}%
1086 \def\@journalNameShort{ACM Trans. Embedd. Comput. Syst.}%
1087 \def\@permissionCodeOne{1539-9087}%
1088 \or % TELO
1089 \def\@journalName{ACM Transactions on Evolutionary Learning}%
1090 \def\@journalNameShort{ACM Trans. Evol. Learn.}%
1091 \def\@permissionCodeOne{2688-3007}%
1092 \or % THRI
1093 \def\@journalName{ACM Transactions on Human-Robot Interaction}%
1094 \def\@journalNameShort{ACM Trans. Hum.-Robot Interact.}%
1095 \def\@permissionCodeOne{2573-9522}%
1096 \or % TIIS
1097 \def\@journalName{ACM Transactions on Interactive Intelligent Systems}%

```

```

1098 \def\@journalNameShort{ACM Trans. Interact. Intell. Syst.}%
1099 \def\@permissionCodeOne{2160-6455}%
1100 \or % TIOT
1101 \def\@journalName{ACM Transactions on Internet of Things}%
1102 \def\@journalNameShort{ACM Trans. Internet Things}%
1103 \def\@permissionCodeOne{2577-6207}%
1104 \or % TISSEC
1105 \def\@journalName{ACM Transactions on Information and System Security}%
1106 \def\@journalNameShort{ACM Trans. Info. Syst. Sec.}%
1107 \def\@permissionCodeOne{1094-9224}%
1108 \or % TIST
1109 \def\@journalName{ACM Transactions on Intelligent Systems and Technology}%
1110 \def\@journalNameShort{ACM Trans. Intell. Syst. Technol.}%
1111 \def\@permissionCodeOne{2157-6904}%
1112 \or % TKDD
1113 \def\@journalName{ACM Transactions on Knowledge Discovery from Data}%
1114 \def\@journalNameShort{ACM Trans. Knowl. Discov. Data.}%
1115 \def\@permissionCodeOne{1556-4681}%
1116 \or % TMIS
1117 \def\@journalName{ACM Transactions on Management Information Systems}%
1118 \def\@journalNameShort{ACM Trans. Manag. Inform. Syst.}%
1119 \def\@permissionCodeOne{2158-656X}%
1120 \or % TOCE
1121 \def\@journalName{ACM Transactions on Computing Education}%
1122 \def\@journalNameShort{ACM Trans. Comput. Educ.}%
1123 \def\@permissionCodeOne{1946-6226}%
1124 \or % TOCHI
1125 \def\@journalName{ACM Transactions on Computer-Human Interaction}%
1126 \def\@journalNameShort{ACM Trans. Comput.-Hum. Interact.}%
1127 \def\@permissionCodeOne{1073-0516}%
1128 \or % TOCL
1129 \def\@journalName{ACM Transactions on Computational Logic}%
1130 \def\@journalNameShort{ACM Trans. Comput. Logic}%
1131 \def\@permissionCodeOne{1529-3785}%
1132 \or % TOCS
1133 \def\@journalName{ACM Transactions on Computer Systems}%
1134 \def\@journalNameShort{ACM Trans. Comput. Syst.}%
1135 \def\@permissionCodeOne{0734-2071}%
1136 \or % TOCT
1137 \def\@journalName{ACM Transactions on Computation Theory}%
1138 \def\@journalNameShort{ACM Trans. Comput. Theory}%
1139 \def\@permissionCodeOne{1942-3454}%
1140 \or % TODAES
1141 \def\@journalName{ACM Transactions on Design Automation of Electronic Systems}%
1142 \def\@journalNameShort{ACM Trans. Des. Autom. Electron. Syst.}%
1143 \def\@permissionCodeOne{1084-4309}%
1144 \or % TODS
1145 \def\@journalName{ACM Transactions on Database Systems}%
1146 \def\@journalNameShort{ACM Trans. Datab. Syst.}%
1147 \def\@permissionCodeOne{0362-5915}%

```

```

1148 \or % TOG
1149   \def\@journalName{ACM Transactions on Graphics}%
1150   \def\@journalNameShort{ACM Trans. Graph.}%
1151   \def\@permissionCodeOne{0730-0301}
1152 \or % TOIS
1153   \def\@journalName{ACM Transactions on Information Systems}%
1154   \def\@permissionCodeOne{1046-8188}%
1155 \or % TOIT
1156   \def\@journalName{ACM Transactions on Internet Technology}%
1157   \def\@journalNameShort{ACM Trans. Internet Technol.}%
1158   \def\@permissionCodeOne{1533-5399}%
1159 \or % TOMACS
1160   \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
1161   \def\@journalNameShort{ACM Trans. Model. Comput. Simul.}%
1162 \or % TOMM
1163   \def\@journalName{ACM Transactions on Multimedia Computing, Communications and Applications}%
1164   \def\@journalNameShort{ACM Trans. Multimedia Comput. Commun. Appl.}%
1165   \def\@permissionCodeOne{1551-6857}%
1166   \def\@permissionCodeTwo{0100}%
1167 \or % TOMPECS
1168   \def\@journalName{ACM Transactions on Modeling and Performance Evaluation of Computing Systems}%
1169   \def\@journalNameShort{ACM Trans. Model. Perform. Eval. Comput. Syst.}%
1170   \def\@permissionCodeOne{2376-3639}%
1171 \or % TOMS
1172   \def\@journalName{ACM Transactions on Mathematical Software}%
1173   \def\@journalNameShort{ACM Trans. Math. Softw.}%
1174   \def\@permissionCodeOne{0098-3500}%
1175 \or % TOPC
1176   \def\@journalName{ACM Transactions on Parallel Computing}%
1177   \def\@journalNameShort{ACM Trans. Parallel Comput.}%
1178   \def\@permissionCodeOne{1539-9087}%
1179 \or % TOPS
1180   \def\@journalName{ACM Transactions on Privacy and Security}%
1181   \def\@journalNameShort{ACM Trans. Priv. Sec.}%
1182   \def\@permissionCodeOne{2471-2566}%
1183 \or % TOPLAS
1184   \def\@journalName{ACM Transactions on Programming Languages and Systems}%
1185   \def\@journalNameShort{ACM Trans. Program. Lang. Syst.}%
1186   \def\@permissionCodeOne{0164-0925}%
1187 \or % TOS
1188   \def\@journalName{ACM Transactions on Storage}%
1189   \def\@journalNameShort{ACM Trans. Storage}%
1190   \def\@permissionCodeOne{1553-3077}%
1191 \or % TOSEM
1192   \def\@journalName{ACM Transactions on Software Engineering and Methodology}%
1193   \def\@journalNameShort{ACM Trans. Softw. Eng. Methodol.}%
1194   \def\@permissionCodeOne{1049-331X}%
1195 \or % TOSN
1196   \def\@journalName{ACM Transactions on Sensor Networks}%
1197   \def\@journalNameShort{ACM Trans. Sensor Netw.}%

```

```

1198 \def\@permissionCodeOne{1550-4859}%
1199 \or % TQC
1200 \def\@journalName{ACM Transactions on Quantum Computing}%
1201 \def\@journalNameShort{ACM Trans. Quantum Comput.}%
1202 \def\@permissionCodeOne{2643-6817}%
1203 \or % TRET
1204 \def\@journalName{ACM Transactions on Reconfigurable Technology and Systems}%
1205 \def\@journalNameShort{ACM Trans. Reconfig. Technol. Syst.}%
1206 \def\@permissionCodeOne{1936-7406}%
1207 \or % TSAS
1208 \def\@journalName{ACM Transactions on Spatial Algorithms and Systems}%
1209 \def\@journalNameShort{ACM Trans. Spatial Algorithms Syst.}%
1210 \def\@permissionCodeOne{2374-0353}%
1211 \or % TSC
1212 \def\@journalName{ACM Transactions on Social Computing}%
1213 \def\@journalNameShort{ACM Trans. Soc. Comput.}%
1214 \def\@permissionCodeOne{2469-7818}%
1215 \or % TSLP
1216 \def\@journalName{ACM Transactions on Speech and Language Processing}%
1217 \def\@journalNameShort{ACM Trans. Speech Lang. Process.}%
1218 \def\@permissionCodeOne{1550-4875}%
1219 \or % TWEB
1220 \def\@journalName{ACM Transactions on the Web}%
1221 \def\@journalNameShort{ACM Trans. Web}%
1222 \def\@permissionCodeOne{1559-1131}%
1223 \else % FACMP, a dummy journal
1224 \def\@journalName{Forthcoming ACM Publication}%
1225 \def\@journalNameShort{ACM Forthcoming}%
1226 \def\@permissionCodeOne{XXXX-XXXX}%
1227 \fi
1228 \ClassInfo{\@classname}{Using journal code \@journalCode}%
1229 }{%
1230 \ClassError{\@classname}{Incorrect journal #1}%
1231 }%

```

\acmJournal And the syntactic sugar around it

```

1232 \def\acmJournal#1{\setkeys{ACM}{acmJournal=#1}%
1233 \global\@ACM@journal@bibstriptrue}

```

The defaults:

```

1234 \def\@journalCode@nr{0}
1235 \def\@journalName{}%
1236 \def\@journalNameShort{\@journalName}%
1237 \def\@permissionCodeOne{XXXX-XXXX}%
1238 \def\@permissionCodeTwo{}%

```

\acmConference This is the conference command

```

1239 \newcommand\acmConference[4][{}]{%
1240 \gdef\acmConference@shortname{#1}%

```

```

1241 \gdef\acmConference@name{#2}%
1242 \gdef\acmConference@date{#3}%
1243 \gdef\acmConference@venue{#4}%
1244 \ifx\acmConference@shortname\@empty
1245 \gdef\acmConference@shortname{#2}%
1246 \fi
1247 \global\@ACM@journal@bibstripfalse
1248 }
1249 \if@ACM@journal\else
1250 \acmConference[Conference'17]{ACM Conference}{July 2017}{Washington,
1251 DC, USA}%
1252 \fi

\acmBooktitle The book title of the conference:
\@acmBooktitle 1253 \def\acmBooktitle#1{\gdef\@acmBooktitle{#1}}
1254 \acmBooktitle{Proceedings of \acmConference@name
1255 \ifx\acmConference@name\acmConference@shortname\else
1256 \ (\acmConference@shortname)\fi}

\@editorsAbbrev How to abbreviate editors
1257 \def\@editorsAbbrev{(Ed.)}

\@acmEditors The list of editors
1258 \def\@acmEditors{}

\editor Add a new editor to the list
1259 \def\editor#1{\ifx\@acmEditors\@empty
1260 \gdef\@acmEditors{#1}%
1261 \else
1262 \gdef\@editorsAbbrev{(Eds.)}%
1263 \g@addto@macro\@acmEditors{\and#1}%
1264 \fi}

\subtitle The subtitle macro
1265 \def\subtitle#1{\def\@subtitle{#1}}
1266 \subtitle{}

\num@authorgroups The total number of “groups”. Each group is several authors with the same affiliations(s)
1267 \newcount\num@authorgroups
1268 \num@authorgroups=0\relax

\num@authors The total number of authors
1269 \newcount\num@authors
1270 \num@authors=0\relax

\if@insideauthorgroup Whether we are continuing an author group
1271 \newif\if@insideauthorgroup
1272 \@insideauthorgroupfalse

```

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

```

1273 \renewcommand\author[2][{}%
1274 \IfSubStr{\detokenize{#2}}{,}{\ClassWarning{\@classname}{Do not put several
1275     authors in the same \string\author\space macro!}}{}%
1276 \global\advance\num@authors by 1\relax
1277 \if@insideauthorgroup\else
1278     \global\advance\num@authorgroups by 1\relax
1279     \global\@insideauthorgroupttrue
1280 \fi
1281 \ifx\addresses\@empty
1282     \if@ACM@anonymous
1283         \gdef\addresses{\@author{Anonymous Author(s)}%
1284             \ifx\@acmSubmissionID\@empty\else\Submission Id:
1285                 \@acmSubmissionID\fi}}%
1286         \gdef\authors{Anonymous Author(s)}%
1287     \else
1288         \gdef\addresses{\@author{#2}}%
1289         \gdef\authors{#2}%
1290     \fi
1291 \else
1292     \if@ACM@anonymous\else
1293         \g@addto@macro\addresses{\and\@author{#2}}%
1294         \g@addto@macro\authors{\and#2}%
1295     \fi
1296 \fi
1297 \if@ACM@anonymous
1298     \ifx\shortauthors\@empty
1299         \gdef\shortauthors{Anon.
1300             \ifx\@acmSubmissionID\@empty\else Submission Id:
1301                 \@acmSubmissionID\fi}%
1302     \fi
1303 \else
1304     \def\@tempa{#1}%
1305     \ifx\@tempa\@empty
1306         \ifx\shortauthors\@empty
1307             \gdef\shortauthors{#2}%
1308         \else
1309             \g@addto@macro\shortauthors{\and#2}%
1310         \fi
1311     \else
1312         \ifx\shortauthors\@empty
1313             \gdef\shortauthors{#1}%
1314         \else
1315             \g@addto@macro\shortauthors{\and#1}%
1316         \fi
1317     \fi
1318 \fi}

```

`\affiliation` The macro `\affiliation` mimics `\address` from `amsart`. Note that it has an optional



argument, which we use differently from `amsart`.

```

1319 \newcommand{\affiliation}[2][{}]{%
1320   \global\@insideauthorgroupfalse
1321   \if@ACM@anonymous\else
1322     \g@addto@macro\addresses{\affiliation{#1}{#2}}%
1323   \fi}

```

`@ACM@affiliation@obeypunctuation` Whether to use the author's punctuation (false by default, which adds American-style address punctuation)

```

1324 \define@boolkey+{@ACM@affiliation@}{@ACM@affiliation@}{obeypunctuation}%
1325 [true]{\ClassError{\@classname}{The option obeypunctuation can be either true or false}}

```

`\additionalaffiliation` Additional affiliations go to footnotes

```

1326 \def\additionalaffiliation#1{\authornote{\@additionalaffiliation{#1}}}

```

`@additionalaffiliation` Process `\additionalaffiliation` inside `\authornote`

```

1327 \def@additionalaffiliation#1{\bgroup
1328   \def\position##1{\ignorespaces}%
1329   \def\institution##1{##1\ignorespaces}%
1330   \def\department{\@ifnextchar[{\@department}{\@department[]}}%
1331   \def@department[##1]##2{\unskip, ##2\ignorespaces}%
1332   \let\streetaddress\position
1333   \let\city\position
1334   \let\state\position
1335   \let\postcode\position
1336   \let\country\position
1337   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.

```

1338 \renewcommand{\email}[2][{}]{%
1339   \IfSubStr{#2}{,}{\ClassWarning{\@classname}{Do not put several
1340     addresses in the same \string\email\space macro!}}{}%
1341   \if@ACM@anonymous\else
1342     \g@addto@macro\addresses{\email{#1}{#2}}%
1343   \fi}

```

`\orcid` Right now we do not typeset ORCIDs

```

1344 \def\orcid#1{\unskip\ignorespaces}

```

`\authorsaddresses` Setting up authors' addresses

```

1345 \def\authorsaddresses#1{\def\@authorsaddresses{#1}}
1346 \authorsaddresses{\mkauthorsaddresses}

```

`@titlenotes` The title notes

```

1347 \def@titlenotes{}

```

```

\titlenote Adding a note to the title
1348 \def\titlenote#1{%
1349   \g@addto@macro\@title{\footnotemark}%
1350   \if@ACM@anonymous
1351     \g@addto@macro\@titlenotes{%
1352       \stepcounter{footnote}\footnotetext{Title note}}%
1353   \else
1354     \g@addto@macro\@titlenotes{\stepcounter{footnote}\footnotetext{#1}}%
1355   \fi}

\@subtitlenotes The subtitle notes
1356 \def\@subtitlenotes{}

\subtitlenote Adding a note to the subtitle
1357 \def\subtitlenote#1{%
1358   \g@addto@macro\@subtitle{\footnotemark}%
1359   \if@ACM@anonymous
1360     \g@addto@macro\@subtitlenotes{%
1361       \stepcounter{footnote}\footnotetext{Subtitle note}}%
1362   \else
1363     \g@addto@macro\@subtitlenotes{%
1364       \stepcounter{footnote}\footnotetext{#1}}%
1365   \fi}

\@authornotes The author notes
1366 \def\@authornotes{}

\authornote Adding a note to the author
1367 \def\authornote#1{%
1368   \if@ACM@anonymous\else
1369     \g@addto@macro\addresses{\@authornotemark}%
1370     \g@addto@macro\@authornotes{%
1371       \stepcounter{footnote}\footnotetext{#1}}%
1372   \fi}

\authornotemark Adding a footnote mark to the authors
1373 \newcommand\authornotemark[1][\relax]{%
1374   \ifx#1\relax\relax\relax
1375     \g@addto@macro\addresses{\@authornotemark}%
1376   \else
1377     \g@addto@macro\addresses{\@authornotemark{#1}}%
1378   \fi}

\acmVolume The current volume
1379 \def\acmVolume#1{\def\@acmVolume{#1}}
1380 \acmVolume{1}

\acmNumber The current number
1381 \def\acmNumber#1{\def\@acmNumber{#1}}
1382 \acmNumber{1}

```

<code>\acmArticle</code>	<p>The current article</p> <pre>1383 \def\acmArticle#1{\def\@acmArticle{#1}} 1384 \acmArticle{}</pre>
<code>\acmArticleSeq</code>	<p>The sequence number</p> <pre>1385 \def\acmArticleSeq#1{\def\@acmArticleSeq{#1}} 1386 \acmArticleSeq{\@acmArticle}</pre>
<code>\acmYear</code>	<p>The current year</p> <pre>1387 \def\acmYear#1{\def\@acmYear{#1}} 1388 \acmYear{\the\year}</pre>
<code>\acmMonth</code>	<p>The current month</p> <pre>1389 \def\acmMonth#1{\def\@acmMonth{#1}} 1390 \acmMonth{\the\month}</pre>
<code>\@acmPubDate</code>	<p>The publication date</p> <pre>1391 \def\@acmPubDate{\ifcase\@acmMonth\or 1392   January\or February\or March\or April\or May\or June\or 1393   July\or August\or September\or October\or November\or 1394   December\fi~\@acmYear}</pre>
<code>\acmPrice</code>	<p>The price</p> <pre>1395 \def\acmPrice#1{\def\@acmPrice{#1}} 1396 \acmPrice{15.00}</pre>
<code>\acmSubmissionID</code>	<p>The submission ID</p> <pre>1397 \def\acmSubmissionID#1{\def\@acmSubmissionID{#1}} 1398 \acmSubmissionID{}</pre>
<code>\acmISBN</code>	<p>The book ISBN</p> <pre>1399 \def\acmISBN#1{\def\@acmISBN{#1}} 1400 \acmISBN{978-x-xxxx-xxxx-x/YY/MM}</pre>
<code>\acmDOI</code>	<p>The paper DOI</p> <pre>1401 \def\acmDOI#1{\def\@acmDOI{#1}} 1402 \acmDOI{10.1145/nnnnnnn.nnnnnnn}</pre>
<code>\if@ACM@badge</code>	<p>Whether to print a badge. Note that either a left or right badge triggers it:</p> <pre>1403 \newif\if@ACM@badge 1404 \@ACM@badgefalse</pre>
<code>\@ACM@badge@width</code>	<p>The width of the badge</p> <pre>1405 \newlength\@ACM@badge@width 1406 \setlength\@ACM@badge@width{5pc}</pre>
<code>\@ACM@title@width</code>	<p>The width of the badge</p> <pre>1407 \newlength\@ACM@title@width</pre>

`\@ACM@badge@skip` The space between the badge and the title

```

1408 \newlength\@ACM@badge@skip
1409 \setlength\@ACM@badge@skip{1pc}

```

`\acmBadgeR` Setting the right badge

```

1410 \newcommand\acmBadgeR[2][\@ACM@badgetrue
1411   \def\@acmBadgeR@url{#1}%
1412   \def\@acmBadgeR@image{#2}}
1413 \def\@acmBadgeR@url{}
1414 \def\@acmBadgeR@image{}

```

`\acmBadgeL` Setting the left badge

```

1415 \newcommand\acmBadgeL[2][\@ACM@badgetrue
1416   \def\@acmBadgeL@url{#1}%
1417   \def\@acmBadgeL@image{#2}}
1418 \def\@acmBadgeL@url{}
1419 \def\@acmBadgeL@image{}

```

`\startPage` The start page of the paper

```

1420 \def\startPage#1{\def\@startPage{#1}}
1421 \startPage{}

```

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

```

1422 \def\terms#1{\ClassWarning{\@classname}{The command \string\terms{} is
1423   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.

```

1424 \def\keywords#1{\def\@keywords{#1}}
1425 \let\@keywords\empty

1426 \AtEndDocument{\if@ACM@nonacm\else\ifx\@keywords\empty
1427   \ifnum\getrefnumber{TotPages}>2\relax
1428   \ClassWarningNoLine{\@classname}{ACM keywords are mandatory
1429     for papers over two pages}%
1430   \fi\fi\fi}

```

`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

```

1431 \renewenvironment{abstract}{\Collect@Body\@saveabstract}{\}

```

`\@saveabstract` And saving the abstract

```

1432 \long\def\@saveabstract#1{\if@ACM@maketitle@typeset
1433   \ClassError{\@classname}{Abstract must be defined before maketitle
1434     command. Please move it!}\fi
1435   \long\gdef\@abstract{#1}}
1436 \@saveabstract{}

```

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

```
1437 \long\def\@empty{}
```

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

```
1438 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printccs}[true]{%
1439   \if@ACM@printccs
1440     \ClassInfo{\@classname}{Printing CCS}%
1441   \else
1442     \ClassInfo{\@classname}{Suppressing CCS}%
1443 \fi}{\ClassError{\@classname}{The option printccs can be either true or false}}
```

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

```
1444 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printacmref}[true]{%
1445   \if@ACM@printacmref
1446     \ClassInfo{\@classname}{Printing bibformat}%
1447   \else
1448     \ClassInfo{\@classname}{Suppressing bibformat}%
1449 \fi}{\ClassError{\@classname}{The option printacmref can be either true or false}}
```

```
1450 \AtEndDocument{\if@ACM@nonacm\else\if@ACM@printacmref\else
1451   \ifnum\getrefnumber{TotPages}>1\relax
1452   \ClassWarningNoLine{\@classname}{ACM reference format is mandatory
1453     for papers over one page}%
1454 \fi\fi\fi}
```

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

```
1455 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printfolios}[true]{%
1456   \if@ACM@printfolios
1457     \ClassInfo{\@classname}{Printing folios}%
1458   \else
1459     \ClassInfo{\@classname}{Suppressing folios}%
1460 \fi}{\ClassError{\@classname}{The option printfolios can be either true or false}}
```

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

```
1461 \define@cmdkey{@ACM@topmatter@}[@ACM@]{authorsperrrow}[0]{%
1462   \IfInteger{#1}{\ClassInfo{\@classname}{Setting authorsperrrow to
1463     #1}}{\ClassWarning{\@classname}{The parameter authorsperrrow must be
1464     numerical. Ignoring the input #1}\gdef\@ACM@authorsperrrow{0}}
```

`\settopmatter` The usual syntactic sugar

```
1465 \def\settopmatter#1{\setkeys{@ACM@topmatter@}{#1}}
```

Now the settings

```
1466 \settopmatter{printccs=true, printacmref=true}
1467 \if@ACM@manuscript
1468   \settopmatter{printfolios=true}
1469 \else
1470   \if@ACM@journal
1471     \settopmatter{printfolios=true}
```

```

1472 \else
1473 \settopmatter{printfolios=false}
1474 \fi
1475 \fi
1476 \settopmatter{authorsperrow=0}

\@received The container for the paper history
1477 \def\@received{}

\received The \received command
1478 \newcommand\received[2][\def\@tempa{#1}%
1479 \ifx\@tempa\@empty
1480 \ifx\@received\@empty
1481 \gdef\@received{Received #2}%
1482 \else
1483 \g@addto@macro{\@received}{; revised #2}%
1484 \fi
1485 \else
1486 \ifx\@received\@empty
1487 \gdef\@received{#1 #2}%
1488 \else
1489 \g@addto@macro{\@received}{; #1 #2}%
1490 \fi
1491 \fi}
1492 \AtEndDocument{%
1493 \ifx\@received\@empty\else
1494 \par\bigskip\noindent\small\normalfont\@received\par
1495 \fi}

```

### 3.13 Concepts system

We exclude CCSXML stuff generated by the ACM system:

```

1496 \RequirePackage{comment}
1497 \excludecomment{CCSXML}

\@concepts This is the storage macro and counter for concepts
1498 \let\@concepts\@empty
1499 \newcounter{concepts}

\ccsdesc The first argument is the significance, the second is the concept(s)
1500 \newcommand\ccsdesc[2][100]{%
1501 \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!
1502 \def\textrightarrow{$\rightarrow$}
1503 \def\ccsdesc@parse#1~#2~#3~{%
1504 \stepcounter{concepts}%

```

```

1505 \expandafter\ifx\csname CCS@General@#2\endcsname\relax
1506 \expandafter\gdef\csname CCS@General@#2\endcsname{\textbullet\
1507 \textbf{#2}}}%
1508 \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{;}%
1509 \expandafter\gdef\csname CCS@Specific@#2\endcsname{}%
1510 \g@addto@macro{\@concepts}{\csname CCS@General@#2\endcsname
1511 \csname CCS@Punctuation@#2\endcsname
1512 \csname CCS@Specific@#2\endcsname}%
1513 \fi
1514 \ifx#3\relax\relax\else
1515 \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{
1516 \textrightarrow}%
1517 \expandafter\g@addto@macro\expandafter{\csname CCS@Specific@#2\endcsname}{%
1518 \addtocounter{@concepts}{-1}}%
1519 \ifnum#1>499\textbf{#3}\else
1520 \ifnum#1>299\textit{#3}\else
1521 #3\fi\fi\ifnum\value{@concepts}=0.\else; \fi}%
1522 \fi
1523 \ccsdesc@parse@finish}

1524 \AtEndDocument{\if@ACM@nonacm\else\ifx\@concepts\empty\relax
1525 \ifnum\getrefnumber{TotPages}>2\relax
1526 \ClassWarningNoLine{\@classname}{CCS concepts are mandatory
1527 for papers over two pages}%
1528 \fi\fi\fi}

```

```

\ccdesc@parse@finish Gobble everything to \ccsdesc@parse@end
1529 \def\ccsdesc@parse@finish#1\ccsdesc@parse@end{}

```

### 3.14 Copyright system

This is from acmcopyright.sty

```

\if@printcopyright Whether to print a copyright symbol
1530 \newif\if@printcopyright
1531 \@printcopyrighttrue

\if@printpermission Whether to print the permission block
1532 \newif\if@printpermission
1533 \@printpermissiontrue

\if@acmowned Whether the ACM owns the rights to the paper
1534 \newif\if@acmowned
1535 \@acmownedtrue

```

Keys:

```

1536 \define@choicekey*{ACM@}{acmcopyrightmode}[%
1537 \acm@copyrightinput\acm@copyrightmode]{none,%
1538 acmcopyright,acmlicensed,rightsretained,%

```

```

1539     usgov,usgovmixed,cagov,cagovmixed,licensedusgovmixed,%
1540     licensedcagov,licensedcagovmixed,othergov,licensedothergov,%
1541     iw3c2w3,iw3c2w3g}{%
1542 \@printpermissiontrue
1543 \@printcopyrighttrue
1544 \@acmownedtrue
1545 \ifnum\acm@copyrightmode=0\relax % none
1546 \@printpermissionfalse
1547 \@printcopyrightfalse
1548 \@acmownedfalse
1549 \fi
1550 \ifnum\acm@copyrightmode=2\relax % acmlicensed
1551 \@acmownedfalse
1552 \fi
1553 \ifnum\acm@copyrightmode=3\relax % rightsretained
1554 \@acmownedfalse
1555 \AtBeginDocument{\acmPrice{}}%
1556 \fi
1557 \ifnum\acm@copyrightmode=4\relax % usgov
1558 \@printpermissiontrue
1559 \@printcopyrightfalse
1560 \@acmownedfalse
1561 \AtBeginDocument{\acmPrice{}}%
1562 \fi
1563 \ifnum\acm@copyrightmode=6\relax % cagov
1564 \@acmownedfalse
1565 \fi
1566 \ifnum\acm@copyrightmode=8\relax % licensedusgovmixed
1567 \@acmownedfalse
1568 \fi
1569 \ifnum\acm@copyrightmode=9\relax % licensedcagov
1570 \@acmownedfalse
1571 \fi
1572 \ifnum\acm@copyrightmode=10\relax % licensedcagovmixed
1573 \@acmownedfalse
1574 \fi
1575 \ifnum\acm@copyrightmode=11\relax % othergov
1576 \@acmownedtrue
1577 \fi
1578 \ifnum\acm@copyrightmode=12\relax % licensedothergov
1579 \@acmownedfalse
1580 \fi
1581 \ifnum\acm@copyrightmode=13\relax % iw3c2w3
1582 \@acmownedfalse
1583 \AtBeginDocument{\acmPrice{}}%
1584 \fi
1585 \ifnum\acm@copyrightmode=14\relax % iw3c2w3g
1586 \@acmownedfalse
1587 \AtBeginDocument{\acmPrice{}}%
1588 \fi}

```



`\setcopyright` This is the syntactic sugar around setting keys.

```
1589 \def\setcopyright#1{\setkeys{ACM@}{acmcopyrightmode=#1}}
1590 \setcopyright{acmcopyright}
```

`\@copyrightowner` Here is the owner of the copyright

```
1591 \def\@copyrightowner{%
1592   \ifcase\acm@copyrightmode\relax % none
1593   \or % acmcopyright
1594     Association for Computing Machinery.
1595   \or % acmlicensed
1596     Copyright held by the owner/author(s). Publication rights licensed to
1597     ACM\@.
1598   \or % rightsretained
1599     Copyright held by the owner/author(s).
1600   \or % usgov
1601   \or % usgovmixed
1602     Association for Computing Machinery.
1603   \or % cagov
1604     Crown in Right of Canada.
1605   \or %cagovmixed
1606     Association for Computing Machinery.
1607   \or %licensedusgovmixed
1608     Copyright held by the owner/author(s). Publication rights licensed to
1609     ACM\@.
1610   \or % licensedcagov
1611     Crown in Right of Canada. Publication rights licensed to
1612     ACM\@.
1613   \or %licensedcagovmixed
1614     Copyright held by the owner/author(s). Publication rights licensed to
1615     ACM\@.
1616   \or % othergov
1617     Association for Computing Machinery.
1618   \or % licensedothergov
1619     Copyright held by the owner/author(s). Publication rights licensed to
1620     ACM\@.
1621   \or % ic2w3www
1622     IW3C2 (International World Wide Web Conference Committee), published
1623     under Creative Commons CC-BY~4.0 License.
1624   \or % ic2w3wwwgoogle
1625     IW3C2 (International World Wide Web Conference Committee), published
1626     under Creative Commons CC-BY-NC-ND~4.0 License.
1627   \fi}
```

`\@formatdoi` Print a clickable DOI

```
1628 \def\@formatdoi#1{\url{https://doi.org/#1}}
```

`\@copyrightpermission` The canned permission block.

```
1629 \def\@copyrightpermission{%
1630   \ifcase\acm@copyrightmode\relax % none
```

1631 \or % acmcopyright  
 1632 Permission to make digital or hard copies of all or part of this  
 1633 work for personal or classroom use is granted without fee provided  
 1634 that copies are not made or distributed for profit or commercial  
 1635 advantage and that copies bear this notice and the full citation on  
 1636 the first page. Copyrights for components of this work owned by  
 1637 others than ACM must be honored. Abstracting with credit is  
 1638 permitted. To copy otherwise, or republish, to post on servers or to  
 1639 redistribute to lists, requires prior specific permission  
 1640 and\hspace\*{.5pt}/or a fee. Request permissions from  
 1641 permissions@acm.org.  
 1642 \or % acmlicensed  
 1643 Permission to make digital or hard copies of all or part of this  
 1644 work for personal or classroom use is granted without fee provided  
 1645 that copies are not made or distributed for profit or commercial  
 1646 advantage and that copies bear this notice and the full citation on  
 1647 the first page. Copyrights for components of this work owned by  
 1648 others than the author(s) must be honored. Abstracting with credit  
 1649 is permitted. To copy otherwise, or republish, to post on servers  
 1650 or to redistribute to lists, requires prior specific permission  
 1651 and\hspace\*{.5pt}/or a fee. Request permissions from  
 1652 permissions@acm.org.  
 1653 \or % rightsretained  
 1654 Permission to make digital or hard copies of part or all of this work  
 1655 for personal or classroom use is granted without fee provided that  
 1656 copies are not made or distributed for profit or commercial advantage  
 1657 and that copies bear this notice and the full citation on the first  
 1658 page. Copyrights for third-party components of this work must be  
 1659 honored. For all other uses, contact the  
 1660 owner\hspace\*{.5pt}/author(s).  
 1661 \or % usgov  
 1662 This paper is authored by an employee(s) of the United States  
 1663 Government and is in the public domain. Non-exclusive copying or  
 1664 redistribution is allowed, provided that the article citation is  
 1665 given and the authors and agency are clearly identified as its  
 1666 source.  
 1667 \or % usgovmixed  
 1668 ACM acknowledges that this contribution was authored or co-authored  
 1669 by an employee, contractor, or affiliate of the United States  
 1670 government. As such, the United States government retains a  
 1671 nonexclusive, royalty-free right to publish or reproduce this  
 1672 article, or to allow others to do so, for government purposes only.  
 1673 \or % cagov  
 1674 This article was authored by employees of the Government of Canada.  
 1675 As such, the Canadian government retains all interest in the  
 1676 copyright to this work and grants to ACM a nonexclusive,  
 1677 royalty-free right to publish or reproduce this article, or to allow  
 1678 others to do so, provided that clear attribution is given both to  
 1679 the authors and the Canadian government agency employing them.  
 1680 Permission to make digital or hard copies for personal or classroom

1681 use is granted. Copies must bear this notice and the full citation  
1682 on the first page. Copyrights for components of this work owned by  
1683 others than the Canadian Government must be honored. To copy  
1684 otherwise, distribute, republish, or post, requires prior specific  
1685 permission and\hspace\*{.5pt}/or a fee. Request permissions from  
1686 permissions@acm.org.

1687 \or % cagovmixed

1688 ACM acknowledges that this contribution was co-authored by an  
1689 affiliate of the national government of Canada. As such, the Crown  
1690 in Right of Canada retains an equal interest in the copyright.  
1691 Reprints must include clear attribution to ACM and the author's  
1692 government agency affiliation. Permission to make digital or hard  
1693 copies for personal or classroom use is granted. Copies must bear  
1694 this notice and the full citation on the first page. Copyrights for  
1695 components of this work owned by others than ACM must be honored.  
1696 To copy otherwise, distribute, republish, or post, requires prior  
1697 specific permission and\hspace\*{.5pt}/or a fee. Request permissions  
1698 from permissions@acm.org.

1699 \or % licensedusgovmixed

1700 Publication rights licensed to ACM\@. ACM acknowledges that this  
1701 contribution was authored or co-authored by an employee, contractor  
1702 or affiliate of the United States government. As such, the  
1703 Government retains a nonexclusive, royalty-free right to publish or  
1704 reproduce this article, or to allow others to do so, for Government  
1705 purposes only.

1706 \or % licensedcagov

1707 This article was authored by employees of the Government of Canada.  
1708 As such, the Canadian government retains all interest in the  
1709 copyright to this work and grants to ACM a nonexclusive,  
1710 royalty-free right to publish or reproduce this article, or to allow  
1711 others to do so, provided that clear attribution is given both to  
1712 the authors and the Canadian government agency employing them.  
1713 Permission to make digital or hard copies for personal or classroom  
1714 use is granted. Copies must bear this notice and the full citation  
1715 on the first page. Copyrights for components of this work owned by  
1716 others than the Canadian Government must be honored. To copy  
1717 otherwise, distribute, republish, or post, requires prior specific  
1718 permission and\hspace\*{.5pt}/or a fee. Request permissions from  
1719 permissions@acm.org.

1720 \or % licensedcagovmixed

1721 Publication rights licensed to ACM\@. ACM acknowledges that this  
1722 contribution was authored or co-authored by an employee, contractor  
1723 or affiliate of the national government of Canada. As such, the  
1724 Government retains a nonexclusive, royalty-free right to publish or  
1725 reproduce this article, or to allow others to do so, for Government  
1726 purposes only.

1727 \or % othergov

1728 ACM acknowledges that this contribution was authored or co-authored  
1729 by an employee, contractor or affiliate of a national government. As  
1730 such, the Government retains a nonexclusive, royalty-free right to

```

1731 publish or reproduce this article, or to allow others to do so, for
1732 Government purposes only.
1733 \or % licensedothergov
1734 Publication rights licensed to ACM\@. ACM acknowledges that this
1735 contribution was authored or co-authored by an employee, contractor
1736 or affiliate of a national government. As such, the Government
1737 retains a nonexclusive, royalty-free right to publish or reproduce
1738 this article, or to allow others to do so, for Government purposes
1739 only.
1740 \or % iw3c2w3
1741 This paper is published under the Creative Commons Attribution~4.0
1742 International (CC-BY~4.0) license. Authors reserve their rights to
1743 disseminate the work on their personal and corporate Web sites with
1744 the appropriate attribution.
1745 \or % iw3c2w3g
1746 This paper is published under the Creative Commons
1747 Attribution-NonCommercial-NoDerivs~4.0 International
1748 (CC-BY-NC-ND~4.0) license. Authors reserve their rights to
1749 disseminate the work on their personal and corporate Web sites with
1750 the appropriate attribution.
1751 \fi}

\copyrightyear By default, the copyright year is the same as \acmYear, but one can override this:
1752 \def\copyrightyear#1{\def\copyrightyear{#1}}
1753 \copyrightyear{\acmYear}

\@teaserfigures The teaser figures container
1754 \def\@teaserfigures{}

teaserfigure The teaser figure
1755 \newenvironment{teaserfigure}{\Collect@Body\@saveteaser}{}

\@saveteaser Saving the teaser
1756 \long\def\@saveteaser#1{\g@addto@macro\@teaserfigures{\@teaser{#1}}}

\thanks We redefine amsart \thanks so the anonymous key works
1757 \renewcommand{\thanks}[1]{%
1758   \@ifnotempty{#1}{%
1759     \if@ACM@anonymous
1760       \g@addto@macro\thankses{\thanks{A note}}%
1761     \else
1762       \g@addto@macro\thankses{\thanks{#1}}%
1763     \fi}}

```

### 3.15 Maketitle hook

The current  $\text{\LaTeX}$  provides a nice `lthooks` mechanism. However, since it is relatively new, we will use oldfashioned approach—at least for now.

```

\@beginmaketitlehook The hook
1764 \ifx\@beginmaketitlehook\undefined
1765 \let\@beginmaketitlehook\empty
1766 \fi

\AtBeginMaketitle Adding to the hook
1767 \def\AtBeginMaketitle{\g@addto@macro\@beginmaketitlehook}

```

### 3.16 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*].

```
1768 \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.

```

1769 \def\maketitle{\@beginmaketitlehook
1770 \@ACM@maketitle@typesettrue
1771 \if@ACM@anonymous
1772 % Anonymize omission of \author-s
1773 \ifnum\num@authorgroups=0\author{}\fi
1774 \fi
1775 \begingroup
1776 \let\@vspace\@vspace@orig
1777 \let\@vspacer\@vspacer@orig
1778 \let\@footnotemark\@footnotemark@nolink
1779 \let\@footnotetext\@footnotetext@nolink
1780 \renewcommand\thefootnote{\@fnsymbol\c@footnote}%
1781 \hsize=\textwidth
1782 \def\@makefnmark{\hbox{\@textsuperscript{\@thefnmark}}}%
1783 \mktitle\if@ACM@sigchiamode\else\mkauthors\fi\mkteasers
1784 \printtopmatter
1785 \if@ACM@sigchiamode\mkauthors\fi
1786 \setcounter{footnote}{0}%
1787 \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}%
1788 \@titlenotes
1789 \@subtitlenotes
1790 \@authornotes
1791 \let\@makefnmark\relax
1792 \let\@thefnmark\relax
1793 \let\@makefntext\noindent
1794 \ifx\@empty\thankses\else
1795 \footnotetextauthorsaddresses{%
1796 \def\par{\let\par\@par}\parindent\z@\@setthanks}%

```

```

1797 \fi
1798 \ifx\@empty\@authorsaddresses\else
1799     \if@ACM@anonymous\else
1800     \if@ACM@journal@bibstrip
1801     \footnotetextauthorsaddresses{%
1802     \def\par{\let\par\@par}\parindent\z@\@setauthorsaddresses}%
1803     \fi
1804     \fi
1805 \fi
1806 \if@ACM@nonacm\else\footnotetextcopyrightpermission{%
1807     \if@ACM@authordraft
1808     \raisebox{-2ex}{\z@}{\z@}{\makebox[0pt][l]{\large\bfseries
1809     Unpublished working draft. Not for distribution.}}%
1810     \color[gray]{0.9}%
1811     \fi
1812     \parindent\z@\parskip0.1\baselineskip
1813     \if@ACM@authorversion\else
1814     \if@printpermission\@copyrightpermission\par\fi
1815     \fi
1816     \if@ACM@manuscript\else
1817     \if@ACM@journal@bibstrip\else % Print the conference information
1818     {\itshape \acmConference@shortname, \acmConference@date, \acmConference@venue}\par
1819     \fi
1820     \fi
1821     \if@printcopyright
1822     \copyright\ \@copyrightyear\ \@copyrightowner\
1823     \else
1824     \@copyrightyear.\
1825     \fi
1826     \if@ACM@manuscript
1827     Manuscript submitted to ACM\
1828     \else
1829     \if@ACM@authorversion
1830     This is the author's version of the work. It is posted here for
1831     your personal use. Not for redistribution. The definitive Version
1832     of Record was published in
1833     \if@ACM@journal@bibstrip
1834     \emph{\@journalName}%
1835     \else
1836     \emph{\@acmBooktitle}%
1837     \fi
1838     \ifx\@acmDOI\@empty
1839     .
1840     \else
1841     , \@formatdoi{\@acmDOI}.
1842     \fi\
1843     \else
1844     \if@ACM@nonacm\else
1845     \if@ACM@journal@bibstrip
1846     \@permissionCodeOne/\@acmYear/\@acmMonth-ART\@acmArticle

```

```

1847         \ifx\@acmPrice\@empty\else\ $\@acmPrice\fi\\
1848         \@formatdoi{\@acmDOI}%
1849     \else % Conference
1850         \ifx\@acmISBN\@empty\else ACM~ISBN~\@acmISBN
1851         \ifx\@acmPrice\@empty.\else\dots\$\@acmPrice\fi\\fi
1852         \ifx\@acmDOI\@empty\else\@formatdoi{\@acmDOI}\fi%
1853     \fi
1854 \fi
1855 \fi
1856 \fi}
1857 \fi
1858 \endgroup
1859 \setcounter{footnote}{0}%
1860 \@mkabstract
1861 \if@ACM@printccs
1862 \ifx\@concepts\@empty\else\bgroup
1863     {\@specialsection{CCS Concepts}%
1864     \noindent\@concepts\par}\egroup
1865 \fi
1866 \fi
1867 \ifx\@keywords\@empty\else\bgroup
1868     {\if@ACM@journal
1869         \@specialsection{Additional Key Words and Phrases}%
1870     \else
1871         \@specialsection{Keywords}%
1872     \fi
1873     \noindent\@keywords}\par\egroup
1874 \fi
1875 \let\metadata@authors=\authors
1876 \nxandlist{, }{, }{\, }{\, }\metadata@authors
1877 \def\@ACM@checkaffil{}%
1878 \hypersetup{%
1879     pdfauthor={\metadata@authors},
1880     pdftitle={\@title},
1881     pdfsubject={\@concepts},
1882     pdfkeywords={\@keywords},
1883     pdfcreator={LaTeX with acmart
1884         \csname ver@acmart.cls\endcsname\space
1885         and hyperref
1886         \csname ver@hyperref.sty\endcsname}}%
1887 \andify\authors
1888 \andify\shortauthors
1889 \global\let\authors=\authors
1890 \global\let\shortauthors=\shortauthors
1891 \if@ACM@printacmref
1892     \@mkbibcitation
1893 \fi
1894 \global\@topnum\z@ % this prevents floats from falling
1895     % at the top of page 1
1896 \global\@botnum\z@ % we do not want them to be on the bottom either

```

```

1897 \@printendtopmatter
1898 \@afterindentfalse
1899 \@afterheading
1900 }

```

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

```

1901 \def\@specialsection#1{%
1902   \ifcase\ACM@format@nr
1903     \relax % manuscript
1904     \par\medskip\small\noindent#1: %
1905   \or % acmsmall
1906     \par\medskip\small\noindent#1: %
1907   \or % acmlarge
1908     \par\medskip\small\noindent#1: %
1909   \or % acmtog
1910     \par\medskip\small\noindent#1: %
1911   \or % sigconf
1912     \section*{#1}%
1913   \or % siggraph
1914     \section*{#1}%
1915   \or % sigplan
1916     \noindentparagraph*{#1:~}%
1917   \or % sigchi
1918     \section*{#1}%
1919   \or % sigchi-a
1920     \section*{#1}%
1921   \fi
1922 }

```

`\@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.

```

1923 \def\@printtopmatter{%
1924   \ifx\@startPage\@empty
1925     \gdef\@startPage{1}%
1926   \else
1927     \setcounter{page}{\@startPage}%
1928   \fi
1929   \thispagestyle{firstpagestyle}%
1930   \noindent
1931   \ifcase\ACM@format@nr
1932     \relax % manuscript
1933     \box\mktitle@bx\par
1934   \or % acmsmall
1935     \box\mktitle@bx\par
1936   \or % acmlarge
1937     \box\mktitle@bx\par
1938   \or % acmtog
1939     \twocolumn[\box\mktitle@bx]%

```



```

1940 \or % sigconf
1941   \twocolumn[\box\mktitle@bx]%
1942 \or % siggraph
1943   \twocolumn[\box\mktitle@bx]%
1944 \or % sigplan
1945   \twocolumn[\box\mktitle@bx]%
1946 \or % sigchi
1947   \twocolumn[\box\mktitle@bx]%
1948 \or % sigchi-a
1949   \par\box\mktitle@bx\par\bigskip
1950   \if@ACM@badge
1951     \marginpar{\noindent
1952       \ifx\@acmBadgeL@image\empty\else
1953         \href{\@acmBadgeL@url}{%
1954           \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}%
1955         \hskip\@ACM@badge@skip
1956       \fi
1957       \ifx\@acmBadgeR@image\empty\else
1958         \href{\@acmBadgeR@url}{%
1959           \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}%
1960         \fi}%
1961   \fi
1962 \fi
1963 }

\@mktitle The title of the article
1964 \def\@mktitle{%
1965   \ifcase\ACM@format@nr
1966   \relax % manuscript
1967     \@mktitle@i
1968   \or % acmsmall
1969     \@mktitle@i
1970   \or % acmlarge
1971     \@mktitle@i
1972   \or % acmtog
1973     \@mktitle@i
1974   \or % sigconf
1975     \@mktitle@iii
1976   \or % siggraph
1977     \@mktitle@iii
1978   \or % sigplan
1979     \@mktitle@iii
1980   \or % sigchi
1981     \@mktitle@iii
1982   \or % sigchi-a
1983     \@mktitle@iv
1984   \fi
1985 }

\@titlefont The font to typeset the title

```

```

1986 \def\@titlefont{%
1987   \ifcase\ACM@format@nr
1988   \relax % manuscript
1989   \LARGE\sffamily\bfseries
1990   \or % acmsmall
1991   \LARGE\sffamily\bfseries
1992   \or % acmlarge
1993   \LARGE\sffamily\bfseries
1994   \or % acmtog
1995   \Huge\sffamily
1996   \or % sigconf
1997   \Huge\sffamily\bfseries
1998   \or % siggraph
1999   \Huge\sffamily\bfseries
2000   \or % sigplan
2001   \Huge\bfseries
2002   \or % sigchi
2003   \Huge\sffamily\bfseries
2004   \or % sigchi-a
2005   \Huge\bfseries
2006   \fi}

```

\@subtitlefont The font to typeset the subtitle

```

2007 \def\@subtitlefont{\normalsize
2008   \ifcase\ACM@format@nr
2009   \relax % manuscript
2010   \mdseries
2011   \or % acmsmall
2012   \mdseries
2013   \or % acmlarge
2014   \mdseries
2015   \or % acmtog
2016   \LARGE
2017   \or % sigconf
2018   \LARGE\mdseries
2019   \or % siggraph
2020   \LARGE\mdseries
2021   \or % sigplan
2022   \LARGE\mdseries
2023   \or % sigchi
2024   \LARGE\mdseries
2025   \or % sigchi-a
2026   \mdseries
2027   \fi}

```

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

```

2028 \def\@mktitle@i{\hsize=\textwidth
2029   \ACM@title@width=\hsize
2030   \ifx\@acmBadgeL@image\@empty\else
2031     \advance\@ACM@title@width by -\@ACM@badge@width

```

```

2032 \advance\@ACM@title@width by -\@ACM@badge@skip
2033 \fi
2034 \ifx\@acmBadgeR@image\@empty\else
2035 \advance\@ACM@title@width by -\@ACM@badge@width
2036 \advance\@ACM@title@width by -\@ACM@badge@skip
2037 \fi
2038 \setbox\mktitle@bx=\vbox{\noindent\@titlefont
2039 \ifx\@acmBadgeL@image\@empty\else
2040 \raisebox{-.5\baselineskip}{\z@}{\z@}{\href{\@acmBadgeL@url}{%
2041 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
2042 \hskip\@ACM@badge@skip
2043 \fi
2044 \parbox[t]{\@ACM@title@width}{\raggedright
2045 \@titlefont\noindent
2046 \@title
2047 \ifx\@subtitle\@empty\else
2048 \par\noindent{\@subtitlefont\@subtitle}
2049 \fi}%
2050 \ifx\@acmBadgeR@image\@empty\else
2051 \hskip\@ACM@badge@skip
2052 \raisebox{-.5\baselineskip}{\z@}{\z@}{\href{\@acmBadgeR@url}{%
2053 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
2054 \fi
2055 \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.

```

2056 \def\mktitle@iii{\hsize=\textwidth
2057 \setbox\mktitle@bx=\vbox{\@titlefont\centering
2058 \@ACM@title@width=\hsize
2059 \if@ACM@badge
2060 \advance\@ACM@title@width by -2\@ACM@badge@width
2061 \advance\@ACM@title@width by -2\@ACM@badge@skip
2062 \parbox[b]{\@ACM@badge@width}{\strut
2063 \ifx\@acmBadgeL@image\@empty\else
2064 \raisebox{-.5\baselineskip}{\z@}{\z@}{\href{\@acmBadgeL@url}{%
2065 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
2066 \fi}%
2067 \hskip\@ACM@badge@skip
2068 \fi
2069 \parbox[t]{\@ACM@title@width}{\centering\@titlefont
2070 \@title
2071 \ifx\@subtitle\@empty\else
2072 \par\noindent{\@subtitlefont\@subtitle}
2073 \fi
2074 }%
2075 \if@ACM@badge

```

```

2076 \hskip\@ACM@badge@skip
2077 \parbox[b]{\@ACM@badge@width}{\strut
2078 \ifx\@acmBadgeR@image\@empty\else
2079 \raisebox{-.5\baselineskip}{\z@}{\href{\@acmBadgeR@url}{%
2080 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
2081 \fi}%
2082 \fi
2083 \par\bigskip}}%

```

\@mktitle@iv The version of \@mktitle for sigchi-a

```

2084 \def\@mktitle@iv{\hsize=\textwidth
2085 \setbox\mktitle@bx=\vbox{\raggedright\leftskip5pc\@titlefont
2086 \noindent\leavevmode\leaders\hrule height 2pt\hfill\kern0pt\par
2087 \noindent\@title
2088 \ifx\@subtitle\@empty\else
2089 \par\noindent\@subtitlefont\@subtitle
2090 \fi
2091 \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.

```

2092 \newbox\@ACM@commabox
2093 \def\@ACM@addtoaddress#1{%
2094 \ifvmode\else
2095 \if@ACM@affiliation@obeypunctuation\else
2096 \setbox\@ACM@commabox=\hbox{, }%
2097 \unskip\cleaders\copy\@ACM@commabox\hskip\wd\@ACM@commabox
2098 \fi\fi
2099 #1}

```

\institution Theoretically we can define the macros for \affiliation inside the \@mkauthors-style commands. However, this would lead to a strange error if an author uses them outside \affiliation. Of course we can make them produce an error message, but...

```

\streetaddress 2100 \def\streetaddress#1{\unskip\ignorespaces}
\city 2101 \def\postcode#1{\unskip\ignorespaces}
\state 2102 \if@ACM@journal
\postcode 2103 \def\position#1{\unskip\ignorespaces}
\country 2104 \def\institution#1{\global\@ACM@instpresenttrue
2105 \unskip~#1\ignorespaces}
2106 \def\city#1{\global\@ACM@citypresenttrue\unskip\ignorespaces}
2107 \def\state#1{\unskip\ignorespaces}
2108 \newcommand\department[2][0]{\unskip\ignorespaces}
2109 \def\country#1{\global\@ACM@countrypresenttrue

```

```

2110 \if@ACM@affiliation@obeypunctuation\else, \fi#1\ignorespaces}
2111 \else
2112 \def\position#1{\if@ACM@affiliation@obeypunctuation#1\else#1\par\fi}%
2113 \def\institution#1{\global\@ACM@instpresenttrue
2114 \if@ACM@affiliation@obeypunctuation#1\else#1\par\fi}%
2115 \newcommand\department[2][0]{\if@ACM@affiliation@obeypunctuation
2116 #2\else#2\par\fi}%
2117 % \def\streetaddress#1{\if@ACM@affiliation@obeypunctuation#1\else#1\par\fi}%
2118 \def\city#1{\global\@ACM@citypresenttrue\@ACM@addtoaddress{#1}}%
2119 \let\state\@ACM@addtoaddress
2120 % \def\postcode#1{\if@ACM@affiliation@obeypunctuation#1\else\unskip\space#1\fi}%
2121 \def\country#1{\global\@ACM@countrypresenttrue\@ACM@addtoaddress{#1}}%
2122 \fi

```

\@mkauthors   Typesetting the authors

```

2123 \def\@mkauthors{\begingroup
2124 \hsize=\textwidth
2125 \ifcase\ACM@format@nr
2126 \relax % manuscript
2127 \mkauthors@i
2128 \or % acmsmall
2129 \mkauthors@i
2130 \or % acmlarge
2131 \mkauthors@i
2132 \or % acmtog
2133 \mkauthors@i
2134 \or % sigconf
2135 \mkauthors@iii
2136 \or % siggraph
2137 \mkauthors@iii
2138 \or % sigplan
2139 \mkauthors@iii
2140 \or % sigchi
2141 \mkauthors@iii
2142 \or % sigchi-a
2143 \mkauthors@iv
2144 \fi
2145 \endgroup
2146 }

```

\@authorfont   Somehow different conferences use different fonts for author names. Why?

```

2147 \def\@authorfont{\Large\sffamily}

```

\@affiliationfont   Font for affiliations

```

2148 \def\@affiliationfont{\normalsize\normalfont}

```

Adjusting fonts for different formats

```

2149 \ifcase\ACM@format@nr
2150 \relax % manuscript

```

```

2151 \or % acmsmall
2152   \def\@authorfont{\large\sffamily}
2153   \def\@affiliationfont{\small\normalfont}
2154 \or % acmlarge
2155 \or % acmtog
2156   \def\@authorfont{\LARGE\sffamily}
2157   \def\@affiliationfont{\large}
2158 \or % sigconf
2159   \def\@authorfont{\LARGE}
2160   \def\@affiliationfont{\large}
2161 \or % siggraph
2162   \def\@authorfont{\normalsize\normalfont}
2163   \def\@affiliationfont{\normalsize\normalfont}
2164 \or % sigplan
2165   \def\@authorfont{\Large\normalfont}
2166   \def\@affiliationfont{\normalsize\normalfont}
2167 \or % sigchi
2168   \def\@authorfont{\bfseries}
2169   \def\@affiliationfont{\mdseries}
2170 \or % sigchi-a
2171   \def\@authorfont{\bfseries}
2172   \def\@affiliationfont{\mdseries}
2173 \fi

```

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

```

2174 \def\typeset@author@line{%
2175   \andify\@currentauthors\par\noindent
2176   \@currentauthors\def\@currentauthors{}%
2177   \ifx\@currentaffiliations\@empty\else
2178     \andify\@currentaffiliations
2179     \unskip, {\@currentaffiliations}\par
2180   \fi
2181   \def\@currentaffiliations{}}

```

\if@ACM@instpresent Whether the given affiliation has institution

```

2182 \newif\if@ACM@instpresent
2183 \@ACM@instpresenttrue

```

\if@ACM@citypresent Whether the given affiliation has city

```

2184 \newif\if@ACM@citypresent
2185 \@ACM@citypresenttrue

```

\if@ACM@countrypresent Whether the given affiliation has country

```

2186 \newif\if@ACM@countrypresent
2187 \@ACM@countrypresenttrue

```

\@ACM@resetaffil Reset affiliation flags

```

2188 \def\@ACM@resetaffil{%

```

```

2189 \global\@ACM@instpresentfalse
2190 \global\@ACM@citypresentfalse
2191 \global\@ACM@countrypresentfalse
2192 }

\@ACM@checkaffil Check affiliation flags
2193 \def\@ACM@checkaffil{%
2194   \if@ACM@instpresent\else
2195     \ClassWarningNoLine{\@classname}{No institution present for an affiliation}%
2196   \fi
2197   \if@ACM@citypresent\else
2198     \ClassWarningNoLine{\@classname}{No city present for an affiliation}%
2199   \fi
2200   \if@ACM@countrypresent\else
2201     \ClassError{\@classname}{No country present for an affiliation}{ACM
2202       requires each author to indicate their country using country macro.}%
2203   \fi
2204 }

\@mkauthors@i This version is used in most journal formats. Note that \and between authors with the
same affiliation becomes _and_:
2205 \def\@mkauthors@i{%
2206   \def\@currentauthors{}%
2207   \def\@currentaffiliations{}%
2208   \global\let\and\@typeset@author@line
2209   \def\@author##1{%
2210     \ifx\@currentauthors\@empty
2211       \gdef\@currentauthors{\@authorfont\MakeTextUppercase{##1}}%
2212     \else
2213       \g@addto@macro{\@currentauthors}{\and\MakeTextUppercase{##1}}%
2214     \fi
2215     \gdef\and{}}%
2216   \def\email##1##2{%
2217     \def\@tempa{##2}\ifx\@tempa\@empty\else
2218       \ifx\@currentaffiliations\@empty
2219         \gdef\@currentaffiliations{%
2220           \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2221           \setkeys{@ACM@affiliation@}{##1}%
2222           \@ACM@resetaffil
2223           \@affiliationfont##2\@ACM@checkaffil}%
2224         \else
2225           \g@addto@macro{\@currentaffiliations}{\and
2226             \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2227             \setkeys{@ACM@affiliation@}{##1}\@ACM@resetaffil
2228             ##2\@ACM@checkaffil}%
2229         \fi
2230       \fi
2231     \fi
2232     \global\let\and\@typeset@author@line}%
2233   \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par\medskip

```

```

2234 \noindent\addresses\@typeset@author@line
2235 \par\medskip}%
2236 }

\mkauthors@ii The \mkauthors@ii command was the version used in acmtog. It is no longer neces-
sary.

\author@bx The box to put an individual author in
2237 \newbox\author@bx

\author@bx@wd The width of the author box
2238 \newdimen\author@bx@wd

\author@bx@sep The separation between author boxes
2239 \newskip\author@bx@sep
2240 \author@bx@sep=1pc\relax

\@typeset@author@bx Typesetting the box with authors. Note that in sigchi-a the box is not centered.
2241 \def\@typeset@author@bx{\bgroup\hsize=\author@bx@wd
2242 \def\and{\par}\normalbaselines
2243 \global\setbox\author@bx=\vtop{\if@ACM@sigchiamode\else\centering\fi
2244 \@authorfont\@currentauthors\par\@affiliationfont
2245 \@currentaffiliation}\egroup
2246 \box\author@bx\hspace{\author@bx@sep}%
2247 \gdef\@currentauthors{}}%
2248 \gdef\@currentaffiliation{}}

\mkauthors@iii The sigconf version. Here we use a centered design with each author in a separate box.
2249 \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  $(\texttt{\textbackslash textwidth} - \texttt{\textbackslash author@bx@sep})/N - \texttt{\textbackslash author@bx@sep}$ , where  $N$  is the
number of boxes per row.

2250 \author@bx@wd=\textwidth\relax
2251 \advance\author@bx@wd by -\author@bx@sep\relax
2252 \ifnum\@ACM@authorsperrow>0\relax
2253 \divide\author@bx@wd by \@ACM@authorsperrow\relax
2254 \else
2255 \ifcase\@num@authorgroups
2256 \relax % 0?
2257 \or % 1=one author per row
2258 \or % 2=two authors per row
2259 \divide\author@bx@wd by \@num@authorgroups\relax
2260 \or % 3=three authors per row
2261 \divide\author@bx@wd by \@num@authorgroups\relax
2262 \or % 4=two authors per row (!)
2263 \divide\author@bx@wd by 2\relax
2264 \else % three authors per row

```



```

2265     \divide\author@bx@wd by 3\relax
2266     \fi
2267 \fi
2268 \advance\author@bx@wd by -\author@bx@sep\relax
Now, parsing of \addresses:
2269 \gdef\@currentauthors{}%
2270 \gdef\@currentaffiliation{}%
2271 \def\@author##1{\ifx\@currentauthors\@empty
2272     \gdef\@currentauthors{\par##1}%
2273 \else
2274     \g@addto@macro\@currentauthors{\par##1}%
2275 \fi
2276 \gdef\and{}}%
2277 \def\email##1##2{\ifx\@currentaffiliation\@empty
2278     \gdef\@currentaffiliation{\bgroup
2279         \mathchardef\UrlBreakPenalty=10000\nolinkurl{##2}\egroup}%
2280 \else
2281     \g@addto@macro\@currentaffiliation{\par\bgroup
2282         \mathchardef\UrlBreakPenalty=10000\nolinkurl{##2}\egroup}%
2283 \fi}%
2284 \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
2285     \gdef\@currentaffiliation{%
2286         \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2287         \setkeys{@ACM@affiliation@}{##1}\@ACM@resetaffil
2288         ##2\@ACM@checkaffil}%
2289 \else
2290     \g@addto@macro\@currentaffiliation{\par
2291         \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2292         \setkeys{@ACM@affiliation@}{##1}\@ACM@resetaffil
2293         ##2\@ACM@checkaffil}%
2294 \fi
2295 \global\let\and\@typeset@author@bx
2296 }%

```

Actual typesetting is done by the \and macro:

```

2297 \hsize=\textwidth
2298 \global\setbox\mktitle@bx=\vbox{\noindent
2299     \box\mktitle@bx\par\medskip\leavevmode
2300     \lineskip=1pc\relax\centering\hspace*{-1em}%
2301     \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.

```
2302 \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.

```

2303 \author@bx@wd=\columnwidth\relax
2304 \advance\author@bx@wd by -\author@bx@sep\relax
2305 \ifnum\@ACM@authorsperrow>0\relax
2306   \divide\author@bx@wd by \@ACM@authorsperrow\relax
2307 \else
2308   \ifcase\num@authorgroups
2309   \relax % 0?
2310   \or % 1=one author per row
2311   \else % 2=two authors per row
2312     \divide\author@bx@wd by 2\relax
2313   \fi
2314 \fi
2315 \advance\author@bx@wd by -\author@bx@sep\relax

```

Now, parsing of \addresses:

```

2316 \gdef\@currentauthors{}%
2317 \gdef\@currentaffiliation{}%
2318 \def\author##1{\ifx\@currentauthors\empty
2319   \gdef\@currentauthors{\par##1}%
2320 \else
2321   \g@addto@macro\@currentauthors{\par##1}%
2322 \fi
2323 \gdef\and{}}%
2324 \def\email##1##2{\ifx\@currentaffiliation\empty
2325   \gdef\@currentaffiliation{\nolinkurl{##2}}%
2326 \else
2327   \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
2328 \fi}%
2329 \def\affiliation##1##2{\ifx\@currentaffiliation\empty
2330   \gdef\@currentaffiliation{%
2331     \setkeys{@ACM@affiliation@}{obexpunctuation=false}%
2332     \setkeys{@ACM@affiliation@}{##1}\@ACM@resetaffil
2333     ##2\@ACM@checkaffil}%
2334 \else
2335   \g@addto@macro\@currentaffiliation{\par
2336     \setkeys{@ACM@affiliation@}{obexpunctuation=false}%
2337     \setkeys{@ACM@affiliation@}{##1}\@ACM@resetaffil
2338     ##2\@ACM@checkaffil}%
2339 \fi
2340 \global\let\and\@typeset@author@bx}%
2341 %

```

Actual typesetting is done by the \and macro

```

2342 \bgroup\hsize=\columnwidth
2343 \par\raggedright\leftskip=\z@
2344 \lineskip=1pc\noindent
2345 \addresses\let\and\@typeset@author@bx\and\par\bigskip\egroup}

```

\@mkauthorsaddresses Typesetting authors' addresses in the footnote style

```

2346 \def\@mkauthorsaddresses{%

```

```

2347 \ifnum\num@author>1\relax
2348 Authors' \else Author's \fi
2349 \ifnum\num@authorgroups>1\relax
2350 addresses: \else address: \fi
2351 \bgroup
2352 \def\streetaddress##1{\unskip, ##1}%
2353 \def\postcode##1{\unskip, ##1}%
2354 \def\position##1{\unskip\ignorespaces}%
2355 \def\institution##1{\unskip, ##1}%
2356 \def\city##1{\unskip, ##1}%
2357 \def\state##1{\unskip, ##1}%
2358 \renewcommand\department[2][0]{\unskip\@addpunct, ##2}%
2359 \def\country##1{\unskip, ##1}%
2360 \def\and{\unskip; }%
2361 \def\author##1{##1}%
2362 \def\email##1##2{\unskip, \nolinkurl{##2}}%
2363 \addresses
2364 \egroup}

2365 \AtEndDocument{\if@ACM@nonacm\else\if@ACM@journal
2366 \ifx\@authorsaddresses\@empty
2367 \ClassWarningNoLine{\@classname}{Authors'
2368 addresses are mandatory for ACM journals}%
2369 \fi\fi\fi}

```

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

```
2370 \def\@setaddresses{}
```

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

```
2371 \def\@authornotemark{\g@addto@macro\@currentauthors{\footnotemark\relax}}
```

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

```
2372 \def\@@authornotemark#1{\g@addto@macro\@currentauthors{\footnotemark[#1]}}
```

\@mkteasers Typesetting the teasers

```

2373 \def\@mkteasers{%
2374 \ifx\@teaserfigures\@empty\else
2375 \def\@teaser##1{\par\bigskip\bgroup
2376 \captionsetup{type=figure}##1\egroup\par}
2377 \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par
2378 \noindent\@Description@presentfalse
2379 \@teaserfigures\par\if@Description@present\else
2380 \global\@undescrbed@imagestrue
2381 \ClassWarning{\@classname}{A possible image without
2382 description}\fi
2383 \medskip}%
2384 \fi}

```

\@mkabstract Typesetting the abstract

```

2385 \def\@mkabstract{\bgroup
2386   \ifx\@abstract\@empty\else
2387   {\phantomsection\addcontentsline{toc}{section}{Abstract}%
2388     \if@ACM@journal
2389       \everypar{\setbox\z@\lastbox\everypar{}}\small
2390     \else
2391       \section*\@abstractname}%
2392     \fi
2393   \ignorespaces\@abstract\par}%
2394 \fi\egroup}

```

\@mkbibcitation    Print the bibcitation format

```

2395 \def\@mkbibcitation{\bgroup
2396   \let\@vspace\@vspace@orig
2397   \let\@vspacer\@vspacer@orig
2398   \def\@pages@word{\ifnum\getrefnumber{TotPages}=1\relax page\else pages\fi}%
2399   \def\footnotemark{}%
2400   \def\@unskip{\ignorespaces}%
2401   \def\footnote{\ClassError{\@classname}{Please do not use footnotes
2402     inside a \string\title{} or \string\author{} command! Use
2403     \string\titlenote{} or \string\authornote{} instead!}}%
2404   \def\@article@string{\ifx\@acmArticle\@empty{\ } \else,
2405     Article~\@acmArticle\ } \fi}%
2406   \par\medskip\small\noindent{\bfseries ACM Reference Format:}\par\nobreak
2407   \noindent\bgroup
2408     \def\@unskip{, \ignorespaces}\authors\egroup. \@acmYear. \@title
2409     \ifx\@subtitle\@empty. \else: \@subtitle. \fi
2410     \if@ACM@nonacm\else
2411       % The 'nonacm' option disables 'printacmref' by default,
2412       % and the present \@mkbibcitation definition is never used
2413       % in this case. The conditional remains useful if the user
2414       % explicitly sets \settopmatter{printacmref=true}.
2415       \if@ACM@journal@bibstrip
2416         \textit{\@journalNameShort}
2417         \@acmVolume, \@acmNumber \@article@string (\@acmPubDate),
2418         \ref{TotPages}~\@pages@word.
2419       \else
2420         In \textit{\@acmBooktitle}%
2421         \ifx\@acmEditors\@empty\textit{.}\else
2422           \andify\@acmEditors\textit{, }\@acmEditors~\@editorsAbbrev.%
2423         \fi\
2424         ACM, New York, NY, USA%
2425         \@article@string\unskip, \ref{TotPages}~\@pages@word.
2426       \fi
2427     \fi
2428     \ifx\@acmDOI\@empty\else\@formatdoi{\@acmDOI}\fi
2429 \par\egroup}

```

\@printendtopmatter    End the top matter

```

2430 \def\@printendtopmatter{%
2431   \let\@vspace\@vspace@orig
2432   \let\@vspacer\@vspacer@orig
2433   \par\bigskip
2434   \let\@vspace\@vspace@acm
2435   \let\@vspacer\@vspacer@acm
2436 }

```

\setthanks We redefine \setthanks using \long

```

2437 \def\@setthanks{\long\def\thanks##1{\par##1\@addpunct.}\thankses}

```

\setauthorsaddresses

```

2438 \def\@setauthorsaddresses{\@authorsaddresses\unskip\@addpunct.}

```

### 3.17 Headers and Footers

We use fancyhdr for our headers and footers:

```

2439 \RequirePackage{fancyhdr}

```

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

```

2440 \let\ACM@ps@plain\ps@plain
2441 \let\ACM@ps@myheadings\ps@myheadings
2442 \let\ACM@ps@headings\ps@headings
2443 \def\ACM@restore@pagestyle{%
2444   \let\ps@plain\ACM@ps@plain
2445   \let\ps@myheadings\ACM@ps@myheadings
2446   \let\ps@headings\ACM@ps@headings}
2447 \AtBeginDocument{\ACM@restore@pagestyle}

```

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

```

2448 \if@ACM@review
2449   \newsavebox{\ACM@linecount@bx}
2450   \newlength\ACM@linecount@bxht
2451   \newcount\ACM@linecount
2452   \ACM@linecount\@ne\relax
2453   \def\ACM@mk@linecount{%
2454     \savebox{\ACM@linecount@bx}[4em][t]{\parbox[t]{4em}{\normalfont
2455       \normalsize
2456       \setlength{\ACM@linecount@bxht}{0pt}%
2457       \loop{\color{red}\scriptsize\the\ACM@linecount}\
2458         \global\advance\ACM@linecount by \@ne
2459         \addtolength{\ACM@linecount@bxht}{\baselineskip}}%
2460       \ifdim\ACM@linecount@bxht<\textheight\repeat
2461       {\color{red}\scriptsize\the\ACM@linecount}\hfill
2462       \global\advance\ACM@linecount by \@ne}}
2463 \fi

```

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

```

2464 \def\ACM@linecountL{%

```

```

2465 \if@ACM@review
2466 \ACM@mk@linecount
2467 \begin{picture}(0,0)%
2468 \put(-26,-22){\usebox{\ACM@linecount@bx}}%
2469 \end{picture}%
2470 \fi}

```

\ACM@linecountR How to display the box on the right. In one column formats we do not step the numbers.

```

2471 \def\ACM@linecountR{%
2472 \if@ACM@review
2473 \ifcase\ACM@format@nr
2474 \relax % manuscript
2475 \relax
2476 \or % acmsmall
2477 \relax
2478 \or % acmlarge
2479 \relax
2480 \or % acmtog
2481 \ACM@mk@linecount
2482 \or % sigconf
2483 \ACM@mk@linecount
2484 \or % siggraph
2485 \ACM@mk@linecount
2486 \or % sigplan
2487 \ACM@mk@linecount
2488 \or % sigchi
2489 \ACM@mk@linecount
2490 \or % sigchi-a
2491 \ACM@mk@linecount
2492 \fi
2493 \begin{picture}(0,0)%
2494 \put(20,-22){\usebox{\ACM@linecount@bx}}%
2495 \end{picture}%
2496 \fi}

```

\ACM@timestamp The timestamp system

```

2497 \if@ACM@timestamp
2498 % Subtracting 30 from \time gives us the effect of rounding down despite
2499 % \numexpr rounding to nearest
2500 \newcounter{ACM@time@hours}
2501 \setcounter{ACM@time@hours}{\numexpr (\time - 30) / 60 \relax}
2502 \newcounter{ACM@time@minutes}
2503 \setcounter{ACM@time@minutes}{\numexpr \time - \theACM@time@hours * 60 \relax}
2504 \newcommand\ACM@timestamp{%
2505 \footnotesize%
2506 \ifx\@acmSubmissionID\@empty\relax\else
2507 Submission ID: \@acmSubmissionID.{ }%
2508 \fi
2509 \the\year-\two@digits{\the\month}-\two@digits{\the\day}{ }%
2510 \two@digits{\theACM@time@hours}:\two@digits{\theACM@time@minutes}{. }%

```

```

2511     Page \thepage\ of \@startPage--\pageref*{TotPages}.%
2512   }
2513 \fi

\@shortauthors Even if the author redefined \shortauthors, we do not print it in the headers when in
anonymous mode:
2514 \def\@shortauthors{%
2515   \if@ACM@anonymous
2516     Anon.
2517     \ifx\@acmSubmissionID\@empty\else Submission Id: \@acmSubmissionID\fi
2518   \else\shortauthors\fi}

\@headfootfont The font to typeset header and footer text.
2519 \def\@headfootfont{\sffamily\footnotesize}

standardpagestyle The page style for all pages but the first one The page style for all pages but the first one
2520 \AtBeginDocument{%
2521   \fancypagestyle{standardpagestyle}{%
2522     \fancyhf{}%
2523     \renewcommand{\headrulewidth}{\z@}%
2524     \renewcommand{\footrulewidth}{\z@}%
2525     \def\@acmArticlePage{%
2526       \ifx\@acmArticle\@empty%
2527         \if@ACM@printfolios\thepage\fi%
2528       \else%
2529         \@acmArticle\if@ACM@printfolios:\thepage\fi%
2530       \fi%
2531     }%
2532     \if@ACM@journal@bibstrip
2533       \ifcase\ACM@format@nr
2534         \relax % manuscript
2535         \fancyhead[LE]{\ACM@linecountL\if@ACM@printfolios\thepage\fi}%
2536         \fancyhead[RO]{\if@ACM@printfolios\thepage\fi}%
2537         \fancyhead[RE]{\@shortauthors}%
2538         \fancyhead[LO]{\ACM@linecountL\shorttitle}%
2539         \if@ACM@nonacm\else%
2540           \fancyfoot[RO,LE]{\footnotesize Manuscript submitted to ACM}%
2541         \fi%
2542       \or % acmsmall
2543         \fancyhead[LE]{\ACM@linecountL\@headfootfont\@acmArticlePage}%
2544         \fancyhead[RO]{\@headfootfont\@acmArticlePage}%
2545         \fancyhead[RE]{\@headfootfont\@shortauthors}%
2546         \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2547         \if@ACM@nonacm\else%
2548           \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2549             \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2550         \fi
2551       \or % acmlarge
2552         \fancyhead[LE]{\ACM@linecountL\@headfootfont

```

```

2553 \acmArticlePage\quad\textbullet\quad\@shortauthors}%
2554 \fancyhead[LO]{\ACM@linecountL}%
2555 \fancyhead[RO]{\@headfootfont
2556 \shorttitle\quad\textbullet\quad\@acmArticlePage}%
2557 \if@ACM@nonacm\else%
2558 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2559 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2560 \fi
2561 \or % acmtog
2562 \fancyhead[LE]{\ACM@linecountL\@headfootfont
2563 \@acmArticlePage\quad\textbullet\quad\@shortauthors}%
2564 \fancyhead[LO]{\ACM@linecountL}%
2565 \fancyhead[RE]{\ACM@linecountR}%
2566 \fancyhead[RO]{\@headfootfont
2567 \shorttitle\quad\textbullet\quad\@acmArticlePage\ACM@linecountR}%
2568 \if@ACM@nonacm\else%
2569 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2570 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2571 \fi
2572 \else % Proceedings
2573 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2574 \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2575 \fancyhead[RE]{\@headfootfont\@shortauthors\ACM@linecountR}%
2576 \if@ACM@nonacm\else%
2577 \fancyhead[LE]{\ACM@linecountL\@headfootfont\footnotesize
2578 \acmConference@shortname,
2579 \acmConference@date, \acmConference@venue}%
2580 \fancyhead[RO]{\@headfootfont
2581 \acmConference@shortname,
2582 \acmConference@date, \acmConference@venue\ACM@linecountR}%
2583 \fi
2584 \fi
2585 \else % Proceedings
2586 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2587 \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2588 \fancyhead[RE]{\@headfootfont\@shortauthors\ACM@linecountR}%
2589 \if@ACM@nonacm\else%
2590 \fancyhead[LE]{\ACM@linecountL\@headfootfont
2591 \acmConference@shortname,
2592 \acmConference@date, \acmConference@venue}%
2593 \fancyhead[RO]{\@headfootfont
2594 \acmConference@shortname,
2595 \acmConference@date, \acmConference@venue\ACM@linecountR}%
2596 \fi
2597 \fi
2598 \if@ACM@sigchiamode
2599 \fancyheadoffset[L]{\dimexpr(\marginparsep+\marginparwidth)}%
2600 \fi
2601 \if@ACM@timestamp
2602 \fancyfoot[LO,RE]{\ACM@timestamp}

```



```

2603 \fi
2604 }%
2605 \pagestyle{standardpagestyle}
2606 }

\@folio@wd Folio blob width, height, offsets and max number
\@folio@ht
\@folio@voffset
\@folio@max
2607 \newdimen\@folio@wd
2608 \@folio@wd=\z@
2609 \newdimen\@folio@ht
2610 \@folio@ht=\z@
2611 \newdimen\@folio@voffset
2612 \@folio@voffset=\z@
2613 \def\@folio@max{1}
2614 \ifcase\ACM@format@nr
2615 \relax % manuscript
2616 \or % acmsmall
2617 \@folio@wd=45.75pt\relax
2618 \@folio@ht=1.25in\relax
2619 \@folio@voffset=.2in\relax
2620 \def\@folio@max{8}
2621 \or % acmlarge
2622 \@folio@wd=43.25pt\relax
2623 \@folio@ht=79pt\relax
2624 \@folio@voffset=.55in\relax
2625 \def\@folio@max{10}
2626 \fi

\@folioblob The macro to typeset the folio blob.
2627 \def\@folioblob{\@tempcnta=0\@acmArticleSeq\relax
2628 \ifnum\@tempcnta=0\relax\else
First, we calculate \@acmArticleSeq modulo \@folio@max
2629 \loop
2630 \ifnum\@tempcnta>\@folio@max\relax
2631 \advance\@tempcnta by - \@folio@max
2632 \repeat
2633 \advance\@tempcnta by -1\relax
2634 \@tempdima=\@folio@ht\relax
2635 \multiply\@tempdima by \the\@tempcnta\relax
2636 \advance\@tempdima by -\@folio@voffset\relax
2637 \begin{picture}(0,0)
2638 \makebox[\z@]{\raisebox{-\@tempdima}{%
2639 \rlap{%
2640 \raisebox{-0.45\@folio@ht}{\z@}{\z@}{%
2641 \rule{\@folio@wd}{\@folio@ht}}}%
2642 \parbox{\@folio@wd}{%
2643 \centering
2644 \textcolor{white}{\LARGE\sffamily\bfseries\@acmArticle}}}}
2645 \end{picture}\fi}
2646

```

firstpagestyle The page style for the first page only.

```
2647 \AtBeginDocument{%
2648 \fancypagestyle{firstpagestyle}{%
2649   \fancyhf{}%
2650   \renewcommand{\headrulewidth}{\z@}%
2651   \renewcommand{\footrulewidth}{\z@}%
2652   \if@ACM@journal@bibstrip
2653     \ifcase\ACM@format@nr
2654       \relax % manuscript
2655       \fancyhead[L]{\ACM@linecountL}%
2656       \fancyfoot[RO,LE]{\if@ACM@printfolios\small\thepage\fi}%
2657       \if@ACM@nonacm\else%
2658         \fancyfoot[RE,LO]{\footnotesize Manuscript submitted to ACM}%
2659       \fi%
2660     \or % acmsmall
2661       \if@ACM@nonacm\else%
2662         \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2663           \@acmNumber, Article \@acmArticle. Publication date:
2664             \@acmPubDate.}%
2665         \fi%
2666         \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2667         \fancyhead[LO]{\ACM@linecountL}%
2668         \fancyhead[RO]{\@folioblob}%
2669         \fancyheadoffset[RO,LE]{0.6\@folio@wd}%
2670     \or % acmlarge
2671       \if@ACM@nonacm\else%
2672         \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2673           \@acmNumber, Article \@acmArticle. Publication date:
2674             \@acmPubDate.}%
2675         \fi%
2676         \fancyhead[RO]{\@folioblob}%
2677         \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2678         \fancyhead[LO]{\ACM@linecountL}%
2679         \fancyheadoffset[RO,LE]{1.4\@folio@wd}%
2680     \or % acmtog
2681       \if@ACM@nonacm\else%
2682         \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2683           \@acmNumber, Article \@acmArticle. Publication date:
2684             \@acmPubDate.}%
2685         \fi%
2686         \fancyhead[L]{\ACM@linecountL}%
2687         \fancyhead[R]{\ACM@linecountR}%
2688       \else % Conference proceedings
2689         \fancyhead[L]{\ACM@linecountL}%
2690         \fancyhead[R]{\ACM@linecountR}%
2691         \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2692       \fi
2693     \else
2694       \fancyhead[L]{\ACM@linecountL}%

```

```

2695 \fancyhead[R]{\ACM@linecountR}%
2696 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2697 \fi
2698 \if@ACM@timestamp
2699 \ifnum\ACM@format@nr=0\relax % Manuscript
2700 \fancyfoot[LO,RE]{\ACM@timestamp\quad
2701 \if@ACM@nonacm\else
2702 \footnotesize Manuscript submitted to ACM
2703 \fi}
2704 \else
2705 \fancyfoot[LO,RE]{\ACM@timestamp}
2706 \fi
2707 \fi
2708 }}

```

### 3.18 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.

```

2709 \def\ACM@NRadjust#1{%
2710 \begingroup
2711 \expandafter\ifx\csname Sectionformat\endcsname\relax
2712 % do nothing when \Sectionformat is unknown
2713 \def\next{\endgroup #1}%
2714 \else
2715 \def\next{\endgroup
2716 \let\realSectionformat\Sectionformat
2717 \def\ACM@sect@format@{#1}%
2718 \let\Sectionformat\ACM@NR@adjustedSectionformat
2719 %% next lines added 2018-06-17 to ensure section number is styled

```

```

2720 \let\real@adddotafter\@adddotafter
2721 \let\@adddotafter\ACM@adddotafter
2722 #1{ }% imposes the styles, but nullifies \MakeUppercase
2723 \let\@adddotafter\real@adddotafter
2724 }%
2725 \fi \next
2726 }

```

\ACM@NR@adjustedSectionformat

```

2727 \def\ACM@NR@adjustedSectionformat#1#2{%
2728 \realSectionformat{\ACM@sect@format{#1}}{#2}%
2729 \let\Sectionformat\realSectionformat}
2730 \DeclareRobustCommand{\ACM@sect@format}{\ACM@sect@format@}
2731 \def\ACM@sect@format@null#1{#1}
2732 \let\ACM@sect@format@null\ACM@sect@format@null
2733 \AtBeginDocument{%
2734 \expandafter\ifx\csname LTX@adddotafter\endcsname\relax
2735 \let\LTX@adddotafter\@adddotafter
2736 \fi
2737 }

```

\ACM@adddotafter

```

2738 \def\ACM@adddotafter#1{\ifx\relax#1\relax\else\LTX@adddotafter{#1}\fi}

```

Sectioning is different for different levels

```

2739 \renewcommand\section{\@startsection{section}{1}{\z@}%
2740 {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2741 {.25\baselineskip}%
2742 {\ACM@NRadjust\@secfont}}
2743 \renewcommand\subsection{\@startsection{subsection}{2}{\z@}%
2744 {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2745 {.25\baselineskip}%
2746 {\ACM@NRadjust\@subsecfont}}
2747 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{\z@}%
2748 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2749 {-3.5\p@}%
2750 {\ACM@NRadjust{\@subsubsecfont\@adddotafter}}}}
2751 \renewcommand\paragraph{\@startsection{paragraph}{4}{\parindent}%
2752 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2753 {-3.5\p@}%
2754 {\ACM@NRadjust{\@parfont\@adddotafter}}}}
2755 \newcommand\noindentparagraph{\@startsection{paragraph}{4}{\z@}%
2756 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2757 {-3.5\p@}%
2758 {\ACM@NRadjust{\@parfont}}}}
2759
2760 \renewcommand\part{\@startsection{part}{9}{\z@}%
2761 {-10\p@ \@plus -4\p@ \@minus -2\p@}%
2762 {4\p@}%
2763 {\ACM@NRadjust\@parfont}}

```

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

```

2764 \def\section@raggedright{\@rightskip\@flushglue
2765   \rightskip\@rightskip
2766   \leftskip\z@skip
2767   \parindent\z@}

```

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

`\@subsecfont` 2768 `\def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}`

`\@subsubsecfont` 2769 `\def\@subsecfont{\sffamily\bfseries\section@raggedright}`

`\@parfont` 2770 `\def\@subsubsecfont{\sffamily\itshape}`

```

2771 \def\@parfont{\itshape}
2772 \setcounter{secnumdepth}{3}
2773 \ifcase\ACM@format@nr
2774 \relax % manuscript
2775 \or % acmsmall
2776 \or % acmlarge
2777 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
2778 \def\@subsecfont{\sffamily\large\section@raggedright}
2779 \or % acmtog
2780 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
2781 \def\@subsecfont{\sffamily\large\section@raggedright}
2782 \or % sigconf
2783 \def\@secfont{\bfseries\Large\section@raggedright\MakeTextUppercase}
2784 \def\@subsecfont{\bfseries\Large\section@raggedright}
2785 \or % siggraph
2786 \def\@secfont{\sffamily\bfseries\Large\section@raggedright\MakeTextUppercase}
2787 \def\@subsecfont{\sffamily\bfseries\Large\section@raggedright}
2788 \or % sigplan
2789 \def\@secfont{\bfseries\Large\section@raggedright}
2790 \def\@subsecfont{\bfseries\section@raggedright}
2791 \def\@subsubsecfont{\bfseries\section@raggedright}
2792 \def\@parfont{\bfseries\itshape}
2793 \def\@subparfont{\itshape}
2794 \or % sigchi
2795 \setcounter{secnumdepth}{1}
2796 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
2797 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
2798 \or % sigchi-a
2799 \setcounter{secnumdepth}{0}
2800 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
2801 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
2802 \fi

```

`\@adddotafter` Add punctuation after a sectioning command

```

2803 \def\@adddotafter#1{#1\@addpunct{.}}

```

`\@addspaceafter` Add space after a sectioning command

```

2804 \def\@addspaceafter#1{#1\@addpunct{\enspace}}

```

### 3.19 TOC lists

`\dotsep` Related to the `\tableofcontents` are all the horizontal fillers. Base  $\text{\LaTeX}$  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.

```
2805 \providecommand*\dotsep{4.5}
```

### 3.20 Theorems

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

```
2806 \def\acmplainbodyfont{\itshape}
```

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

```
2807 \def\acmplainindent{\parindent}
```

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

```
2808 \def\acmplainheadfont{\scshape}
```

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

```
2809 \def\acmplainnotefont{\@empty}
```

Customization of the `acmplain` theorem style:

```
2810 \ifcase\ACM@format@nr
2811 \relax % manuscript
2812 \or % acmsmall
2813 \or % acmlarge
2814 \or % acmtog
2815 \or % sigconf
2816 \or % siggraph
2817 \or % sigplan
2818 \def\acmplainbodyfont{\itshape}
2819 \def\acmplainindent{\z@}
2820 \def\acmplainheadfont{\bfseries}
2821 \def\acmplainnotefont{\normalfont}
2822 \or % sigchi
2823 \or % sigchi-a
2824 \fi
```

`acmplain` The `acmplain` theorem style

```
2825 \newtheoremstyle{acmplain}%
2826 { .5\baselineskip\@plus.2\baselineskip
2827   \@minus.2\baselineskip}% space above
2828 { .5\baselineskip\@plus.2\baselineskip
2829   \@minus.2\baselineskip}% space below
2830 {\acmplainbodyfont}% body font
2831 {\acmplainindent}% indent amount
2832 {\acmplainheadfont}% head font
```

```

2833 {.}% punctuation after head
2834 {.5em}% spacing after head
2835 {\thmname{#1}\thmnumber{ #2}\thmnote{ {\@acmplainnotefont{#3}}}}% head spec

\@acmdefinitionbodyfont The font to typeset the body of the acmdefinition theorem style.
2836 \def\@acmdefinitionbodyfont{\normalfont}

\@acmdefinitionindent The amount to indent the acmdefinition theorem style.
2837 \def\@acmdefinitionindent{\parindent}

\@acmdefinitionheadfont The font to typeset the head of the acmdefinition theorem style.
2838 \def\@acmdefinitionheadfont{\itshape}

\@acmdefinitionnotefont The font to typeset the note of the acmdefinition theorem style.
2839 \def\@acmdefinitionnotefont{\@empty}

Customization of the acmdefinition theorem style:
2840 \ifcase\ACM@format@nr
2841 \relax % manuscript
2842 \or % acmsmall
2843 \or % acmlarge
2844 \or % acmtog
2845 \or % sigconf
2846 \or % siggraph
2847 \or % sigplan
2848 \def\@acmdefinitionbodyfont{\normalfont}
2849 \def\@acmdefinitionindent{\z@}
2850 \def\@acmdefinitionheadfont{\bfseries}
2851 \def\@acmdefinitionnotefont{\normalfont}
2852 \or % sigchi
2853 \or % sigchi-a
2854 \fi

acmdefinition The acmdefinition theorem style
2855 \newtheoremstyle{acmdefinition}%
2856 {.5\baselineskip\@plus.2\baselineskip
2857 \@minus.2\baselineskip}% space above
2858 {.5\baselineskip\@plus.2\baselineskip
2859 \@minus.2\baselineskip}% space below
2860 {\@acmdefinitionbodyfont}% body font
2861 {\@acmdefinitionindent}% indent amount
2862 {\@acmdefinitionheadfont}% head font
2863 {.}% punctuation after head
2864 {.5em}% spacing after head
2865 {\thmname{#1}\thmnumber{ #2}\thmnote{ {\@acmdefinitionnotefont{#3}}}}% head spec

Make acmplain the default theorem style.
2866 \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.

```

2867 \AtEndPreamble{%
2868   \if@ACM@acmthm
2869   \theoremstyle{acmplain}
2870   \@ifundefined{theorem}{%
2871     \newtheorem{theorem}{Theorem}[section]
2872   }{}
2873   \@ifundefined{conjecture}{%
2874     \newtheorem{conjecture}[theorem]{Conjecture}
2875   }{}
2876   \@ifundefined{proposition}{%
2877     \newtheorem{proposition}[theorem]{Proposition}
2878   }{}
2879   \@ifundefined{lemma}{%
2880     \newtheorem{lemma}[theorem]{Lemma}
2881   }{}
2882   \@ifundefined{corollary}{%
2883     \newtheorem{corollary}[theorem]{Corollary}
2884   }{}
2885   \theoremstyle{acmdefinition}
2886   \@ifundefined{example}{%
2887     \newtheorem{example}[theorem]{Example}
2888   }{}
2889   \@ifundefined{definition}{%
2890     \newtheorem{definition}[theorem]{Definition}
2891   }{}
2892   \fi
2893   \theoremstyle{acmplain}
2894 }
```

`\@proofnamefont` The font to typeset the proof name.

```
2895 \def\@proofnamefont{\scshape}
```

`\@proofindent` Whether or not to indent proofs.

```
2896 \def\@proofindent{\indent}
```

Customization of the proof environment.

```

2897 \ifcase\ACM@format@nr
2898 \relax % manuscript
2899 \or % acmsmall
2900 \or % acmlarge
2901 \or % acmtog
```



```

2902 \or % sigconf
2903 \or % siggraph
2904 \or % sigplan
2905 \def\@proofnamefont{\itshape}
2906 \def\@proofindent{\noindent}
2907 \or % sigchi
2908 \or % sigchi-a
2909 \fi

```

proof We want some customization of the proof environment.

```

2910 \renewenvironment{proof}[1][\proofname]{\par
2911 \pushQED{\qed}%
2912 \normalfont \topsep6\p@\@plus6\p@\relax
2913 \trivlist
2914 \item[\@proofindent\hskip\labelsep
2915 {\@proofnamefont #1\@addpunct{.}}]\ignorespaces
2916 }{%
2917 \popQED\endtrivlist\@endpfalse
2918 }

```

### 3.21 Balancing columns

We need balancing only if the user did not disable it, and we use a two column format

```

2919 \AtEndPreamble{%
2920 \if@ACM@balance
2921 \ifcase\ACM@format@nr
2922 \relax % manuscript
2923 \global\@ACM@balancefalse
2924 \or % acmsmall
2925 \global\@ACM@balancefalse
2926 \or % acmlarge
2927 \global\@ACM@balancefalse
2928 \or % acmtog
2929 \RequirePackage{balance}%
2930 \or % sigconf
2931 \RequirePackage{balance}%
2932 \or % siggraph
2933 \RequirePackage{balance}%
2934 \or % sigplan
2935 \RequirePackage{balance}%
2936 \or % sigchi
2937 \RequirePackage{balance}%
2938 \or % sigchi-a
2939 \global\@ACM@balancefalse
2940 \fi
2941 \fi
2942 }
2943 \AtEndDocument{%
2944 \if@ACM@balance

```

```

2945 \if@twocolumn
2946 \balance
2947 \fi\fi}

```

### 3.22 Acknowledgments

```

\acksname
2948 \newcommand\acksname{Acknowledgments}

\acks This is a comment-like structure
2949 \specialcomment{acks}{%
2950 \begingroup
2951 \section*{\acksname}
2952 \phantomsection\addcontentsline{toc}{section}{\acksname}
2953 }{%
2954 \endgroup
2955 }

\grantsponsor We just typeset the name of the sponsor
2956 \def\grantsponsor#1#2#3{#2}

\grantnum
2957 \newcommand\grantnum[3][{}]{#3%
2958 \def\@tempa{#1}\ifx\@tempa\@empty\else\space(\url{#1})\fi}

```

### 3.23 Conditional typesetting

We use the comment package for conditional typesetting:

```

2959 \AtEndPreamble{%
2960 \if@ACM@screen
2961 \includecomment{screenonly}
2962 \excludecomment{printonly}
2963 \else
2964 \excludecomment{screenonly}
2965 \includecomment{printonly}
2966 \fi
2967 \if@ACM@anonymous
2968 \excludecomment{anonsuppress}
2969 \excludecomment{acks}
2970 \else
2971 \includecomment{anonsuppress}
2972 \fi}

```

### 3.24 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’.
2973 \newcommand\showeprint[2][arxiv]{%

```

```

2974 \def\@tempa{#1}%
2975 \ifx\@tempa\@empty\def\@tempa{arxiv}\fi
2976 \def\@tempb{arxiv}%
2977 \ifx\@tempa\@tempb
2978     arXiv:\href{https://arxiv.org/abs/#2}{#2}\else arXiv:#2%
2979 \fi}

```

### 3.25 End of Class

`\vspace` We do not disable `\vspace`, but add warning to it

```

2980 \let\@vspace@orig=\@vspace
2981 \let\@vspacer@orig=\@vspacer
2982 \apptocmd{\@vspace}{\ClassWarning{\@classname}{\string\vspace\space should
2983     only be used to provide space above/below surrounding
2984     objects}}{}{}
2985 \apptocmd{\@vspacer}{\ClassWarning{\@classname}{\string\vspace\space should
2986     only be used to provide space above/below surrounding
2987     objects}}{}{}
2988 \let\@vspace@acm=\@vspace
2989 \let\@vspacer@acm=\@vspacer

```

`\ACM@origbaselinestretch` We produce an error if the user tries to change `\baselinestretch`

```

2990 \let\ACM@origbaselinestretch\baselinestretch
2991 \AtEndDocument{\ifx\baselinestretch\ACM@origbaselinestretch\else
2992     \ClassError{\@classname}{An attempt to redefine
2993         \string\baselinestretch\space detected. Please do not do this for
2994         ACM submissions!}\fi}

2995 \normalsize\normalfont\frenchspacing
2996 </class>

```

## References

- [1] UK T<sub>E</sub>X Users Group. UK list of T<sub>E</sub>X frequently asked questions. <https://texfaq.org>, 2019.
- [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 v4.44*, December 2019. <http://www.ctan.org/pkg/glossaries>.
- [11] David Carlisle. *The textcase package*, October 2004. <http://www.ctan.org/pkg/textcase>.

## Change History

1.48	General: Added prologue option to xcolor . . . . .	46	\if@ACM@printacmref: Added warning for longer papers . . . . .	69
	Bib code cleanup (Zack Weinberg)	33	\keywords: Added warning for missing keywords . . . . .	68
	Documentation update (siggraph) .	33	General: ACM reference format is now mandatory for papers over one page; CCS concepts and keywords are now mandatory for papers over two pages . . . . .	33
1.49	General: New journal: DTRAP . . . . .	33	Authors' addresses are mandatory for journal articles . . . . .	33
1.53	General: New journals: PACMCGIT, TIOT, TDSCI . . . . .	33		
	Rearranged docs . . . . .	33	1.69	\vspace: Added the changed command to avoid grouping . . . . .
1.54	General: Moved footnote stuff before hyperref call (Ross Moore) . . . . .	33	1.70	General: Name change for TDS . . . . .
1.56	General: Documented \Description	33	1.71	General: Bibliography change: volume for @inproceedings is now in brackets together with series . . . . .
1.57	General: Booktabs package is now the default . . . . .	33		LuaTeX now uses the OTF versions of fonts . . . . .
1.58	General: Changes in samples (Enrico Gregorio) . . . . .	33		Retired sigchi and sigchi-a . . . . .
	New journal: HEALTH. TDS is renamed to TDSCI . . . . .	33	1.75	General: Documentation update . . . . .
1.60	\if@ACM@urlbreakonhyphens: introduced macro . . . . .	34	v1.00	General: First released version . . . . .
	General: New option: urlbreakonhyphens . . . . .	33	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> ) . . . . .
1.62	General: New journal: TELO . . . . .	33		Defined ACM colors . . . . .
1.63	General: New journal: FACMP . . . . .	33		Explicitly put draft option (closes <a href="https://github.com/borisveytsman/acmart/issues/4">https://github.com/borisveytsman/acmart/issues/4</a> ) . . . . .
	New journal: TQUANT . . . . .	33		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> ) . . . . .
1.63a	General: Move: TQUANT to TQC . . . . .	33	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> ) . . . . .
1.64	General: Putting abstract after \maketitle now causes an error .	33		
1.65	General: New journal: DGOV . . . . .	33		
1.66	\@mkauthorsaddresses: Added warning for missing addresses . . . . .	91		
	\ccsdesc@parse: Added warning for missing concepts . . . . .	71		

Documentation changes (closes <a href="https://github.com/borisveytsman/acmart/issues/13">https://github.com/borisveytsman/acmart/issues/13</a> )	33	\acmBadgeL: Added macro	68
		\acmBadgeR: Added macro	68
		\if@ACM@badge: Added macro	67
v1.03		v1.07	
\@formatdoi: Added macro	73	\maketitle: Corrected a bug with abstract footnotes	77
\if@ACM@authorversion: Added macro	35	Corrected a bug with permission and footnotes order	77
\maketitle: Added special case of authorversion	77	v1.08	
General: Added anonsuppress environment	33	General: SIGPLAN reformatting by Matthew Fluet	33
Added authorversion option (closes <a href="https://github.com/borisveytsman/acmart/issues/9">https://github.com/borisveytsman/acmart/issues/9</a> )	33	Typos corrected (Tobias Pape)	33
v1.04		v1.09	
\acmArticleSeq: Name change by Matthew Fluet	67	General: Revert SIGPLAN caption rules	33
\acmDOI: Name change by Matthew Fluet	67	v1.10	
\acmISBN: Name change by Matthew Fluet	67	\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>	77
General: Updated bibliography for siggraph	33	General: Changes of 'licensedothergov' wording	71
v1.05		standardpagestyle: Reversed folios location	95
General: Added processing doi numbers for acmsiggraph and doi numbers for sigproc.bib	33	v1.11	
Patched \setcitestyle command; closes <a href="https://github.com/borisveytsman/acmart/issues/19">https://github.com/borisveytsman/acmart/issues/19</a>	33	General: Customization of ACM theorem styles and proof environment by Matthew Fluet	33
v1.06		v1.12	
\@ACM@badge@skip: Added macro	68	\@marginfigure: Now centering by default	53
\@ACM@badge@width: Added macro	67	\@margintable: Now centering by default	53
\@ACM@title@width: Added macro	67	\@parfont: Moved to \section@raggedright	101
\@mktitle@i: Added processing badges	82	\copyrightpermissionfootnoterule: Added macro	49
Made generic	82	\descriptionlabel: Redefined	55
\@mktitle@ii: Now this macro is obsolete	83	\footnoterule: Made shorter	49
\@mktitle@iii: Added processing badges	83	\if@ACM@natbib@override: Added macro	35
Made more generic	83	\if@ACM@newfonts: Added macro	50
\@mktitle@iv: Made more generic	84	\maketitle: Moved thankses to copyrightpermission box	77
\@printtopmatter: Added processing badges	80	\section@raggedright: Introduced macro	101
\@subtitlefont: Added macro	82	General: Added graceful behavior when libertine fonts are absent	50
\@titlefont: Added macro	81	Documentation updates	33

v1.13		\position: Added macro . . . . .	84
\@mpfootnotetext: Made minipage		\postcode: Added macro . . . . .	84
footnotes centered . . . . .	44	\state: Added macro . . . . .	84
\bibliographystyle: Redefined		\streetaddress: Added macro . . . .	84
macro . . . . .	46	standardpagestyle: Better handling	
\bibstyle@acmauthoryear: Added		of anonymous mode . . . . .	95
macro . . . . .	41	v1.16	
\bibstyle@acmnumeric: Added		\@headfootfont: Added macro . . . .	95
macro . . . . .	41	General: Formatting header/footer	
\if@ACM@printfolios: Added macro	69	(Matthew Fluet) . . . . .	33
General: Font adjustments for		standardpagestyle: Customize	
acmsmall . . . . .	85	header/footer text font . . . . .	95
Increased font size for ACM Large	38	v1.17	
Print bibliographic information by		\@makefnmark: Redefined . . . . .	44
default for the proceedings . . . .	69	\@mkauthors: TOG now uses the same	
standardpagestyle: Added headers		authors block as other journals . .	85
for sigs . . . . .	95	\@mkauthors@ii: Deleted . . . . .	88
Expanded headers for sigchi-a . . .	95	\@mkbibcitation: Added \nobreak	92
Suppressed folios if sig . . . . .	95	Changed format for sigs . . . . .	92
v1.14		\acmArticle: The default is now	
\bibstyle@acmauthoryear: Moved		numerical . . . . .	67
def of \bibstyle@acmauthoryear		\acmMonth: The default must be	
before use . . . . .	41	numerical. Closes #50. . . . .	67
\bibstyle@acmnumeric: Moved def of		\acmNumber: The default is now	
\bibstyle@numeric before use . .	41	numerical . . . . .	66
General: \citestyle updates		\acmVolume: The default is now	
(Matthew Fluet) . . . . .	33	numerical . . . . .	66
Patched \citestyle . . . . .	39	\acmYear: The default is now	
v1.15		numerical . . . . .	67
\@ACM@addtoaddress: Added macro	84	\description: Decreased indent . . .	55
\@mkauthors@iii: New authors		\grantnum: Added url . . . . .	106
system . . . . .	88	\grantsponsor: Renamed . . . . .	106
\@shortauthors: Introduced macro .	95	\if@ACM@printacmref: Renamed	
\@typeset@author@bx: Moved to		from \if@ACM@printbib . . . . .	69
separate macro . . . . .	88	General: Slightly decreased margins	
\acks: Added macro . . . . .	106	for sigs . . . . .	47
\affiliation: Added code for author		standardpagestyle: Added paper	
groups . . . . .	64	title to sigs . . . . .	95
\author: Added code for author		v1.18	
groups . . . . .	64	\@mkauthors@i: Now we andify	
\city: Added macro . . . . .	84	affiliations . . . . .	87
\country: Added macro . . . . .	84	\@typeset@author@line: Added	
\department: Added macro . . . . .	84	macro . . . . .	86
\grantnum: Added macro . . . . .	106	General: Natbib is now the default for	
\grantsponsor: Added macro . . . .	106	all formats . . . . .	33
\if@insideauthorgroup: Introduced		v1.19	
macro . . . . .	63	\@mkabstract: Include 'Abstract' in	
\institution: Added macro . . . . .	84	PDF bookmarks (Matthew Fluet) .	91
\num@authorgroups: Renamed . . . .	63	\acks: Include 'Acknowledgements' in	
\orcid: Introduced macro . . . . .	65	PDF bookmarks (Matthew Fluet)	106

General: Include 'Abstract', 'Acknowledgements', and 'References' in PDF bookmarks (Matthew Fluet) . . . . .	33	v1.31	Switched to T1: looks like libertine has problems with \l in OT1 . . .	50
Include 'References' in PDF bookmarks (Matthew Fluet) . . . .	39		Updated IMWUT and PACMPL . .	56
v1.20			\@additionalaffiliation: Added macro . . . . .	65
\@mkabstract: Deleted spurious space	91		\@mkbibcitation: Disabled linebreak	92
General: Bug fixes for bst . . . . .	33		\@startsection: Added	
v1.21			\tochangmeasure . . . . .	41
\showeprint: Added macro . . . . .	106		Redefined macro . . . . .	43
v1.22			\@textbottom: Redefined . . . . .	49
General: More bibliography changes for Aptara . . . . .	33		\acmMonth: The default now is the current month (Matteo Riondato)	67
v1.23			\acmYear: The default now is the current year (Matteo Riondato) . .	67
General: Add PACMPL journal option	33		\additionalaffiliation: Added macro . . . . .	65
v1.24			\l@section: Redefined macro . .	44
General: Add IMWUT journal option	56		\l@subsubsection: Redefined macro	44
v1.25			General: Documentation changes . . .	33
General: Updated PACMPL . . . . .	56	v1.32		
v1.26			\@formatdoi: New doi format . . . . .	73
General: Corrected \shortcite bug .	33		General: Added POMACS journal option . . . . .	33
Documentation typos fixed (thanks to Stephen Spencer) . . . . .	33		Format siggraph is now obsolete .	33
v1.27		v1.33		
\if@ACM@printccs: Typo corrected .	69		\@ACM@addtoaddress: Added obeypunctuation code . . . . .	84
v1.28			\@mkauthors@i: Added obeypunctuation code . . . . .	87
\ccsdesc@parse: Change from \to to \textrightarrow (Matteo Riondato) . . . . .	70		\@mkauthors@iii: Added obeypunctuation code . . . . .	88
General: Corrected option natbib behavior . . . . .	41		\@mkauthors@iv: Added obeypunctuation code . . . . .	89
Got rid of warnings in pdf keywords	44		\@subtitlefont: Added \normalsize . . . . .	82
v1.29			\ACM@linecountL: Renamed macro .	93
\@mkabstract: Removed spurious indentation (John Wickerson) . . .	91		\ACM@linecountR: Added macro . . .	94
\ccsdesc@parse: Add spacing after bullet and around rightrightarrow; semicolon separators no longer in bold/italic (John Wickerson) . . . .	70		\ACM@timestamp: Added current page number . . . . .	94
General: Increased head to 13pt . . . .	47		Added macro (Michael D. Adams) .	94
standardpagestyle: Corrected printfolios (Matthew Fluet) . . . . .	95		Added submission id . . . . .	94
v1.30			\acmSubmissionID: Added macro . .	67
\department: Added optional parameter . . . . .	84		\city: Added obeypunctuation code	84
General: Added \frenchspacing . . .	107		\country: Added obeypunctuation code . . . . .	84
Bibtex style now recognizes https:// in doi . . . . .	33		\department: Added obeypunctuation code . . . . .	84
			\if@ACM@affiliation@obeypunctuation: Added macro . . . . .	65



\if@ACM@authordraft: Added macro	36	Rearranged bibstrip	77
\if@ACM@natbib@override: Deleted macro	35	The \terms command is now obsolete	77
\if@ACM@timestamp: Added macro (Michael D. Adams)	36	\terms: The \terms command now just produces a warning	68
\institution: Added obeypunctuation code	84	v1.35	
\maketitle: Fixed the bug with figures on top and bottom of the title page, thanks to David Epstein	77	\bibstyle@acmauthoryear: Square brackets for author-year style	41
\position: Added obeypunctuation code	84	General: BibTeX bug fixed: et al.	33
\postcode: Added obeypunctuation code	84	If the copyright is set to usgov or rightsretained, the price is suppressed	71
\state: Added obeypunctuation code	84	v1.36	
\streetaddress: Added obeypunctuation code	84	\@ACM@authorssperrow: Added macro	69
General: Added acmart-preload-hook	33	\@mkauthors@iii: Added authorsperrow override	88
Added cmap and glyphtounicode	50	\@mkauthors@iv: Added authorsperrow override	89
BibTeX comma before articleno bug corrected	33	\if@ACM@authordraft: Corrected typo, thanks to bargteil	36
BibTeX crossref bug corrected	33	General: Added PACMHCI journal options	56
BibTeX numpages bug corrected	33	Added the possibility to adjust number of author boxes per row in conference formats	33
Documentation updates	33	v1.37	
Moved \ci tename definition for non-natbib bibliography, so a package may redefine it	45	\description: Reduce list indentation (Matthew Fluet)	55
Switched to Type 1 fonts for libertine even if OTF-capable engine is used (Kai Mindermann)	50	\descriptionlabel: Reduce list indentation (Matthew Fluet)	55
firstpagestyle: Added right linecount for two-column formats	98	\normalparindent: Set \normalparindent (Matthew Fluet)	48
Added timestamp (Michael D. Adams)	98	General: Reduce list indentation (Matthew Fluet)	55
standardpagestyle: Added right linecount for two-column formats	95	Set \normalparindent; Reduce list indentation (Matthew Fluet)	33
Added timestamp (Michael D. Adams)	95	v1.38	
v1.34		General: Increase default font size for SIGPLAN	33, 38
\@mkbibcitation: Deleted DOI from doi numbers	92	v1.39	
\ACM@linecount@bx: Rulers now are continuous	93	\@@authornotemark: Added macro	91
\ACM@linecount@L: Rulers now are continuous	93	\authornotemark: Added macro	66
\ACM@linecount@R: Rulers now are continuous	94	v1.40	
\maketitle: Added date to the bibstrip in conf proceedings	77	\@copyrightowner: Added new copyright version: licensedcagov	73
Deleted 'DOI' from doi numbers	77	\@copyrightpermission: Added new copyright version: licensedcagov	73
		\@mkauthors@i: Switched to MakeTextUppercase	87

\@parfont: Switched to MakeTextUppercase . . . . .	101	\acmBooktitle: Added macro . . . . .	63
\ACM@linecount@bx: Work around a bug in xcolor: looks like cmyk colors in boxes do not work . . . .	93	\editor: Added macro . . . . .	63
\ccdesc@parse@finish: Added macro . . . . .	71	\if@ACM@acmthm: Added macro . . . .	34
\city: We now do not print this even in SIG . . . . .	84	\maketitle: Empty DOI or ISBN are not printed (by Michael Ekstrand)	77
\country: Fixed bugs with extra spaces . . . . .	84	General: Added package refcount . . .	33
\l@section: Redefined macro . . . .	43	Deleted package cleveref . . . . .	33
\postcode: We now do not print this even in SIG . . . . .	84	Put theorem defs in a separate style	33
\state: We now do not print this even in SIG . . . . .	84	v1.45	
\streetaddress: We now do not print this even in SIG . . . . .	84	\@folioblob: Switched \bfseries\sffamily to \sffamily\bfseries . . . . .	97
General: Added 'textcase' package . .	39	\@parfont: Switched \bfseries\sffamily to \sffamily\bfseries . . . . .	101
Added heightrounded to geometry . .	47	\@titlefont: Switched \bfseries\sffamily to \sffamily\bfseries . . . . .	81
Added new copyright version: licensedcagov . . . . .	33	v1.46	
Added package cleveref . . . . .	33	\@mkauthorsaddresses: Introduced macro . . . . .	90
Added Ross Moore code for glyphtounicode . . . . .	50	\@mkbibcitation: Added subtitle . . .	92
Bibliography changes . . . . .	33	\@printendtopmatter: Made it \par\bigskip uniformly . . . . .	92
v1.41		\@printtopmatter: Deleted rule . . .	80
General: Added new badges . . . . .	33	\@setauthorsaddresses: Introduced macro . . . . .	93
v1.42		\ACM@linecount@bx: Rearranged the code to get rid of spurious underfull messages (Benjamin Byholm) . . . . .	93
v1.43		\author: Started counting authors . .	64
\@startsection: Added \makeatletter . . . . .	43	\authorsaddresses: Introduced macro . . . . .	65
\country: Added comma before country for journals . . . . .	84	\country: Corrected spacing for institution . . . . .	84
v1.44		\if@ACM@acmthm: Modified description . . . . .	34
\@acmBooktitle: Added macro . . . .	63	\liningnums: Workaround for compatibility with fontspec . . . .	51
\@acmEditors: Added macro . . . . .	63	\maketitle: Added authors' addresses Thankses go before authors' addresses . . . . .	77
\@editorsAbbrev: Added macro . . . .	63	\num@authors: Introduced macro . . .	63
\@folioblob: Suppress the blob if acmArticleSeq is empty . . . . .	97	General: Added etoolbox . . . . .	33
\@mkbibcitation: If the paper has just one page, use 'page' instead of 'pages' . . . . .	92	Bst file bug fixes: label width is calculated correctly . . . . .	33
\ACM@restore@pagestyle: Added macro . . . . .	93	Delayed hypersetup since journal options may change screen mode	44
\acmArticle: The default is now empty . . . . .	67	PACM now set screen to true . . . .	56
\acmArticleSeq: Now acmArticle might be empty . . . . .	67		

Restore theorem defs to class file . . . . .	33	v1.53	General: Added PACMCGIT, TIOT, TDSCI . . . . .	56
v1.47				
General: New journal: THRI . . . . .	33			
v1.48		v1.54		
\@headfootfont: Deleted unnecessary switch (Michael D. Adams) . . . . .	95	\@mkbibcitation: Bug corrected (Ross Moore) . . . . .	92	
\@mkabstract: Removed spurious indentation if abstract is followed by an empty line . . . . .	91	\@shortauthors: Added submission id in anonymous mode . . . . .	95	
\ACM@timestamp: Formatting change (Michael D. Adams) . . . . .	94	\ACM@NR@adjustedSectionformat: Added macro . . . . .	100	
\if@ACM@review: Review mode now switches on folios . . . . .	35	\ACM@NR@adjust: Added macro . . . . .	99	
\maketitle: Added acmart and version info to pdfcreator tag . . . . .	77	\ACM@adddotafter: Added macro . . . . .	100	
Added language and doctitle attributes to PDF (Andreas Reichinger) . . . . .	77	\author: Added submission id in anonymous mode . . . . .	64	
Suppressed empty DOI (Serguei Mokhov) . . . . .	77	\if@ACM@nonacm: Added macro . . . . .	35	
General: \citeyear no longer behaves like \citeyearpar . . . . .	45	General: Added Ross's patch for sectioning . . . . .	100	
Code prettying (Michael D. Adams) . . . . .	33	Deleted indent for subsubsection . . . . .	100	
Initial support for Biblalex (Daniel Thomas) . . . . .	33	XeTeX now uses T1 encoding . . . . .	50	
Misc entries in the bibliography no longer produce a separate date . . . . .	33	v1.55		
Typos fixed (Jamie Davis) . . . . .	33	\@mkbibcitation: Bug corrected . . . . .	92	
v1.50		\maketitle: Fixes topnum . . . . .	77	
\@copyrightpermission: New copyright statements for iw3c2w3[g] . . . . .	73	General: Now we use purple color for links . . . . .	44	
v1.51		Table captions for SIGCHI now use the same font size as figure captions (Luis Leiva) . . . . .	52	
General: Corrected the bug with price suppression . . . . .	71	Typo corrected (Zack Weinberg) . . . . .	39	
Suppress price if the copyright is set to iw3c2w3 or iw3c2w3g . . . . .	71	v1.56		
XeTeX now uses OTF fonts (Joachim Breitner) . . . . .	50	\@marginfigure: Added checking for description . . . . .	53	
firstpagestyle: We now use journal abbreviation for footers . . . . .	98	\@mkteasers: Added check for description . . . . .	91	
standardpagestyle: We now use journal abbreviation for footers . . . . .	95	\Description: Added macro . . . . .	51	
v1.52		\acksname: Added macro (Philip Quinn) . . . . .	106	
\@copyrightowner: Rewording of licenses . . . . .	73	\ccsdesc@parse: End the concepts list with a period (Philip Quinn) . . . . .	70	
\@copyrightpermission: Another rewording of copyright statements for iw3c2w3[g] . . . . .	73	\if@Description@present: Added macro . . . . .	51	
		\if@undescribed@images: Added macro . . . . .	51	
		General: Looks like XeTeX requires explicit monotype font declaration . . . . .	50	
		Make two-column layouts flush (Philip Quinn) . . . . .	47	
		v1.57		
		\ACM@origbaselinestretch: Added check whether the user changed \baselinestretch . . . . .	107	

\author: Added warning if \author has comma . . . . .	64	v1.61	\@typeset@author@bx: Added \normalbaselines . . . . .	88
\email: Added warning if \author has comma . . . . .	65	v1.64	\ACM@linecount@bx: Bug fix: made the spacing on the left and the right size equal . . . . .	93
\if@ACM@balance: Added macro . . .	35		\if@ACM@maketitle@typeset: Introduced macro . . . . .	56
\vspace: Added warning . . . . .	107		\maketitle: Added a switch setting to show that \maketitle is typeset .	77
v1.58		v1.65	\@mkauthorsaddresses: Deleted cs@addpunct . . . . .	90
\@dblfloat: Deleted spurious \vspace warning . . . . .	54	v1.66	\@specialsection: Suppress warnings about \vspace . . . . .	80
\@marginfigure: Deleted spurious \vspace warning . . . . .	53		General: Patching algorithm and algorithm* to prevent spurious space warnings . . . . .	51
\@margintable: Deleted spurious \vspace warning . . . . .	53	v1.67	\@parfont: Deleted redefinitions of sections . . . . .	101
\@mkbibcitation: Deleted spurious \vspace warning . . . . .	92		\@specialsection: Paragraph inside group does not print its argument. Added a bugfix . . . . .	80
\@printendtopmatter: Deleted spurious \vspace warning . . . . .	92		General: Patching lstlisting and lstlisting* to prevent spurious space warnings . . . . .	51
\@sidebar: Deleted spurious \vspace warning . . . . .	53			
\maketitle: Original \vspace inside \maketitle . . . . .	77			
\vspace: Preserved old versions as \@vspace@orig and \@vspace@orig . . . . .	107			
General: Added HEALTH. TDSCI is renamed to TDS . . . . .	56			
Suppressed \addtocounter in pdf subject . . . . .	44			
v1.59		v1.68	\@specialsection: Deleted grouping altogether . . . . .	80
\acmConference: Setting \@ACM@journal@bibstrip . . . . .	62		General: New command for unindent paras . . . . .	100
\acmJournal: Setting \@ACM@journal@bibstrip . . . . .	62	v1.69	\@printendtopmatter: Deleted grouping . . . . .	92
\if@ACM@journal@bibstrip: Introduced macro . . . . .	37		\@specialsection: Changed dot to colon for sigplan . . . . .	80
firstpagestyle: Added logic for conference papers using journal format . . . . .	98		\ACM@linecountR: Do not increase numbers in one column format . .	94
Moved page styles to \AtBeginDocument . . . . .	98		\ccsdesc@parse: Use math right arrow in text . . . . .	70
standardpagestyle: Added logic for conference papers using journal format . . . . .	95		General: No dots for unindented paragraphs . . . . .	100
Moved page styles to \AtBeginDocument . . . . .	95	v1.71		
v1.60			\l@subsubsection: Bug fixed (thanks to Andrew Black) . . . . .	44
\@headfootfont: Moved to footnotesize . . . . .	95			

v1.72		
\author: Added \detokenize (Kuldeep S. Meel) . . . . .	64	
\maketitle: Do not andify authors for pdf metadata (Scott Pakin) . . .	77	
General: Added hyperxmp . . . . .	45	
v1.73		
\@ACM@checkaffil: Added macro . .	87	
\@ACM@resetaffil: Added macro . .	86	
\@mkauthors@i: Check the presence of required elements for affiliations . . . . .	87	
\@mkauthors@iii: Check the presence of required elements for affiliations . . . . .	88	
\@mkauthors@iv: Check the presence of required elements for affiliations . . . . .	89	
\city: Check the presence in affil . .	84	
\country: Check the presence in affil	84	
\if@ACM@citypresent: Added macro	86	
		\if@ACM@countrypresent: Added macro . . . . . 86
		\if@ACM@instpresent: Added macro 86
		\institution: Check the presence in affil . . . . . 84
		\maketitle: Do not check again the presense of address fields . . . . . 77
		General: Patching minted and minted* to prevent spurious space warnings . . . . . 51
	v1.74	
	General: Changed the order of font loading . . . . .	50
	v1.75	
	\@ACM@checkaffil: Changed warning to error for country . . . . .	87
	\@beginmaketitlehook: Introduced macro . . . . .	77
	\AtBeginMaketitle: Introduced macro . . . . .	77
	\maketitle: Added \@beginmaketitlehook . . . . .	77

## 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		
\\$ . . . . . 1847, 1851	\@ACM@journal@bibstripfalse\@Description@presenttrue . . . . . 208, 1247 . . . . . 737, 740	
\- . . . . . 499	\@ACM@journal@bibstriptrue \@M . . . . . 368, 407, 425, 434	
\@ 1597, 1609, 1612, 1615, 1620, 1700, 1721, 1734	. . . . . 206, 1233	\@abstract 1435, 2386, 2393
\@authornotemark . . . . . 1377, <u>2372</u>	\@ACM@journalfalse . . . . . 194, 196, 198, 200, 202	\@acmArticle . . . 1383, 1386, 1846, 2404,
\@par . . . . . 368, 425	\@ACM@journaltrue . . . . . 186, 188, 190, 192	2405, 2526, 2529,
\@ACM@addtoaddress . . . . . <u>2092</u> , 2118, 2119, 2121	\@ACM@labelwidth . . . . . 867, 870, 878, 883, 909	2549, 2559, 2570,
\@ACM@authorsperrrow . . . . . <u>1461</u> , 2252, 2253, 2305, 2306	\@ACM@maketitle@typesetfalse . . . . . 916	\@acmArticlePage . . . 2525, 2543, 2544, 2553, 2556, 2563, 2567
\@ACM@badge@skip . . . . . <u>1408</u> , 1955, 2032, 2036, 2042, 2051, 2061, 2067, 2076	\@ACM@maketitle@typesettrue\@acmArticleSeq . . . . . 1770	\@acmArticleSeq 1385, 2627
\@ACM@badge@width . . . . . <u>1405</u> , 1954, 1959, 2031, 2035, 2041, 2053, 2060, 2062, 2065, 2077, 2080	\@ACM@manuscriptfalse 181	\@acmBadgeL@image . . . . . 1417, 1419,
\@ACM@badgefalse . . . 1404	\@ACM@manuscripttrue 179	1952, 1954, 2030,
\@ACM@badgetrue 1410, 1415	\@ACM@newfontsfalse . . . . . 701, 704, 707	2039, 2041, 2063, 2065
\@ACM@balancefalse . . . . . <u>2188</u> , 2223, 2228, 2287, 2292, 2332, 2337	\@ACM@newfontstrue . . 698	\@acmBadgeL@url . 1416, 1418, 1953, 2040, 2064
\@ACM@checkaffil 1877, <u>2193</u> , 2224, 2229, 2288, 2293, 2333, 2338	\@ACM@printacmreffalse . . . . . 93	\@acmBadgeR@image . . . . . 1412, 1414, 1957, 1959, 2034, 2050, 2053, 2078, 2080
\@ACM@citypresentfalse . . . . . 2190	\@ACM@printfoliostrue 76	\@acmBadgeR@url . 1411, 1413, 1958, 2052, 2079
\@ACM@citypresenttrue . . . 2106, 2118, 2185	\@ACM@reviewtrue . . . 134	\@acmBooktitle . . . . . 1253, 1836, 2420
\@ACM@commabox . . . . . <u>2092</u> , 2096, 2097	\@ACM@screentrue 1006, 1035, 1041, 1047, 1053	\@acmDOI . . 1401, 1838, 1841, 1848, 1852, 2428
\@ACM@countrypresentfalse . . . . . 2191	\@ACM@sigchiamodeffalse . . . . . 183	\@acmEditors <u>1258</u> , 1259, 1260, 1263, 2421, 2422
\@ACM@countrypresenttrue . . . 2109, 2121, 2187	\@ACM@sigchiamodetrue 203	\@acmISBN . . . . . 1399, 1850
\@ACM@instpresentfalse . . . . . 2189	\@ACM@timestamptrue 133	\@acmMonth 1389, 1391, 1846
\@ACM@instpresenttrue . . . 2104, 2113, 2183	\@ACM@title@width . . . . . <u>1407</u> , 2029, 2031, 2032, 2035, 2036, 2044, 2058, 2060, 2061, 2069	\@acmNumber . . . . . 1381, 2417, 2549, 2559, 2570, 2663, 2673, 2683
	\@DeclareACMFormat . . . 38, 39, 40, 41, 42, 43, 44, 45, 46, 47	\@acmPrice 1395, 1847, 1851
	\@Description@presentfalse . . . 743, 746, 819, 2378	\@acmPubDate . . . <u>1391</u> , 2417, 2549, 2559, 2570, 2664, 2674, 2684
		\@acmSubmissionID . . . . . 1284,

1285, 1300, 1301,	\@authorfont . . . . .	\@currentaffiliation
1397, 2506, 2507, 2517	2147, 2152, 2156,	2245, 2248, 2270,
\@acmVolume . . . . . 1379,	2159, 2162, 2165,	2277, 2278, 2281,
2417, 2548, 2558,	2168, 2171, 2211, 2244	2284, 2285, 2290,
2569, 2662, 2672, 2682	\@authornotemark . . .	2317, 2324, 2325,
\@acmYear . . . . . 1387,	. . . 1369, 1375, 2371	2327, 2329, 2330, 2335
1394, 1753, 1846, 2408	\@authornotes . . . . .	\@currentaffiliations
\@acmdefinitionbodyfont	. . . 1366, 1370, 1790	. . . . . 2177,
. . . 2836, 2848, 2860	\@authorsaddresses .	2178, 2179, 2181,
\@acmdefinitionheadfont	1345, 1798, 2366, 2438	2207, 2219, 2220, 2226
. . . 2838, 2850, 2862	\@auxout . . . . . 536	\@currentauthors . . .
\@acmdefinitionindent	\@begindocumenthook 532	. . . . 2175, 2176,
. . . 2837, 2849, 2861	\@beginmaketitlehook	2206, 2210, 2211,
\@acmdefinitionnotefont	. . . 1764, 1767, 1769	2213, 2244, 2247,
. . . 2839, 2851, 2865	\@botnum . . . . . 1896	2269, 2271, 2272,
\@acmownedfalse . 1548,	\@citestyle . . . . . 277	2274, 2316, 2318,
1551, 1554, 1560,	\@classname . . . . . 24,	2319, 2321, 2371, 2372
1564, 1567, 1570,	26, 35, 51, 53,	\@currentlabel . 452, 466
1573, 1579, 1582, 1586	54, 59, 61, 62, 67,	\@dblarg . . . . . 354
\@acmownedtrue . . . .	69, 70, 75, 78, 79,	\@dblfloat . . . . . 831
. . . 1535, 1544, 1576	84, 86, 87, 92, 98,	\@department . . 1330, 1331
\@acmplainbodyfont .	99, 103, 108, 110,	\@dotsep . . . . . 2805
. . . 2806, 2818, 2830	111, 116, 118, 119,	\@editorsAbbrev . . .
\@acmplainheadfont .	124, 126, 127, 132,	. . . 1257, 1262, 2422
. . . 2808, 2820, 2832	136, 137, 148, 154,	\@empty . . . . . 210, 358,
\@acmplainindent . . .	160, 166, 232, 699,	1244, 1259, 1281,
. . . 2807, 2819, 2831	702, 705, 742, 751,	1284, 1298, 1300,
\@acmplainnotefont .	754, 822, 1007,	1305, 1306, 1312,
. . . 2809, 2821, 2835	1036, 1042, 1048,	1425, 1426, 1479,
\@adddotafter . . . . .	1054, 1228, 1230,	1480, 1486, 1493,
2720, 2721, 2723,	1274, 1325, 1339,	1498, 1524, 1765,
2735, 2750, 2754, 2803	1422, 1428, 1433,	1794, 1798, 1838,
\@additionalaffiliation	1440, 1442, 1443,	1847, 1850, 1851,
. . . . . 1326, 1327	1446, 1448, 1449,	1852, 1862, 1867,
\@addpunct . 2358, 2437,	1452, 1457, 1459,	1924, 1952, 1957,
2438, 2803, 2804, 2915	1460, 1462, 1463,	2030, 2034, 2039,
\@addspaceafter . . . . 2804	1526, 2195, 2198,	2047, 2050, 2063,
\@affiliationfont . .	2201, 2367, 2381,	2071, 2078, 2088,
2148, 2153, 2157,	2401, 2982, 2985, 2992	2177, 2210, 2218,
2160, 2163, 2166,	\@clubpenalty . . . . . 413	2219, 2271, 2277,
2169, 2172, 2224, 2244	\@concepts . 1498, 1510,	2284, 2318, 2324,
\@afterheading . 399, 1899	1524, 1862, 1864, 1881	2329, 2366, 2374,
\@afterindentfalse .	\@copyrightowner . . .	2404, 2409, 2421,
. . . . . 345, 1898	. . . . . 1591, 1822	2428, 2506, 2517,
\@afterindenttrue . . 343	\@copyrightpermission	2809, 2839, 2958, 2975
\@article@string . . .	. . . . . 1629, 1814	\@endfloatbox . . . . . 834
. . . 2404, 2417, 2425	\@copyrightyear . . . .	\@endpefalse . . . . . 2917
\@author . . . . .	. . . 1752, 1822, 1824	\@endwdefloatbox 834, 842
1283, 1288, 1293,	\@currbox . . . 848, 849, 850	\@finalstrut . . . 457, 470
2209, 2271, 2318, 2361		\@float . . . . . 836

\@flushglue	2764	998, 1002, 1009,	\@listiv	901
\@fnsymbol	1780	1013, 1017, 1021,	\@listv	903
\@folio@ht		1025, 1029, 1032,	\@listvi	905
	2607, 2634, 2640, 2641	1038, 1044, 1050,	\@m	356
\@folio@max	2607, 2630, 2631	1056, 1060, 1064,	\@makefnmark	447,
\@folio@voffset	2607, 2636	1067, 1071, 1075,		472, 1782, 1787, 1791
\@folio@wd	2607,	1077, 1079, 1083,	\@makefntext	
	2641, 2642, 2669, 2679	1085, 1089, 1093,		447, 456, 469, 1793
\@folioblob	2627,	1097, 1101, 1105,	\@marginfigure	814, 815
	2666, 2668, 2676, 2677	1109, 1113, 1117,	\@margintable	825, 826
\@footnotemark	473, 1778	1121, 1125, 1129,	\@minipagefalse	663, 844
\@footnotemark@nolink		1133, 1137, 1141,	\@minus	2740, 2744, 2748,
	473, 1778	1145, 1149, 1153,		2752, 2756, 2761,
\@footnotetext		1156, 1160, 1163,		2827, 2829, 2857, 2859
	448, 474, 1779	1168, 1172, 1176,	\@mkabstract	1860, 2385
\@footnotetext@nolink		1180, 1184, 1188,	\@mkauthors	1783, 1785, 2123
	474, 1779	1192, 1196, 1200,	\@mkauthors@i	2127,
\@for	253	1204, 1208, 1212,		2129, 2131, 2133, 2205
\@formatdoi	1628,	1216, 1220, 1224,	\@mkauthors@ii	2237
	1841, 1848, 1852, 2428	1235, 1236, 1834	\@mkauthors@iii	2135,
\@fps	835	\@journalNameShort		2137, 2139, 2141, 2249
\@fpsadddefault	835		\@mkauthors@iv	2143, 2302
\@gobble	275, 319	983, 987, 991, 995,	\@mkauthorsaddresses	
\@hangfrom	367, 424	999, 1004, 1010,		1346, 2346
\@headfootfont	2519,	1014, 1018, 1022,	\@mkbibcitation	1892, 2395
	2543, 2544, 2545,	1026, 1030, 1033,	\@mkteasers	1783, 2373
	2546, 2552, 2555,	1039, 1045, 1051,	\@mkttitle	1783, 1964
	2562, 2566, 2574,	1057, 1061, 1065,	\@mkttitle@i	1967,
	2575, 2577, 2580,	1068, 1072, 1080,		1969, 1971, 1973, 2028
	2587, 2588, 2590, 2593	1086, 1090, 1094,	\@mkttitle@ii	2056
\@ifnextchar	1330	1098, 1102, 1106,	\@mkttitle@iii	1975,
\@ifnotempty	1758	1110, 1114, 1118,		1977, 1979, 1981, 2056
\@ifnum	291, 293	1122, 1126, 1130,	\@mkttitle@iv	1983, 2084
\@ifstar	352	1134, 1138, 1142,	\@mpargs	666
\@ifundefined		1146, 1150, 1157,	\@mparswitchfalse	628
	2870, 2873, 2876,	1161, 1164, 1169,	\@mpfootins	
	2879, 2882, 2886, 2889	1173, 1177, 1181,		461, 462, 658, 659, 661
\@iiiparbox	666	1185, 1189, 1193,	\@mpfootnotetext	460
\@input	436	1197, 1201, 1205,	\@ne	279, 283, 287, 289,
\@insideauthorgroupfalse		1209, 1213, 1217,		522, 2452, 2458, 2462
	1272, 1320	1221, 1225, 1236,	\@nil	298
\@insideauthorgrouptrue		2416, 2548, 2558,	\@nobreakfalse	401, 441
	1279	2569, 2662, 2672, 2682	\@noskipsecfalse	405
\@journalCode		\@keywords	\@noskipsectrue	402
	917, 1007, 1036,		\@pages@word	
	1042, 1048, 1054, 1228	1424, 1425,		2398, 2418, 2425
\@journalCode@nr		1426, 1867, 1873, 1882	\@par	1796, 1802
	917, 980, 1234	\@latex@error	\@parboxrestore	465
\@journalName	982,		\@parfont	
	986, 990, 994,	\@empty		2754, 2758, 2763, 2768
			\@listI	891, 895
			\@listi	888, 895
			\@listii	896
			\@listiii	899



\@permissionCodeOne	\@secfont . . . . .	2742, 2768	282, 284, 286, 288,
. . . . . 984, 988,	\@secpenalty . . . . .	350	290, 292, 294, 296,
992, 996, 1000,	\@sect . . . . .	354, 355	301, 303, 305, 307,
1005, 1011, 1015,	\@setaddresses . . . .	2370	309, 311, 2976, 2977
1019, 1023, 1027,	\@setauthorsaddresses		\@tempboxa . . . . . 666
1034, 1040, 1046,	. . . . . 1802, 2438		\@tempc . . . . . 299, 300, 302,
1052, 1058, 1062,	\@setthanks . . . .	1796, 2437	304, 306, 308, 310, 312
1069, 1073, 1081,	\@shortauthors . . . .		\@tempcnta . . . . . 2627, 2628,
1087, 1091, 1095,	. . . . . 2514, 2537, 2545,		2630, 2631, 2633, 2635
1099, 1103, 1107,	. . . . . 2553, 2563, 2575, 2588		\@tempdima . . . . .
1111, 1115, 1119,	\@sidebar . . . . .	810, 811	2634, 2635, 2636, 2638
1123, 1127, 1131,	\@specialsection . . .		\@tempskipa . . . . .
1135, 1139, 1143,	. . . . . 1863, 1869, 1871, 1901		342, 344, 345, 350,
1147, 1151, 1154,	\@ssect . . . . .	353, 419	363, 364, 395, 396,
1158, 1165, 1170,	\@startPage . . . .	1420,	398, 410, 411, 420, 421
1174, 1178, 1182,	. . . . . 1924, 1925, 1927, 2511		\@textbottom . . . . . 667
1186, 1190, 1194,	\@startsection . . . .	339,	\@textsuperscript . .
1198, 1202, 1206,	. . . . . 431, 2739, 2743,		. . . . . 472, 1782, 1787
1210, 1214, 1218,	. . . . . 2747, 2751, 2755, 2760		\@texttop . . . . . 668
1222, 1226, 1237, 1846	\@starttoc . . . . .	431	\@thefnmark . . . . . 453, 467,
\@permissionCodeTwo	\@subparfont . . . . .	2793	472, 1782, 1787, 1792
. . . . . 1166, 1238	\@subsecfont . . . .	2746, 2768	\@title . . . . . 1349, 1880,
\@plus . . . . . 434,	\@subsubsecfont . . .	2750, 2768	2046, 2070, 2087, 2408
442, 667, 2740,	\@subtitle . . . . .	1265, 1358,	\@titlefont . . . . . 1986, 2038,
2744, 2748, 2752,	. . . . . 2047, 2048, 2071,		2045, 2057, 2069, 2085
2756, 2761, 2826,	\@subsubsection . . . .	2072, 2088, 2089, 2409	\@titlenotes . . . . .
2828, 2856, 2858, 2912	. . . . . 2007, 2048, 2072, 2089		1347, 1351, 1354, 1788
\@printcopyrightfalse	\@subtitlenotes . . . .		\@tochangmeasure . . . . . 372, 385
. . . . . 1547, 1559	. . . . . 1356, 1360, 1363, 1789		\@toclevel . . . . . 356
\@printcopyrighttrue	\@svsec . . . . .	358, 361, 367, 382	\@tocline . . . . . 444, 445, 446
. . . . . 1531, 1543	\@svsechd . . . . .	380, 408, 428	\@topnum . . . . . 1894
\@printendtopmatter	\@teaser . . . . .	1756, 2375	\@typeset@author@bx
. . . . . 1897, 2430	. . . . . 1754, 1756, 2374, 2379		. . . . . 2241,
\@printpermissionfalse	\@teaserfigures . . . .		2295, 2301, 2340, 2345
. . . . . 1546	\@tempa . . . . .	253,	\@typeset@author@line
\@printpermissiontrue	. . . . . 254, 256, 258, 260,		2174, 2208, 2232, 2234
. . . . . 1533, 1542, 1558	. . . . . 262, 264, 266, 268,		\@undefined . . . . . 532, 730, 1764
\@printtopmatter . . .	. . . . . 270, 272, 274, 276,		\@undescribed@imagesfalse
. . . . . 1784, 1923	. . . . . 278, 280, 282, 284,		. . . . . 739
\@proofindent . . . . .	. . . . . 286, 288, 290, 292,		\@undescribed@imagetrue
. . . . . 2896, 2906, 2914	. . . . . 294, 296, 298, 301,		. . . . . 750, 753, 821, 2380
\@proofnamefont . . . .	. . . . . 303, 305, 307, 309,		\@vspace . . . . .
. . . . . 2895, 2905, 2915	. . . . . 311, 1304, 1305,		744, 747, 755, 757,
\@received . . . . . 1477, 1480,	. . . . . 1478, 1479, 2218,		759, 761, 763, 765,
1481, 1483, 1486,	. . . . . 2958, 2974, 2975, 2977		767, 769, 771, 773,
1487, 1489, 1493, 1494	\@tempb . . . . .	254, 256,	811, 816, 826, 832,
\@rightskip . . . . . 2764, 2765	. . . . . 258, 260, 262, 264,		1776, 2396, 2431,
\@saveabstract . . . . . 1431, 1432	. . . . . 266, 268, 270, 272,		2434, 2980, 2982, 2988
\@saveteaser . . . . . 1755, 1756	. . . . . 274, 276, 278, 280,		\@vspace@acm . . . . . 2434, 2988
\@secCNTformat . . . . . 361, 418			

\@vspace@orig . . . . .	\ACM@fontsize . . . . .	\ACM@restore@pagestyle . . . . .
744, 747, 755, 757,	140, 210, 213, 215,	2440
759, 761, 763, 765,	217, 219, 221, 223,	\ACM@sect@format . . . . .
767, 769, 771, 773,	225, 227, 229, 232, 233	2728, 2730
811, 816, 826, 832,	\ACM@format . . . . . 32, 148	\ACM@sect@format@ . . . . .
1776, 2396, 2431, 2980	\ACM@format@nr . . . 32,	2717, 2730, 2732
\@vspacer . . . . .	148, 153, 159, 165,	\ACM@sect@format@null . . . . .
745, 748, 756, 758,	178, 184, 211, 484,	2731, 2732
760, 762, 764, 766,	568, 633, 669,	\ACM@timestamp . . . . .
768, 770, 772, 774,	785, 852, 1902,	2497, 2602, 2700, 2705
812, 817, 827, 833,	1931, 1965, 1987,	\acmArticle . . . . . 15, 1383
1777, 2397, 2432,	2008, 2125, 2149,	\acmArticleSeq . . . . . 15, 1385
2435, 2981, 2985, 2989	2473, 2533, 2614,	\acmBadgeL . . . . . 16, 1415
\@vspacer@acm . . . . . 2435, 2989	2653, 2699, 2773,	\acmBadgeR . . . . . 16, 1410
\@vspacer@orig . . . . .	2810, 2840, 2897, 2921	\acmBooktitle . . . . . 9, 1253
745, 748, 756, 758,	\ACM@linecount . . . . .	\acmConference . . . . . 9, 1239
760, 762, 764, 766,	. . . . . 2451, 2452,	\acmConference@date . . . . .
768, 770, 772, 774,	2457, 2458, 2461, 2462	1242, 1818,
812, 817, 827, 833,	\ACM@linecount@bx . . . . .	2579, 2582, 2592, 2595
1777, 2397, 2432, 2981	. . . . . 2448, 2468, 2494	\acmConference@name . . . . .
\@width . . . . . 647, 654	\ACM@linecount@bxht . . . . .	1241, 1254, 1255
\@xp . . . . . 438, 439	2450, 2456, 2459, 2460	\acmConference@shortname . . . . .
\@xsect . . . . . 393, 394, 430	\ACM@linecountL . . . . .	1240, 1244, 1245,
\\ 553, 562, 1284, 1822,	. . . . . 2464, 2535,	1255, 1256, 1818,
1827, 1842, 1847,	2538, 2543, 2546,	2578, 2581, 2591, 2594
1851, 2400, 2408, 2457	2552, 2554, 2562,	\acmConference@venue . . . . .
\{ . . . . . 261	2564, 2574, 2577,	. . . . . 1243, 1818,
\} . . . . . 261	2587, 2590, 2655,	2579, 2582, 2592, 2595
	2666, 2667, 2677,	\acmdefinition . . . . . 2855
	2678, 2686, 2689, 2694	\acmDOI . . . . . 16, 1401
\_ . . . . 1256, 1506, 1516,	\ACM@linecountR . . . . .	\acmISBN . . . . . 16, 1399
1822, 1824, 1847,	2471, 2565, 2567,	\acmJournal . . . . . 9, 1232
2404, 2405, 2423, 2511	2575, 2582, 2588,	\acmMonth . . . . . 15, 1389
	2595, 2687, 2690, 2695	\acmNumber . . . . . 15, 1381
A	\ACM@mk@linecount . . . . .	\acmplain . . . . . 2825
\abstract . . . . . 1431	. . . . . 2453,	\acmPrice . . . . . 15, 1395,
abstract (environment) 19	2466, 2481, 2483,	1555, 1561, 1583, 1587
\abstractname . . . . . 2391	2485, 2487, 2489, 2491	\acmSubmissionID . . . . . 15, 1397
\acks . . . . . 2949	\ACM@NR@adjustedSectionform . . . . .	\acmVolume . . . . . 15, 1379
acks (environment) . . . . . 23	. . . . . 2718, 2727	\acmYear . . . . . 15, 1387
\acksname . . . . . 2948, 2951, 2952	\ACM@NRadjust . . . . .	\addcontentsline 249,
\ACM@adddotafter . . . . .	2709, 2742, 2746,	374, 387, 2387, 2952
. . . . . 2721, 2738	2750, 2754, 2758, 2763	\additionalaffiliation . . . . .
\acm@copyrightinput 1537	\ACM@origbaselinestretch . . . . .	11, 1326
\acm@copyrightmode . . . . .	. . . . . 2990	\addpenalty . . . . . 350
. . . . . 1537, 1545,	\ACM@ps@headings . . . . .	\addresses . . . . .
1550, 1553, 1557,	. . . . . 2442, 2446	1281, 1283, 1288,
1563, 1566, 1569,	\ACM@ps@myheadings . . . . .	1293, 1322, 1342,
1572, 1575, 1578,	. . . . . 2441, 2445	1369, 1375, 1377,
1581, 1585, 1592, 1630	\ACM@ps@plain . . . . . 2440, 2444	2234, 2301, 2345, 2363

[illegible]

1440, 1442, 1446, 1448, 1457, 1459, 1462	\DeclareTextFontCommand ..... 732	1102, 1103, 1105, 1106, 1107, 1109, 1110, 1111, 1113, 1114, 1115, 1117, 1118, 1119, 1121, 1122, 1123, 1125, 1126, 1127, 1129, 1130, 1131, 1133, 1134, 1135, 1137, 1138, 1139, 1141, 1142, 1143, 1145, 1146, 1147, 1149, 1150, 1151, 1153, 1154, 1156, 1157, 1158, 1160, 1161, 1163, 1164, 1165, 1166, 1168, 1169, 1170, 1172, 1173, 1174, 1176, 1177, 1178, 1180, 1181, 1182, 1184, 1185, 1186, 1188, 1189, 1190, 1192, 1193, 1194, 1196, 1197, 1198, 1200, 1201, 1202, 1204, 1205, 1206, 1208, 1209, 1210, 1212, 1213, 1214, 1216, 1217, 1218, 1220, 1221, 1222, 1224, 1225, 1226, 1232, 1234, 1235, 1236, 1237, 1238, 1253, 1257, 1258, 1259, 1265, 1304, 1326, 1327, 1328, 1329, 1330, 1331, 1344, 1345, 1347, 1348, 1356, 1357, 1366, 1367, 1379, 1381, 1383, 1385, 1387, 1389, 1391, 1395, 1397, 1399, 1401, 1411, 1412, 1413, 1414, 1416, 1417, 1418, 1419, 1420, 1422, 1424, 1432, 1437, 1465, 1477, 1478, 1502, 1503, 1529,
\ClassWarning 26, 154, 160, 166, 699, 702, 705, 751, 754, 822, 1274, 1339, 1422, 1463, 2381, 2982, 2985	\def ..... 24, 38, 140, 213, 215, 217, 219, 221, 223, 225, 227, 229, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 290, 292, 294, 296, 297, 301, 303, 305, 307, 309, 311, 339, 355, 380, 394, 418, 419, 428, 431, 444, 445, 446, 447, 449, 460, 472, 477, 478, 479, 480, 481, 499, 531, 646, 653, 655, 667, 811, 815, 826, 832, 835, 839, 842, 860, 861, 862, 863, 891, 896, 899, 901, 903, 905, 982, 983, 984, 986, 987, 988, 990, 991, 992, 994, 995, 996, 998, 999, 1000, 1002, 1004, 1005, 1009, 1010, 1011, 1013, 1014, 1015, 1017, 1018, 1019, 1021, 1022, 1023, 1025, 1026, 1027, 1029, 1030, 1032, 1033, 1034, 1038, 1039, 1040, 1044, 1045, 1046, 1050, 1051, 1052, 1056, 1057, 1058, 1060, 1061, 1062, 1064, 1065, 1067, 1068, 1069, 1071, 1072, 1073, 1075, 1077, 1079, 1080, 1081, 1083, 1085, 1086, 1087, 1089, 1090, 1091, 1093, 1094, 1095, 1097, 1098, 1099, 1101,	
\ClassWarningNoLine . 742, 1428, 1452, 1526, 2195, 2198, 2367		
\cleaders ..... 2097		
\clubpenalty ... 407, 413		
\CodelineIndex ..... 16		
\Collect@Body .. 810, 814, 825, 1431, 1755		
\color ... 1810, 2457, 2461		
\color@begingroup 455, 468		
\color@endbox ..... 847		
\color@endgroup .... ..... 458, 471, 664		
\columnwidth ... 464, 647, 833, 2303, 2342		
\contentsnamefont .. 435		
\copy ..... 2097		
\copyright ..... 1822		
\copyrightpermissionfootnoterule ..... 646		
\copyrightyear . 17, 1752		
\country 12, 1336, 2100, 2359		
\csname ..... 319, 370, 372, 376, 383, 385, 389, 418, 438, 439, 453, 467, 1505, 1506, 1508, 1509, 1510, 1511, 1512, 1515, 1517, 1884, 1886, 2711, 2734		
\CurrentOption . 141, 142, 143, 144, 145, 146		
<b>D</b>		
\day ..... 2509		
\DeclareNewFootnote ..... 650, 652		
\DeclareOptionX .... ..... 38, 141, 142, 143, 144, 145, 146		
\DeclareRobustCommand ..... 520, 2730		

1589, 1591, 1628,	2820, 2821, 2836,	1249, 1255, 1261,
1629, 1752, 1754,	2837, 2838, 2839,	1277, 1284, 1287,
1756, 1767, 1769,	2848, 2849, 2850,	1291, 1292, 1300,
1782, 1787, 1796,	2851, 2895, 2896,	1303, 1308, 1311,
1802, 1877, 1901,	2905, 2906, 2956,	1314, 1321, 1341,
1923, 1964, 1986,	2958, 2974, 2975, 2976	1353, 1362, 1368,
2007, 2028, 2056,	\define@boolkey 49, 57,	1376, 1426, 1441,
2084, 2093, 2100,	65, 73, 82, 90, 102,	1447, 1450, 1458,
2101, 2103, 2104,	106, 114, 122, 130,	1469, 1472, 1482,
2106, 2107, 2109,	1324, 1438, 1444, 1455	1485, 1488, 1493,
2112, 2113, 2117,	\define@choicekey ..	1514, 1519, 1520,
2118, 2120, 2121,	..... 32, 917, 1536	1521, 1524, 1761,
2123, 2147, 2148,	\define@cmdkey .... 1461	1783, 1794, 1798,
2152, 2153, 2156,	\definecolor .....	1799, 1806, 1813,
2157, 2159, 2160,	... 540, 541, 542,	1816, 1817, 1823,
2162, 2163, 2165,	543, 544, 545, 546, 547	1828, 1835, 1840,
2166, 2168, 2169,	\department .....	1843, 1844, 1847,
2171, 2172, 2174,	. 12, 1330, 2100, 2358	1849, 1850, 1851,
2176, 2181, 2188,	\Description .... 22, 740	1852, 1862, 1867,
2193, 2205, 2206,	\description .....	1870, 1926, 1952,
2207, 2209, 2216,	\descriptionlabel 907, 910	1957, 2030, 2034,
2217, 2218, 2241,	\detokenize .....	2039, 2047, 2050,
2242, 2249, 2271,	\dimexpr .. 830, 849, 2599	2063, 2071, 2078,
2277, 2284, 2302,	\divide 2253, 2259, 2261,	2088, 2094, 2095,
2318, 2324, 2329,	2263, 2265, 2306, 2312	2110, 2111, 2112,
2346, 2352, 2353,	\do .....	2114, 2116, 2117,
2354, 2355, 2356,	\do@url@hyp .....	2120, 2177, 2194,
2357, 2359, 2360,	\DocInput .....	2197, 2200, 2212,
2361, 2362, 2370,	\documentclass .....	2218, 2225, 2243,
2371, 2372, 2373,	\dots .....	2254, 2264, 2273,
2375, 2385, 2395,		2280, 2289, 2307,
2398, 2399, 2400,	E	2311, 2320, 2326,
2401, 2404, 2408,	\edef 141, 142, 143, 144, 356	2334, 2348, 2350,
2430, 2437, 2438,	\editor .....	2365, 2374, 2379,
2443, 2453, 2464,	\egroup .....	2386, 2390, 2398,
2471, 2514, 2519,	813, 824, 828, 840,	2404, 2409, 2410,
2525, 2613, 2620,	846, 1337, 1864,	2419, 2421, 2428,
2625, 2627, 2709,	1873, 2245, 2279,	2506, 2517, 2518,
2713, 2715, 2717,	2282, 2345, 2364,	2528, 2539, 2547,
2727, 2731, 2738,	2376, 2394, 2408, 2429	2557, 2568, 2572,
2764, 2768, 2769,	\else ... 52, 60, 68, 77,	2576, 2585, 2589,
2770, 2771, 2777,	85, 97, 109, 117,	2628, 2657, 2661,
2778, 2780, 2781,	125, 135, 180, 207,	2671, 2681, 2688,
2783, 2784, 2786,	299, 320, 349, 356,	2693, 2701, 2704,
2787, 2789, 2790,	359, 371, 375, 379,	2714, 2738, 2958,
2791, 2792, 2793,	384, 388, 400, 412,	2963, 2970, 2978, 2991
2796, 2797, 2800,	427, 507, 524, 530,	\email ..... 10, 1338,
2801, 2803, 2804,	532, 555, 557, 658,	2216, 2277, 2324, 2362
2806, 2807, 2808,	718, 723, 749, 752,	\emph .....
2809, 2818, 2819,	782, 820, 1223,	1834, 1836
		\empty .....



2685, 2691, 2692, 2696, 2697, 2703, 2706, 2707, 2725, 2736, 2738, 2802, 2824, 2854, 2892, 2909, 2940, 2941, 2947, 2958, 2966, 2972, 2975, 2979, 2994	1245, 1253, 1260, 1262, 1283, 1286, 1288, 1289, 1299, 1307, 1313, 1435, 1464, 1481, 1487, 1506, 1508, 1509, 1515, 1925, 2211, 2215, 2220, 2247, 2248, 2269, 2270, 2272, 2276, 2278, 2285, 2316, 2317, 2319, 2323, 2325, 2330	\hspace . . . . . 1640, 1651, 1660, 1685, 1697, 1718, 2246, 2300 \Huge . . . . . 1995, 1997, 1999, 2001, 2003, 2005 \hypersetup . . . . . .. 502, 508, 510, 1878
\firstpagestyle . . . . 2647 \floatname . . . . . 809 \flushbottom . . . . . 674, 676, 678, 680, 682 \footnote . . . . . 2401 \footnotemark 481, 1349, 1358, 2371, 2372, 2399 \footnoterule . . . . . 653 \footnotesep . . . 457, 470 \footnotesize . . 463, 2505, 2519, 2540, 2548, 2558, 2569, 2573, 2577, 2586, 2658, 2662, 2672, 2682, 2691, 2696, 2702 \footnotetext . . 1352, 1354, 1361, 1364, 1371 \footnotetextauthorsaddresses . . . . . 1795, 1801 \footnotetextcopyrightpermission . . . . . 1806 \footrulewidth 2524, 2651 \format . . . . . 32 \frenchspacing . . . . 2995 \fulltextwidth . . . . . . . . . 829, 833, 849	\geometry . . . . . 570, 573, 580, 587, 594, 601, 608, 615, 622 \getrefnumber . . . . . 1427, 1451, 1525, 2398 \global . . . . . 402, 405, 441, 461, 740, 750, 753, 821, 848, 1233, 1247, 1276, 1278, 1279, 1320, 1889, 1890, 1894, 1896, 2104, 2106, 2109, 2113, 2118, 2121, 2189, 2190, 2191, 2208, 2232, 2233, 2243, 2295, 2298, 2340, 2377, 2380, 2458, 2462, 2923, 2925, 2927, 2939 \grantnum . . . . . 23, 2957 \grantsponsor . . 23, 2956	I \if . . . . . 299 \if@ACM@acmthm . . 65, 2868 \if@ACM@affiliation@obeypunctuation . . . . . 1324, 2095, 2110, 2112, 2114, 2115, 2117, 2120 \if@ACM@anonymous 114, 1282, 1292, 1297, 1321, 1341, 1350, 1359, 1368, 1759, 1771, 1799, 2515, 2967 \if@ACM@authordraft . . . . . 130, 548, 1807 \if@ACM@authorversion . . . . . 82, 1813, 1829 \if@ACM@badge . . . . . 1403, 1950, 2059, 2075 \if@ACM@balance . . . . . . . . . 102, 2920, 2944 \if@ACM@citypresent . . . . . 2184, 2197 \if@ACM@countrypresent . . . . . 2186, 2200 \if@ACM@instpresent . . . . . 2182, 2194 \if@ACM@journal . . . . . . . . . 150, 205, 778, 1249, 1470, 1868, 2102, 2365, 2388 \if@ACM@journal@bibstrip . . . . . 151, 1800, 1817, 1833, 1845, 2415, 2532, 2652 \if@ACM@maketitle@typeset . . . . . 915, 1432 \if@ACM@manuscript . . . . . . 149, 240, 1467, 1816, 1826 \if@ACM@natbib . . . . . . . . . 106, 245, 336, 513
G \g@addto@macro . 1263, 1293, 1294, 1309, 1315, 1322, 1342, 1349, 1351, 1354, 1358, 1360, 1363, 1369, 1370, 1375, 1377, 1483, 1489, 1510, 1517, 1756, 1760, 1762, 1767, 2213, 2226, 2274, 2281, 2290, 2321, 2327, 2335, 2371, 2372 \gdef . . . . . 1240, 1241, 1242, 1243,	H \hbox . 472, 1782, 1787, 2096 \headrulewidth 2523, 2650 \hfill . . . . . 2086, 2461 \href . 1953, 1958, 2040, 2052, 2064, 2079, 2978 \hrule . . . . 647, 654, 2086 \hsize . . . . . 464, 1781, 2028, 2029, 2056, 2058, 2084, 2124, 2241, 2297, 2342 \hskip . . . . . 367, 381, 411, 424, 428, 1955, 2042, 2051, 2067, 2076, 2097, 2914	

\if@ACM@natbib@override	1965, 1987, 2008,	2277, 2284, 2318,
..... 106	2125, 2149, 2255,	2324, 2329, 2366,
\if@ACM@newfonts 697, 708	2308, 2473, 2533,	2374, 2386, 2404,
\if@ACM@nonacm .. 90,	2614, 2653, 2773,	2409, 2421, 2428,
557, 1426, 1450,	2810, 2840, 2897, 2921	2506, 2517, 2526,
1524, 1806, 1844,	\ifcsname ..... 318	2711, 2734, 2738,
2365, 2410, 2539,	\ifdim 344, 364, 396, 421, 2460	2958, 2975, 2977, 2991
2547, 2557, 2568,	\IfFileExists 699, 702, 705	\ifxetex ..... 714
2576, 2589, 2657,	\IfInteger ..... 1462	\ignorespaces 417, 457,
2661, 2671, 2681, 2701	\ifluatex ..... 719	470, 740, 1328,
\if@ACM@printacmref	\ifNAT@numbers .... 530	1329, 1331, 1344,
..... 1444, 1891	\ifnum ..... 153,	2100, 2101, 2103,
\if@ACM@printccs ...	159, 165, 178, 356,	2105, 2106, 2107,
..... 1438, 1861	357, 371, 375, 384,	2108, 2110, 2354,
\if@ACM@printfolios	388, 1427, 1451,	2393, 2400, 2408, 2915
1455, 2527, 2529,	1519, 1520, 1521,	\immediate ..... 439, 536
2535, 2536, 2573,	1525, 1545, 1550,	\includecomment ....
2586, 2656, 2691, 2696	1553, 1557, 1563,	... 2961, 2965, 2971
\if@ACM@review ....	1566, 1569, 1572,	\includegraphics ...
. 73, 2448, 2465, 2472	1575, 1578, 1581,	.... 1954, 1959,
\if@ACM@screen 49, 501, 2960	1585, 1773, 2252,	2041, 2053, 2065, 2080
\if@ACM@sigchiamode	2305, 2347, 2349,	\indent ..... 2896
..... 152, 448,	2398, 2628, 2630, 2699	\input ..... 686
556, 733, 831, 838,	\ifPDFTeX ..... 685	\InputIfFileExists .. 25
1783, 1785, 2243, 2598	\IfSubStr ..... 1274, 1339	\institution .....
\if@ACM@timestamp ..	\ifvmode ..... 2094	. 12, 1329, 2100, 2355
122, 2497, 2601, 2698	\ifvoid ..... 658	\interfootnotelinepenalty
\if@ACM@urlbreakonhyphens	\ifx . 210, 254, 256, 258,	..... 451
..... 57, 498	260, 262, 264, 266,	\interlinepenalty ..
\if@acmowned ..... 1534	268, 270, 272, 274,	..... 368, 425, 451
\if@Description@present	276, 278, 280, 282,	\item ..... 2914
..... 736,	284, 286, 288, 290,	\itshape .. 1818, 2770,
749, 752, 820, 2379	292, 294, 296, 301,	2771, 2792, 2793,
\if@filesw ..... 437, 535	303, 305, 307, 309,	2806, 2818, 2838, 2905
\if@insideauthorgroup	311, 532, 1244,	
..... 1271, 1277	1255, 1259, 1281,	<b>J</b>
\if@nobreak ..... 347	1284, 1298, 1300,	\jobname ..... 436, 439
\if@noskipsec .. 340, 404	1305, 1306, 1312,	
\if@printcopyright .	1374, 1426, 1479,	<b>K</b>
..... 1530, 1821	1480, 1486, 1493,	\kern 646, 647, 653, 654, 2086
\if@printpermission	1505, 1514, 1524,	\keywords ..... 16, 1424
..... 1532, 1814	1764, 1794, 1798,	
\if@twocolumn ..... 2945	1838, 1847, 1850,	<b>L</b>
\if@undescribed@images	1851, 1852, 1862,	\l@section ..... 444
..... 738, 741	1867, 1924, 1952,	\l@subsection .. 444, 445
\ifcase .....	1957, 2030, 2034,	\l@subsubsection ... 446
184, 211, 484, 568,	2039, 2047, 2050,	\labelenumi ..... 860
633, 669, 785, 852,	2063, 2071, 2078,	\labelenumii ..... 861
980, 1391, 1592,	2088, 2177, 2210,	\labelenumiii ..... 862
1630, 1902, 1931,	2218, 2219, 2271,	\labelenumiv ..... 863



<code>\labelsep</code> . . . . .	869, 877, 882, 892, 897, 900, 902, 904, 906, 2914	1796, 1802, 1875, 1889, 1890, 2119, 2208, 2232, 2295, 2301, 2340, 2345, 2396, 2397, 2431, 2432, 2434, 2435, 2440, 2441, 2442, 2444, 2445, 2446, 2716, 2718, 2720, 2721, 2723, 2729, 2732, 2735, 2980, 2981, 2988, 2989, 2990	<code>\mdseries</code> . . . . . 2010, 2012, 2014, 2018, 2020, 2022, 2024, 2026, 2169, 2172
<code>\labelwidth</code> . . . . .	892, 897, 900, 902, 904, 906, 909		<code>\medskip</code> . . . . .
<code>\LARGE</code> . . . . .	1989, 1991, 1993, 2016, 2018, 2020, 2022, 2024, 2156, 2159, 2644		1904, 1906, 1908, 1910, 2233, 2235, 2299, 2383, 2406
<code>\Large</code> . . . . .	2147, 2165, 2783, 2784, 2786, 2787, 2789		<code>\MessageBreak</code> . . . . .
<code>\large</code> . . . . .	1808, 2152, 2157, 2160, 2777, 2778, 2780, 2781		155, 161, 167, 168, 169, 170, 171, 172, 173, 174, 175
<code>\lastbox</code> . . . . .	406, 2389	<code>\libertineLF</code> . . . . .	<code>\metadata@authors</code> . . . . .
<code>\leaders</code> . . . . .	2086	<code>\lineskip</code> . . . . .	1875, 1876, 1879
<code>\leavevmode</code> . . . . .	340, 2086, 2299	<code>\linespacing</code> . . . . .	<code>\mktitle@bx</code> . . . . .
<code>\leftmargin</code> . . . . .	891, 896, 899, 901, 903, 905	<code>\liningnums</code> . . . . .	1768, 1933, 1935, 1937, 1939, 1941, 1943, 1945, 1947, 1949, 2038, 2057, 2085, 2233, 2298, 2299, 2377
<code>\leftmargini</code> . . . . .	875, 876, 877, 878, 891, 892	<code>\list</code> . . . . .	<code>\month</code> . . . . .
<code>\leftmarginii</code> . . . . .	881, 882, 883, 884, 896, 897	<code>\listisep</code> . . . . .	1390, 2509
<code>\leftmarginiii</code> . . . . .	884, 885, 899, 900	<code>\listparindent</code> . . . . .	<code>\moveleft</code> . . . . .
<code>\leftmarginiv</code> . . . . .	885, 886, 901, 902	<code>\LoadClass</code> . . . . .	<code>\multiply</code> . . . . .
<code>\leftmarginv</code> . . . . .	886, 887, 903, 904	<code>\long</code> . . . . .	
<code>\leftmarginvi</code> . . . . .	887, 905, 906	449, 460, 811, 815, 826, 1432, 1435, 1437, 1756, 2437	<b>N</b>
<code>\leftskip</code> . . . . .	2085, 2343, 2766	<code>\loop</code> . . . . .	<code>\NAT@setcites</code> . . . . .
<code>\let</code> . . . . .	275, 277, 289, 291, 293, 319, 358, 473, 474, 514, 515, 516, 517, 518, 519, 522, 526, 668, 730, 744, 745, 747, 748, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 811, 812, 816, 817, 826, 827, 832, 833, 834, 895, 910, 914, 1332, 1333, 1334, 1335, 1336, 1425, 1498, 1765, 1776, 1777, 1778, 1779, 1791, 1792, 1793,	<code>\LTx@adddotafter</code> . . . . .	<code>\NAT@aysep</code> . . . . .
		2735, 2738	<code>\NAT@citetp</code> . . . . .
			<code>\NAT@close</code> . . . . .
		<b>M</b>	255, 257, 259, 261, 304
		<code>\makeatletter</code> . . . . .	<code>\NAT@cmprs</code> . . . . .
		431	283, 285, 287
		<code>\makebox</code> . . . . .	<code>\NAT@cmt</code> . . . . .
		1808, 2638	310
		<code>\makelabel</code> . . . . .	<code>\NAT@ctype</code> . . . . .
		910	522
		<code>\MakeTextUppercase</code> . . . . .	<code>\NAT@find@eq</code> . . . . .
		2211, 2213, 2768, 2777, 2780, 2783, 2786, 2796, 2800	298
		<code>\maketitle</code> . . . . .	<code>\NAT@fullfalse</code> . . . . .
		20, 1769	522
		<code>\MakeUppercase</code> . . . . .	<code>\NAT@longnamestrue</code> . . . . .
		2722	295
		<code>\marginfigure</code> . . . . .	<code>\NAT@merge</code> . . . . .
		814	289, 291, 293
		<code>marginfigure (environ-</code>	<code>\NAT@nmfmt</code> . . . . .
		<code>ment)</code> . . . . .	297
		31	<code>\NAT@numbersfalse</code> . . . . .
		<code>\marginpar</code> . . . . .	269
		449, 813, 819, 828, 1951	<code>\NAT@numberstrue</code> . . . . .
		<code>\marginparsep</code> . . . . .	271, 273
		830, 2599	<code>\NAT@open</code> . . . . .
		<code>\marginparwidth</code> . . . . .	255, 257, 259, 261, 302, 522
		830, 2599	<code>\NAT@partrue</code> . . . . .
		<code>\margintable</code> . . . . .	522
		825	<code>\NAT@rem@eq</code> . . . . .
		<code>margintable (environ-</code>	300
		<code>ment)</code> . . . . .	<code>\NAT@sep</code> . . . . .
		31	263, 265, 267, 312
		<code>\mathchardef</code> . . . . .	<code>\NAT@sort</code> . . . . .
		2279, 2282	279, 281, 287
		<code>\mbox</code> . . . . .	<code>\NAT@superfalse</code> . . . . .
		297	271
			<code>\NAT@supertrue</code> . . . . .
			273
			<code>\NAT@swafalse</code> . . . . .
			521
			<code>\NAT@up</code> . . . . .
			297
			<code>\NAT@yrsep</code> . . . . .
			308
			<code>\NeedsTeXFormat</code> . . . . .
			1

<code>\newblock</code> . . . . .	523	2148, 2153, 2162,	1128, 1132, 1136,
<code>\newbox</code> . .	1768, 2092, 2237	2163, 2165, 2166,	1140, 1144, 1148,
<code>\newcommand</code> .	325, 331,	2454, 2821, 2836,	1152, 1155, 1159,
	529, 740, 1239,	2848, 2851, 2912, 2995	1162, 1167, 1171,
	1319, 1373, 1410,	<code>\normalparindent</code> . . .	1175, 1179, 1183,
	1415, 1478, 1500,	<code>\normalsize</code> . . . . .	1187, 1191, 1195,
	2108, 2115, 2504,	2007, 2148, 2162,	1199, 1203, 1207,
	2755, 2948, 2957, 2973	2163, 2166, 2455, 2995	1211, 1215, 1219,
<code>\newcount</code> .	1267, 1269, 2451	<code>\num@authorgroups</code> . .	1391, 1392, 1393,
<code>\newcounter</code>	1499, 2500, 2502	. . . . .	1593, 1595, 1598,
<code>\newdimen</code> . . .	829, 867,	1278, 1773, 2255,	1600, 1601, 1603,
	2238, 2607, 2609, 2611	2259, 2261, 2308, 2349	1605, 1607, 1610,
<code>\newenvironment</code> . . . .		<code>\num@authors</code> . . . . .	1613, 1616, 1618,
	. . . . . 814, 825, 1755	. . . . . 1269, 1276, 2347	1621, 1624, 1631,
<code>\newfloat</code> . . . . .	808	<code>\number</code> . . . . .	1642, 1653, 1661,
<code>\newif</code> . . . . .	149, 150,	<code>\numberline</code> . . . .	1667, 1673, 1687,
	151, 152, 697, 736,	<code>\numexpr</code> .	1699, 1706, 1720,
	738, 915, 1271,	<code>\nxandlist</code> . . . . .	1727, 1733, 1740,
	1403, 1530, 1532,		1745, 1905, 1907,
	1534, 2182, 2184, 2186		1909, 1911, 1913,
<code>\newlength</code> . . . . .		<b>O</b>	1915, 1917, 1919,
	1405, 1407, 1408, 2450	<code>\onehalfspacing</code> . . . .	1934, 1936, 1938,
<code>\newsavebox</code> . . . . .	2449	<code>\openout</code> . . . . .	1940, 1942, 1944,
<code>\newskip</code> . . . . .	889, 2239	<code>\or</code> . . . . .	1946, 1948, 1968,
<code>\newtheorem</code> . . . . .		187, 189,	1970, 1972, 1974,
	2871, 2874, 2877,	191, 193, 195, 197,	1976, 1978, 1980,
	2880, 2883, 2887, 2890	199, 201, 214, 216,	1982, 1990, 1992,
<code>\newtheoremstyle</code> . . .		218, 220, 222, 224,	1994, 1996, 1998,
	. . . . . 2825, 2855	226, 228, 486, 487,	2000, 2002, 2004,
<code>\newwrite</code> . . . . .	438	488, 489, 490, 491,	2011, 2013, 2015,
<code>\next</code> . . . .	2713, 2715, 2725	493, 494, 572, 579,	2017, 2019, 2021,
<code>\nobreak</code> . . . . .	397, 2406	586, 593, 600, 607,	2023, 2025, 2128,
<code>\noindent</code> . . . . .		614, 621, 635, 636,	2130, 2132, 2134,
	. 447, 1494, 1793,	637, 639, 640, 641,	2136, 2138, 2140,
	1864, 1873, 1904,	642, 643, 671, 672,	2142, 2151, 2154,
	1906, 1908, 1910,	673, 675, 677, 679,	2155, 2158, 2161,
	1930, 1951, 2038,	681, 683, 787, 788,	2164, 2167, 2170,
	2045, 2048, 2072,	789, 790, 791, 793,	2257, 2258, 2260,
	2086, 2087, 2089,	796, 801, 854, 855,	2262, 2310, 2476,
	2175, 2233, 2234,	856, 857, 858, 859,	2478, 2480, 2482,
	2298, 2344, 2377,	864, 865, 985, 989,	2484, 2486, 2488,
	2378, 2406, 2407, 2906	993, 997, 1001,	2490, 2542, 2551,
<code>\noindentparagraph</code> .		1008, 1012, 1016,	2561, 2616, 2621,
	. . . . . 1916, 2755	1020, 1024, 1028,	2660, 2670, 2680,
<code>\nolinkurl</code> . . . . .	2279,	1031, 1037, 1043,	2775, 2776, 2779,
	2282, 2325, 2327, 2362	1049, 1055, 1059,	2782, 2785, 2788,
<code>\normalbaselines</code> . . .	2242	1063, 1066, 1070,	2794, 2798, 2812,
<code>\normalcolor</code> . . . . .	660	1074, 1076, 1078,	2813, 2814, 2815,
<code>\normalfont</code> . . . . .		1082, 1084, 1088,	2816, 2817, 2822,
	. 472, 1494, 1787,	1092, 1096, 1100,	2823, 2842, 2843,
		1104, 1108, 1112,	
		1116, 1120, 1124,	



<code>\renewcommand</code> .. 247, 251, 252, 255, 257, 259, 261, 263, 265, 267, 317, 734, 907, 1273, 1338, 1757, 1780, 2358, 2523, 2524, 2650, 2651, 2739, 2743, 2747, 2751, 2760	<code>\setbox</code> .... 406, 461, 848, 2038, 2057, 2085, 2096, 2233, 2243, 2298, 2377, 2389	<code>\skip</code> ..... 659
<code>\renewenvironment</code> .. . 810, 908, 1431, 2910	<code>\setcitestyle</code> ..... ... 24, 252, 326, 332	<code>\small</code> .. 450, 813, 820, 828, 1494, 1904, 1906, 1908, 1910, 2153, 2389, 2406, 2656
<code>\repeat</code> ..... 2460, 2632	<code>\setcopyright</code> .. 17, 1589	<code>\smallskipamount</code> ... 890
<code>\RequirePackage</code> 29, 30, 31, 234, 235, 236, 237, 238, 239, 241, 244, 246, 475, 512, 538, 539, 549, 558, 567, 648, 695, 709, 715, 716, 720, 721, 724, 725, 726, 776, 1496, 2439, 2929, 2931, 2933, 2935, 2937	<code>\setcounter</code> .... 1786, 1859, 1927, 2501, 2503, 2772, 2795, 2799	<code>\space</code> .... 385, 1275, 1340, 1884, 2120, 2958, 2982, 2985, 2993
<code>\reset@font</code> .... 450, 463	<code>\setkeys</code> .... 38, 157, 163, 1232, 1465, 1589, 2221, 2222, 2227, 2228, 2286, 2287, 2291, 2292, 2331, 2332, 2336, 2337	<code>\specialcomment</code> .... 2949
<code>\reversemarginpar</code> .. 629	<code>\setlength</code> 631, 632, 638, 645, 869, 870, 875, 881, 884, 885, 886, 887, 1406, 1409, 2456	<code>\standardpagestyle</code> . 2520
<code>\rightarrow</code> ..... 1502	<code>\setmonofont</code> ... 717, 722	<code>\startPage</code> ..... 16, 1420
<code>\rightskip</code> ..... 2765	<code>\settopmatter</code> . 19, 96, 1465, 1466, 1468, 1471, 1473, 1476, 2414	<code>\state</code> . 12, 1334, 2100, 2357
<code>\rlap</code> ..... 2639	<code>\setTrue</code> ..... 432	<code>\stepcounter</code> 1352, 1354, 1361, 1364, 1371, 1504
<code>\rule</code> .... 457, 470, 2641	<code>\SetWatermarkColor</code> . ..... 551, 560	<code>\streetaddress</code> .... . 12, 1332, 2100, 2352
<b>S</b>	<code>\SetWatermarkFontSize</code> ..... 550, 559	<code>\string</code> ... 536, 1275, 1340, 1422, 2402, 2403, 2982, 2985, 2993
<code>\savebox</code> ..... 2454	<code>\SetWatermarkText</code> 552, 561	<code>\strut</code> ..... 2062, 2077
<code>screenonly</code> (environ- ment) ..... 22	<code>\sfdefault</code> ..... 734	<code>\strutbox</code> ..... 457, 470
<code>\scriptsize</code> ... 2457, 2461	<code>\sffamily</code> ..... 1989, 1991, 1993, 1995, 1997, 1999, 2003, 2147, 2152, 2156, 2519, 2644, 2768, 2769, 2770, 2777, 2778, 2780, 2781, 2786, 2787, 2796, 2797, 2800, 2801	<code>\subsection</code> ..... 2743
<code>\scshape</code> .... 2808, 2895	<code>\shortauthors</code> 20, 1298, 1299, 1306, 1307, 1309, 1312, 1313, 1315, 1888, 1890, 2518	<code>\subsubsection</code> .... 2747
<code>\section</code> ..... 248, 1912, 1914, 1918, 1920, 2391, 2739, 2951	<code>\shortcite</code> ..... 526, 529	<code>\subtitle</code> ..... 10, 1265
<code>\section@raggedright</code> .... 2764, 2768, 2769, 2777, 2778, 2780, 2781, 2783, 2784, 2786, 2787, 2789, 2790, 2791, 2796, 2797, 2800, 2801	<code>\shorttitle</code> 2538, 2546, 2556, 2567, 2574, 2587	<code>\subtitlenote</code> .. 14, 1357
<code>\Sectionformat</code> .... 2712, 2716, 2718, 2729	<code>\showeprint</code> ..... 2973	<b>T</b>
<code>\SelectFootnoteRule</code> ..... 649, 651	<code>\sidebar</code> ..... 808 sidebar (environment) . 31	<code>\teaserfigure</code> ..... 1755
		<code>teaserfigure</code> (environ- ment) ..... 19
		<code>\terms</code> ..... 16, 1422
		<code>\textbf</code> ..... 1507, 1519
		<code>\textbullet</code> 479, 1506, 2553, 2556, 2563, 2567
		<code>\textcolor</code> ..... 2644
		<code>\textheight</code> ..... 2460
		<code>\textit</code> ..... 1520, 2416, 2420, 2421, 2422
		<code>\textrightarrow</code> .... .... 480, 1502, 1516
		<code>\textwidth</code> 830, 849, 850, 1781, 2028, 2056, 2084, 2124, 2250, 2297
		<code>\thanks</code> .... 14, 1757, 2437
		<code>\thankses</code> ..... 1760, 1762, 1794, 2437
		<code>\the</code> ..... 1388, 1390, 2457, 2461, 2509, 2635

\theACM@time@hours .		U	\vtop . . . . . 2243
..... 2503, 2510	\unskip . . . . 409, 478,		
\theACM@time@minutes 2510	657, 1331, 1337,	W	
\theenumi . . . . . 860	1344, 2097, 2100,	\wd . . . . . 850, 2097	
\theenumii . . . . . 861	2101, 2103, 2105,	\write . . . . . 536	
\theenumiii . . . . . 862	2106, 2107, 2108,	X	
\theenumiv . . . . . 863	2120, 2179, 2352,	\xdef . . . . . 302,	
\thefootnote . . . . . 1780	2353, 2354, 2355,	304, 306, 308, 310, 312	
\theoremstyle . . . . .	2356, 2357, 2358,	Y	
2866, 2869, 2885, 2893	2359, 2360, 2362,	\year . . . . . 1388, 2509	
\thepage . . . . .	2400, 2408, 2425, 2438	Z	
2511, 2527, 2529,	\unvbox . . . . 462, 661, 666	\z@ . . . 281, 285, 344, 364,	
2535, 2536, 2573,	\upshape . . . . . 907	396, 406, 421, 434,	
2586, 2656, 2691, 2696	\url . . . . . 1628, 2958	457, 470, 632, 667,	
\thispagestyle . . . . 1929	\UrlBreakPenalty . . .	780, 784, 795, 875,	
\thmname . . . . . 2835, 2865	. . . . . 2279, 2282	881, 893, 1796,	
\thmnote . . . . . 2835, 2865	\urlstyle . . . 483, 492, 495	1802, 1808, 1812,	
\thmnumber . . . . 2835, 2865	\usebox . . . . . 2468, 2494	1894, 1896, 2040,	
\thr@@ . . . . . 293	\usepackage . . . . .	2052, 2064, 2079,	
\time . . . . 2498, 2501, 2503	. . 9, 10, 11, 12, 13, 14	2343, 2389, 2523,	
\title . . . . . 10, 2402	V	2524, 2608, 2610,	
\titlenote . . 14, 1348, 2403	\value . . . . . 1521	2612, 2638, 2640,	
\topsep . . . 894, 898, 2912	\vbox . . . . . 461,	2650, 2651, 2739,	
\trivlist . . . . . 2913	848, 2038, 2057,	2743, 2747, 2755,	
\tw@ . . . . . 291	2085, 2233, 2298, 2377	2760, 2767, 2819, 2849	
\two@digits . . . 2509, 2510	\vskip 398, 433, 659, 667, 843	\z@skip 433, 843, 898, 2766	
\twocolumn . . . . 1939,	\vspace . . . . . 2980		
1941, 1943, 1945, 1947			