

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

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## Abstract

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

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# 1 Introduction

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

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

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

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

I am grateful to Matthew Fluet, John Owens, Craig Rodkin, Bernard Rous, David Shamma, Stephen Spencer 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

### 2.1 Installation

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

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

Most users should not attempt to install this package themselves, and rather rely on their T<sub>E</sub>X distributions to provide it. If you decide to install the package yourself, follow the standard rules:

1. Run `latex onacmart.ins`. This will produce the file `acmart.cls`.
2. Put the file `acmart.cls` and the bibliography files `*.bst` to the places where L<sup>A</sup>T<sub>E</sub>X can find them (see [1] or the documentation for your T<sub>E</sub>X system).
3. Update the database of file names. Again, see [1] or the documentation for your T<sub>E</sub>X system for the system-specific details.
4. The file `acmart.pdf` provides the documentation for the package (this is the file you are probably reading now).

---

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

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

The class uses a number of other packages. They are included in all major T<sub>E</sub>X distributions (T<sub>E</sub>XLive, MacT<sub>E</sub>X, MikT<sub>E</sub>X) of 2015 and later, so you probably have them installed. Just in case here is the list of these packages:

- *amscs*, <http://www.ctan.org/pkg/amscs>
- *amsfonts*, <http://www.ctan.org/pkg/amsfonts>
- *amsmath*, <http://www.ctan.org/pkg/amsmath>
- *binhex*, <http://www.ctan.org/pkg/binhex>
- *caption*, <http://www.ctan.org/pkg/caption>
- *comment*, <http://www.ctan.org/pkg/comment>
- *cm-super*, <http://www.ctan.org/pkg/cm-super>
- *cmap*, <http://www.ctan.org/pkg/cmap>
- *cleveref*, <http://www.ctan.org/pkg/cleveref>
- *draftwatermark*, <http://www.ctan.org/pkg/draftwatermark>
- *environ*, <http://www.ctan.org/pkg/environ>
- *fancyhdr*, <http://www.ctan.org/pkg/fancyhdr>
- *float*, <http://www.ctan.org/pkg/float>
- *fontaxes*, <http://www.ctan.org/pkg/fontaxes>
- *geometry*, <http://www.ctan.org/pkg/geometry>
- *graphics*, <http://www.ctan.org/pkg/graphics>
- *hyperref*, <http://www.ctan.org/pkg/hyperref>
- *ifluatex*, <http://www.ctan.org/pkg/ifluatex>
- *ifxetex*, <http://www.ctan.org/pkg/ifxetex>
- *inconsolata*, <http://www.ctan.org/pkg/inconsolata>
- *libertine*, <http://www.ctan.org/pkg/libertine>
- *manyfoot*, <http://www.ctan.org/pkg/manyfoot>
- *microtype*, <http://www.ctan.org/pkg/microtype>
- *mmap*, <http://www.ctan.org/pkg/mmap>
- *ms*, <http://www.ctan.org/pkg/ms>

- *mweights*, <http://www.ctan.org/pkg/mweights>
- *natbib*, <http://www.ctan.org/pkg/natbib>
- *nccfoots*, <http://www.ctan.org/pkg/nccfoots>
- *newtx*, <http://www.ctan.org/pkg/newtx>
- *oberdiek*, <http://www.ctan.org/pkg/oberdiek>
- *pdftex-def*, <http://www.ctan.org/pkg/pdftex-def>
- *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 the 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}
```

Table 1: The possible values for the format option

| Value      | Meaning  |
|------------|--|
| manuscript | A manuscript. This is the default  |
| acmsmall   | Small single column format, used for CIE, CSUR, JACM, JDIQ, JEA, JERIC, JETC, PACMHCI, PACMPL, TAAS, TACCESS, TACO, TALG, TALLIP (formerly TALIP), TCPS, TEAC, TECS, TIIS, 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, TRET, TSAS, TSC, TSLP, TWEB, including special issues. |
| acmlarge   | Large single column format, used for IMWUT, JOCCH, POMACS, TAP, including special issues.  |
| acmtog     | Large double column format, used for TOG, including special issues.  |
| sigconf    | Proceedings format for most of ACM conferences (with the exceptions listed below) and all ICPS volumes.  |
| siggraph   | As of March 2017, this format is no longer used. Please use sigconf for SIGGRAPH conferences.  |
| sigplan    | Proceedings format for SIGPLAN conferences.  |
| sigchi     | Proceedings format for SIGCHI conferences.   |
| sigchi-a   | Format for SIGCHI extended abstract.   |

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

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

There are several Boolean options which can take true or false values. They are listed in Table 2. The words =true can be omitted when setting the 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 copyeditors.

The option screen may in the future involve additional features suitable for on-screen versions of the articles.

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

The option anonymous is used for anonymous review process: all author information becomes 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

Table 2: Boolean options

| Option        | Default | Meaning  |
|---------------|---------|--|
| review        | false   | A review version: lines are numbered, hyperlinks are colored                                 |
| screen        | false   | A screen version: hyperlinks are colored   |
| natbib        | true    | Whether to use natbib package (see Section 2.10)   |
| anonymous     | false   | Whether to make author(s) anonymous  |
| authorversion | false   | Whether to generate a special version for authors' personal use or posting (see Section 2.3) |
| timestamp     | false   | Whether to put a time stamp in the footer of each page                                       |
| authordraft   | false   | Whether author's draft mode is enabled   |

footer also include the page range of the document. This helps detect missing pages in hard copies.

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

## 2.3 Topmatter commands

A number of commands set up *top matter* information, or, in the computer science jargon, *metadata* for the article. They establish the publication name, article title, authors, doi and other data. Some of these commands, like `\title` or `\author`, should be put by the authors. Others, like `\acmVolume` or `\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 the 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`.

The class internally loads `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 3. Note that conference proceedings published in *book* form do not set this macro.

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

Table 3: ACM publications and arguments of the \acmJournal command

| Abbreviation | Publication  |
|--------------|--|
| CIE          | ACM Computers in Entertainment   |
| CSUR         | ACM Computing Surveys  |
| 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                    |
| JOCH         | ACM Journal on Computing and Cultural Heritage                               |
| 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                                   |
| TEAC         | ACM Transactions on Economics and Computation                                |
| TECS         | ACM Transactions on Embedded Computing Systems                               |
| TIIS         | ACM Transactions on Interactive Intelligent Systems                          |
| TISSEC       | ACM Transactions on Information and System Security                          |
| TIST         | ACM Transactions on Intelligent Systems and Technology                       |
| TKDD         | ACM Transactions on Knowledge Discovery from Data                            |
| TMIS         | ACM Transactions on Management Information Systems                           |
| TOCE         | ACM Transactions on Computing Education                                      |
| TOCHI        | ACM Transactions on Computer-Human Interaction                               |
| TOCL         | ACM Transactions on Computational Logic                                      |
| TOCS         | ACM Transactions on Computer Systems   |
| TOCT         | ACM Transactions on Computation Theory                                       |
| TODAES       | ACM Transactions on Design Automation of Electronic Systems                  |
| TODS         | ACM Transactions on Database Systems   |
| TOG          | ACM Transactions on Graphics   |
| TOIS         | ACM Transactions on Information Systems                                      |
| TOIT         | ACM Transactions on Internet Technology                                      |
| TOMACS       | ACM Transactions on Modeling and Computer Simulation                         |
| TOMM         | ACM Transactions on Multimedia Computing, Communications and Applications    |
| TOMPECS      | ACM Transactions on Modeling and Performance Evaluation of Computing Systems |
| TOMS         | ACM Transactions on Mathematical Software                                    |
| TOPC         | ACM Transactions on Parallel Computing                                       |
| TOPLAS       | ACM Transactions on Programming Languages and Systems                        |
| TOPS         | ACM Transactions on Privacy and Security                                     |
| TOS          | ACM Transactions on Storage  |
| TOSEM        | ACM Transactions on Software Engineering and Methodology                     |
| TOSN         | ACM Transactions on Sensor Networks  |
| TRETS        | ACM Transactions on Reconfigurable Technology and Systems                    |
| 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  |



`\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 *or* the name of the book as set by the editor.

**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}
```

`\title`      Normally this command is entered either by the editor or by the typesetter.  
The command `\title`, as in `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.

`\subtitle`      It is expected that this command is inserted by the author of the manuscript.  
Besides title, ACM classes allow subtitle, set with the `\subtitle{<subtitle>}` macro.

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

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

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

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

Note that some formats do not typeset e-mails of ORCID identifiers. Do not worry: 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 `\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, and author  $A_3$  is affiliated with  $I_1$  and  $I_3, \dots$ ). 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 may try to save the space using the format

```

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

```

However, this format is not generally recommended.

`\additionalaffiliation`

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

```

\author{G. Tobin}
\author{Ben Trovato}
\additionalaffiliation{%
  \institution{The Th{\o}rv{\a}ld Group}
  \streetaddress{1 Th{\o}rv{\a}ld Circle}
  \city{Hekla}
  \country{Iceland}}
\affiliation{%

```

```

\institution{Institute for Clarity in Documentation}
\streetaddress{P.O. Box 1212}
\city{Dublin}
\state{Ohio}
\postcode{43017-6221}
}

```

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

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

An example of the author block:

```

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

```

Note that old ACM conference formats did not allow for more than six authors and required some efforts from the 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 within JD Inst!
\department{John Doe Institute}
\institution{University of San Serriffe}
\country{San Serriffe}}
```

The command `\affiliation` formats the output according to American conventions. This might be wrong for some cases. Consider, for example, a German address. In Germany postcode is put before 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 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 commands `\title` and `\author`. Example:

```

\thanks{This work is supported by the Widget Corporation Grant
\#312-001.\\
Author's address: D. Pineo, Kingsbury Hall, 33 Academic Way, Durham,
N.H. 03824; email: dspineo@comcast.net; Colin Ware, Jere A. Chase
Ocean Engineering Lab, 24 Colovos Road, Durham, NH 03824; email:
cware@ccom.unh.edu;
Sean Fogarty, (Current address) NASA Ames Research Center, Moffett
Field, California 94035.}

```

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

`\titlenote` While the command `\thanks` generates a note without 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 `\footnotes` inside `\author` or `\title` commands, since this confuses 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  
\acmNumber     inserted by the editor and set the journal volume, issue, article number, year and month  
\acmArticle     correspondingly. The arguments of all these commands, including \acmMonth is numer-  
\acmYear       ical, including \acmMonth, for example,  
\acmMonth

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

\acmArticleSeq     The articles in the same issue of a journal have a *sequential number*. It is used to  
vertically position the black blob in some formats. By default it is the same as 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

\acmSubmissionID    If you 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

\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 or rightsretained, when it  
is suppressed. Note that to override the defaults you need to set the price *after* the  
\setcopyright command to override the default. Also, the command \acmPrice{  
suppresses the printing of the price.

\acmISBN         Book-like volumes have ISBN numbers attached to them. The macro \acmISBN{<ISBN>}  
sets it. Normally it is set by the typesetter, for example,

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

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

\acmDOI{10.1145/9999997.9999999}

It is normally set by the typesetter.

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

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

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

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

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

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

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

```
\begin{CCSXML}  
<ccs2012>  
<concept>  
<concept_id>10010520.10010553.10010562</concept_id>  
<concept_desc>Computer systems organization~Embedded systems</concept_desc>  
<concept_significance>500</concept_significance>  
</concept>  
<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 need to just copy this code and paste it in your paper anywhere before `\maketitle`.

`\setcopyright` There are several possibilities for the copyright of the papers published by ACM: the authors may transfer the rights to ACM, license them to ACM, some or all authors might be employees of the US or Canada Government, 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 4.

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 decision 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 the 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* `\maketitle` command. Again, this is different from the standard  $\LaTeX$ .

`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}

```



Table 4: Parameters for \setcopyright command

| Parameter          | Meaning  |
|--------------------|--|
| none               | The copyright and permission information is not typeset (this is the option for some ACM conferences).         |
| acmcopyright       | The authors transfer the copyright to ACM (the “traditional” choice).  |
| acmlicensed        | The authors retain the copyright but license the publication rights to ACM.                                    |
| rightsretained     | The authors retain the copyright and publication rights to themselves or somebody else.                        |
| usgov              | All the authors are employees of the US Government.  |
| usgovmixed         | Some authors are employees of the US Government.   |
| cagov              | All the authors are employees of the Canadian Government.  |
| cagovmixed         | Some authors are employees of the Canadian Government.   |
| licensedusgovmixed | Some authors are employees of the US Government, and the publication rights are licensed to ACM.               |
| licensedcagov      | All the authors are employees of the Canadian Government, and the publication rights are licensed to ACM.      |
| licensedcagovmixed | Some authors are employees of the Canadian Government, and the publication rights are licensed to ACM.         |
| othergov           | Authors are employees of a Government other than US or Canada.   |
| licensedothergov   | Authors are employees of a Government other than US or Canada, and the publication rights are licensed to ACM. |

Table 5: Settings for `\settopmatter` command

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

```
\end{teaserfigure}
```

`\settopmatter` Some information in the top matter is printed for certain journals or proceedings and suppressed for others. You may override these defaults using the command `\settopmatter{<settings>}`. The settings and their meanings are listed in Table 5. 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 the boxes per row is determined automatically. If you want to override this decision, you may do it using this parameter, for example,

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

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

`\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}
```

`\maketitle` The macro `\maketitle` must be the last command in the top matter group: i.e., 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 may 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 now free to choose their favorite one.

## 2.5 Figures and tables

New ACM styles use the standard  $\LaTeX$  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 the tables *before* the table bodies.
2. 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 full text width in one-column formats and one column in two-column formats.

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

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

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

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

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

1. Never, ever use vertical rules.
2. Never use double rules.

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

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

```
\begin{table}
\caption{Simulation Configuration}
\label{tab:conf}
\begin{minipage}{\columnwidth}
```

```

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

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

```

sidebar  
 marginfigure  
 margintable

SIGCHI extended abstract extensively uses margin space. The package provides three environments for this with option captions:

**sidebar:** textual information on the margin

**marginfigure:** a figure on the margin

**margintable:** a table on the margin

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

## 2.6 Theorems

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.

## 2.7 Online-only and offline-only material

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

```
\section{Supplementary materials}

\begin{printonly}
  This section is included in the online version of the paper.
\end{printonly}

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

We use *comment* package for typesetting this code, so `\begin` and `\end` should start at the first positions of the lines of their own (no initial spaces etc.).

## 2.8 Note about anonymous mode

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

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

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

## 2.9 Acknowledgments

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

First, in the anonymous mode this section must be omitted: it gives too much information to the reviewers. Second, the data about the 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 `printonly` and `screenonly` environments, `\begin{acks}` and `\end{acks}` should start the line of their own (no leading or trailing spaces).

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

```
\grantsponsor{\sponsordID}{\name}{\url}
\grantnum[\url]{\sponsordID}{\number}.
```

Here `{\sponsordID}` 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 `{\sponsordID}` of the `\grantnum` command must correspond to `\sponsordID` of a `\grantsponsor` command. Some awards have their own web pages, which you can include using the optional argument of `\grantnum` command.

At present `{\sponsordID}` is chosen by the authors and can be an arbitrary key, in the same way the label of `\cite` is arbitrarily chosen. There might be a change to this policy if 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. The 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/youngscientsts]{GS501100001809}{Young
  Scientists' Support Program}.
\end{acks}
```

## 2.10 Bibliography

ACM uses the *natbib* package for formatting references and the style `ACM-Reference-Format.bst` for Bib<sub>TeX</sub> processing. You may disable loading of *natbib* by using the option `natbib=false` in `\documentclass`. However, it is not recommended, as well as the use of Bib<sub>TeX</sub> 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: the author-year format `acmauthoryear` or the numeric format `acmnumeric` using the command `\citestyle`, for example,

```
\citestyle{acmauthoryear}
```

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

`\setcitestyle`      You may further customize *natbib* using `\setcitestyle` command, for example,  
`\setcitestyle{numbers,sort&compress}`

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 the author-date mode.

There are several customized BibTeX entries and fields in ACM style ACM-Reference-Format . bst you may want to be aware of.

The style supports fields doi and url, for example,

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

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

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

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

There are special entries online and game for Web pages and games, for example,

```
@online{Thornburg01,
author = "Harry Thornburg",
year = "2001",
title = "Introduction to Bayesian Statistics",
url = "http://ccrma.stanford.edu/~jos/bayes/bayes.html",
month = mar,
lastaccessed = "March 2, 2005",
}
```

For these entries you can use the lastaccessed field to add the access date to the URL.

There are two ways to enter video and audio sources in the bibliography corresponding to two different possibilities. For standalone sources available on WWW you can use an online entry, setting there 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 the sources available as attachments to conference proceedings and similar documents, you can use the usual inproceedings entry, again setting the 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 entry periodical 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”) entry.

If you do not know the author (this is often the case for online entries), use 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",
}

```

## 2.11 Colors

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

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 only differ 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 & 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, ACM recommends that you choose sets of colors to help ensure suitable variations in Black & White using either of the following tools:

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

## 2.12 Other notable packages and typographic remarks

Several other packages are recommended for specialized tasks.

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

By default `acmart` prevents all widows and orphans (i.e. lonely lines at the beginning and the end of the page) and hyphenation at the end of the page. This is done by 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 *textcase* package [11], so command `\NoCaseChange` inside title may help to prevent extraneous uppercasing.

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

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

For example, one may want to use `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 package. Suppose you want to use `dvipsnames` option of `xcolor` package. Normally you cannot do this because `acmart` loads this package itself without options.

The file `acmart-preload-hook.tex` may 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 which is not acceptable by ACM. Even easier it is to create a file which 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 decided to use this hook, you are on your own.

## 3 Implementation

### 3.1 Identification

We start with the declaration who we are. Most .dtx files put driver code in a separate driver file .drv. 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 [2017/07/09 v1.43 Typesetting articles for Association of
7 Computing Machinery]
8
9 And the driver code:
10 <*gobble>
11 \documentclass{ltxdoc}
12 \usepackage{array,booktabs,amsmath,graphicx,fancyvrb,tabularx}
13 \usepackage[tt=false, type1=true]{libertine}
14 \usepackage[varqu]{zi4}
15 \usepackage[libertine]{newtxmath}
16 \usepackage[tableposition=top]{caption}
17 \usepackage{hypdoc}
18 \PageIndex
19 \CodelineIndex
20 \RecordChanges
21 \EnableCrossrefs
22 \begin{document}
23   \DocInput{acmart.dtx}
24 \end{document}
25 </gobble>
26 <*class>
27 \def\@classname{acmart}
```

### 3.2 Preload

We preload acmart-preload-hook:

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

### 3.3 Options

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

```
30 \RequirePackage{xkeyval}
31
32 We use xstring to check whether user input is integer
33 \RequirePackage{xstring}
```

format The possible formats

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

\if@ACM@screen Whether we use screen mode

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

\if@ACM@review Whether we use review mode

```
57 \define@boolkey+{acmart.cls}[\ACM@]{review}[true]{%
58 \if@ACM@review
59 \PackageInfo{\@classname}{Using review mode}%
60 \else
61 \PackageInfo{\@classname}{Not using review mode}%
62 \fi}{\PackageError{\@classname}{Option review can be either true or
63 false}}
64 \ExecuteOptionsX{review=false}
```

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

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

\if@ACM@natbib@override

```

\if@ACM@natbib Whether we use natbib mode
73 \define@boolkey+{acmart.cls}[@ACM@]{natbib}[true]{%
74   \if@ACM@natbib
75     \PackageInfo{\@classname}{Explicitly selecting natbib mode}%
76   \else
77     \PackageInfo{\@classname}{Explicitly deselecting natbib mode}%
78   \fi}{\PackageError{\@classname}{Option natbib can be either true or
79     false}}
80 \ExecuteOptionsX{natbib=true}

\if@ACM@anonymous Whether we use anonymous mode
81 \define@boolkey+{acmart.cls}[@ACM@]{anonymous}[true]{%
82   \if@ACM@anonymous
83     \PackageInfo{\@classname}{Using anonymous mode}%
84   \else
85     \PackageInfo{\@classname}{Not using anonymous mode}%
86   \fi}{\PackageError{\@classname}{Option anonymous can be either true or
87     false}}
88 \ExecuteOptionsX{anonymous=false}

\if@ACM@timestamp Whether we use timestamp mode
89 \define@boolkey+{acmart.cls}[@ACM@]{timestamp}[true]{%
90   \if@ACM@timestamp
91     \PackageInfo{\@classname}{Using timestamp mode}%
92   \else
93     \PackageInfo{\@classname}{Not using timestamp mode}%
94   \fi}{\PackageError{\@classname}{Option timestamp can be either true or
95     false}}
96 \ExecuteOptionsX{timestamp=false}

\if@ACM@authordraft Whether we use authordraft mode
97 \define@boolkey+{acmart.cls}[@ACM@]{authordraft}[true]{%
98   \if@ACM@authordraft
99     \PackageInfo{\@classname}{Using authordraft mode}%
100    \@ACM@timestamptrue
101    \@ACM@reviewtrue
102   \else
103     \PackageInfo{\@classname}{Not using authordraft mode}%
104   \fi}{\PackageError{\@classname}{Option authordraft can be either true or
105     false}}
106 \ExecuteOptionsX{authordraft=false}

\ACM@fontsize The font size to pass to the base class
107 \def\ACM@fontsize{}
108 \DeclareOptionX{9pt}{\edef\ACM@fontsize{\CurrentOption}}
109 \DeclareOptionX{10pt}{\edef\ACM@fontsize{\CurrentOption}}
110 \DeclareOptionX{11pt}{\edef\ACM@fontsize{\CurrentOption}}
111 \DeclareOptionX{12pt}{\edef\ACM@fontsize{\CurrentOption}}

```

```

112 \DeclareOptionX{draft}{\PassOptionsToClass{\CurrentOption}{amsart}}
113 \DeclareOptionX{*}{\PassOptionsToClass{\CurrentOption}{amsart}}
114 \ProcessOptionsX
115 \ClassInfo{\@classname}{Using format \ACM@format, number \ACM@format@nr}

```

### 3.4 Setting switches

```

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

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

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

```

#### Setting up switches

```

119 \ifnum\ACM@format@nr=5\relax % siggraph
120 \ClassWarning{\@classname}{The format ‘siggraph’ is now obsolete.
121 I am switching to sigconf.}
122 \setkeys{acmart.cls}{format=sigconf}
123 \fi
124 \ifnum\ACM@format@nr=0\relax
125 \@ACM@manuscripttrue
126 \else
127 \@ACM@manuscriptfalse
128 \fi
129 \@ACM@sigchiamodefalse
130 \ifcase\ACM@format@nr
131 \relax % manuscript
132 \@ACM@journaltrue
133 \or % acmsmall
134 \@ACM@journaltrue
135 \or % acmlarge
136 \@ACM@journaltrue
137 \or % acmtog
138 \@ACM@journaltrue
139 \or % sigconf
140 \@ACM@journalfalse
141 \or % siggraph
142 \@ACM@journalfalse
143 \or % sigplan
144 \@ACM@journalfalse
145 \or % sigchi
146 \@ACM@journalfalse
147 \or % sigchi-a
148 \@ACM@journalfalse
149 \@ACM@sigchiamodetrue
150 \fi

```

### 3.5 Loading base class and package

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

```
151 \ifx\ACM@fontsize\@empty
152   \ifcase\ACM@format@nr
153     \relax % manuscript
154     \def\ACM@fontsize{9pt}%
155   \or % acmsmall
156     \def\ACM@fontsize{10pt}%
157   \or % acmlarge
158     \def\ACM@fontsize{10pt}%
159   \or % acmtog
160     \def\ACM@fontsize{9pt}%
161   \or % sigconf
162     \def\ACM@fontsize{9pt}%
163   \or % siggraph
164     \def\ACM@fontsize{9pt}%
165   \or % sigplan
166     \def\ACM@fontsize{10pt}%
167   \or % sigchi
168     \def\ACM@fontsize{10pt}%
169   \or % sigchi-a
170     \def\ACM@fontsize{10pt}%
171   \fi
172 \fi
173 \ClassInfo{\@classname}{Using fontsize \ACM@fontsize}
174 \LoadClass[\ACM@fontsize, reqno]{amsart}
175 \RequirePackage{microtype}
```

We need `totpages` package to calculate the number of pages

```
176 \RequirePackage{totpages}
```

The `amsmath \collect@body` is defined using `\def`. We load `environ` to access the `\long` version of the command

```
177 \RequirePackage{environ}
```

We use `setspace` for doublespacing

```
178 \if@ACM@manuscript
179 \RequirePackage{setspace}
180 \onehalfspacing
181 \fi
```

We need *textcase* for better upcasing

```
182 \RequirePackage{textcase}
```

Citations. We patch `\setcitestyle` to allow, e.g., `\setcitestyle{sort}` and `\setcitestyle{nosort}`. We patch `\citestyle` to warn about undefined citation styles.

```
183 \if@ACM@natbib
184   \RequirePackage{natbib}
185   \renewcommand{\bibsection}{%
```

```

186 \section*{\refname}%
187 \phantomsection\addcontentsline{toc}{section}{\refname}%
188 }
189 \renewcommand{\bibfont}{\bibliofont}
190 \renewcommand\setcitestyle[1]{
191 \@for\@tempa:=#1\do
192 {\def\@tempb{round}\ifx\@tempa\@tempb
193 \renewcommand\NAT@open{(\}\renewcommand\NAT@close{)}\fi
194 \def\@tempb{square}\ifx\@tempa\@tempb
195 \renewcommand\NAT@open{[\}\renewcommand\NAT@close{]}\fi
196 \def\@tempb{angle}\ifx\@tempa\@tempb
197 \renewcommand\NAT@open{<\}\renewcommand\NAT@close{>\}\fi
198 \def\@tempb{curly}\ifx\@tempa\@tempb
199 \renewcommand\NAT@open{\{\}\renewcommand\NAT@close{\}\}\fi
200 \def\@tempb{semicolon}\ifx\@tempa\@tempb
201 \renewcommand\NAT@sep{;}\fi
202 \def\@tempb{colon}\ifx\@tempa\@tempb
203 \renewcommand\NAT@sep{:}\fi
204 \def\@tempb{comma}\ifx\@tempa\@tempb
205 \renewcommand\NAT@sep{,}\fi
206 \def\@tempb{authoryear}\ifx\@tempa\@tempb
207 \NAT@numbersfalse\fi
208 \def\@tempb{numbers}\ifx\@tempa\@tempb
209 \NAT@numberstrue\NAT@superfalse\fi
210 \def\@tempb{super}\ifx\@tempa\@tempb
211 \NAT@numberstrue\NAT@supertrue\fi
212 \def\@tempb{nobibstyle}\ifx\@tempa\@tempb
213 \let\bibstyle=\@gobble\fi
214 \def\@tempb{bibstyle}\ifx\@tempa\@tempb
215 \let\bibstyle=\@citestyle\fi
216 \def\@tempb{sort}\ifx\@tempa\@tempb
217 \def\NAT@sort{\@ne}\fi
218 \def\@tempb{nosort}\ifx\@tempa\@tempb
219 \def\NAT@sort{\@z}\fi
220 \def\@tempb{compress}\ifx\@tempa\@tempb
221 \def\NAT@cmprs{\@ne}\fi
222 \def\@tempb{nocompress}\ifx\@tempa\@tempb
223 \def\NAT@cmprs{\@z}\fi
224 \def\@tempb{sort&compress}\ifx\@tempa\@tempb
225 \def\NAT@sort{\@ne}\def\NAT@cmprs{\@ne}\fi
226 \def\@tempb{mcite}\ifx\@tempa\@tempb
227 \let\NAT@merge\@ne\fi
228 \def\@tempb{merge}\ifx\@tempa\@tempb
229 \ifnum\NAT@merge<\tw@\{\let\NAT@merge\tw@\}\fi
230 \def\@tempb{elide}\ifx\@tempa\@tempb
231 \ifnum\NAT@merge<\thr@\{\let\NAT@merge\thr@\}\fi
232 \def\@tempb{longnamesfirst}\ifx\@tempa\@tempb
233 \NAT@longnamestrue\fi
234 \def\@tempb{nonamebreak}\ifx\@tempa\@tempb
235 \def\NAT@nmfmt#1{\mbox{\NAT@up#1}}\fi

```



```

236 \expandafter\NAT@find@eq\@tempa=\relax\@nil
237 \if\@tempc\relax\else
238   \expandafter\NAT@rem@eq\@tempc
239   \def\@tempb{open}\ifx\@tempa\@tempb
240     \xdef\NAT@open{\@tempc}\fi
241   \def\@tempb{close}\ifx\@tempa\@tempb
242     \xdef\NAT@close{\@tempc}\fi
243   \def\@tempb{aysep}\ifx\@tempa\@tempb
244     \xdef\NAT@aysep{\@tempc}\fi
245   \def\@tempb{yysep}\ifx\@tempa\@tempb
246     \xdef\NAT@yrsep{\@tempc}\fi
247   \def\@tempb{notesep}\ifx\@tempa\@tempb
248     \xdef\NAT@cmt{\@tempc}\fi
249   \def\@tempb{citesep}\ifx\@tempa\@tempb
250     \xdef\NAT@sep{\@tempc}\fi
251   \fi
252 }%
253 \NAT@@setcites
254 }
255 \renewcommand\citestyle[1]{%
256   \ifcsname bibstyle@#1\endcsname%
257   \csname bibstyle@#1\endcsname\let\bibstyle\@gobble%
258   \else%
259   \@latex@error{Undefined ‘#1’ citestyle}%
260   \fi
261 }%
262 \fi

```

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

```

263 \newcommand{\bibstyle@acmauthoryear}{%
264   \setcitestyle{%
265     authoryear,%
266     open={},close={},citesep={;},%
267     aysep={},yysep={},,%
268     notesep={, }}

```

`\bibstyle@acmnumeric` The default numeric format:

```

269 \newcommand{\bibstyle@acmnumeric}{%
270   \setcitestyle{%
271     numbers,sort&compress,%
272     open={},close={},citesep={,},%
273     notesep={, }}

```

The default is numeric:

```

274 \if@ACM@natbib
275 \citestyle{acmnumeric}
276 \fi

```

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

```

277 \def\@startsection#1#2#3#4#5#6{%
278   \if@noskipsec \leavevmode \fi
279   \par
280   \@tempskipa #4\relax
281   \@afterindenttrue
282   \ifdim \@tempskipa <\z@
283     \@tempskipa -\@tempskipa \@afterindentfalse
284   \fi
285   \if@nobreak
286     \everypar{}%
287   \else
288     \addpenalty\@secpenalty\addvspace\@tempskipa
289   \fi
290   \@ifstar
291     {\@ssect{#3}{#4}{#5}{#6}}%
292     {\@dblarg{\@sect{#1}{#2}{#3}{#4}{#5}{#6}}}
293 \def\@sect#1#2#3#4#5#6[#7]#8{%
294   \edef\@toclevel{\ifnum#2=\@m 0\else\number#2\fi}%
295   \ifnum #2>\c@secnumdepth
296     \let\@svsec\@empty
297   \else
298     \refstepcounter{#1}%
299     \protected@edef\@svsec{\@secntformat{#1}\relax}%
300   \fi
301   \@tempskipa #5\relax
302   \ifdim \@tempskipa>\z@
303     \begingroup
304       #6{%
305         \@hangfrom{\hskip #3\relax\@svsec}%
306         \interlinepenalty \@M #8\@par}%
307     \endgroup
308     \csname #1mark\endcsname{#7}%
309     \ifnum #2>\c@secnumdepth \else
310       \@tochangmeasure{\csname the#1\endcsname}%
311     \fi
312     \addcontentsline{toc}{#1}{%
313       \ifnum #2>\c@secnumdepth \else
314         \protect\numberline{\csname the#1\endcsname}%
315       \fi
316       #7}%
317   \else
318     \def\@svsechd{%
319       #6{\hskip #3\relax
320         \@svsec #8}%
321     \csname #1mark\endcsname{#7}%
322     \ifnum #2>\c@secnumdepth \else

```

```

323     \tochangmeasure{\csname the#1\endcsname\space}%
324     \fi
325     \addcontentsline{toc}{#1}{%
326       \ifnum #2>\c@secnumdepth \else
327         \protect\numberline{\csname the#1\endcsname}%
328       \fi
329     #7}}%
330   \fi
331   \xsect{#5}}
332 \def\xsect#1{%
333   \@tempskipa #1\relax
334   \ifdim \@tempskipa>\z@
335     \par \nobreak
336     \vskip \@tempskipa
337     \@afterheading
338   \else
339     \@nobreakfalse
340     \global\@noskipsectrue
341     \everypar{%
342       \if@noskipsec
343         \global\@noskipsecfalse
344         {\setbox\z@\lastbox}%
345         \clubpenalty\@M
346         \begingroup \@svsechd \endgroup
347         \unskip
348         \@tempskipa #1\relax
349         \hskip -\@tempskipa
350       \else
351         \clubpenalty \@clubpenalty
352         \everypar{}%
353       \fi}%
354   \fi
355   \ignorespaces}
356 \def\@secntformat#1{\csname the#1\endcsname\quad}
357 \def\@ssect#1#2#3#4#5{%
358   \@tempskipa #3\relax
359   \ifdim \@tempskipa>\z@
360     \begingroup
361       #4{%
362         \@hangfrom{\hskip #1}%
363         \interlinepenalty \@M #5\@par}%
364     \endgroup
365   \else
366     \def\@svsechd{#4{\hskip #1\relax #5}}%
367   \fi
368   \xsect{#3}}

```

\@startsection Amsart redefines \@startsection. Here we redefine it again to make TOC working

```

369 \def\@starttoc#1#2{\begingroup\makeatletter
370   \setTrue{#1}%

```

```

371 \par\removelastskip\vskip\z@skip
372 \@startsection{section}\@M\z@{\linespacing\@plus\linespacing}%
373 { .5\linespacing}{\centering\contentsnamefont}{#2}%
374 \@input{\jobname.#1}%
375 \if@files
376 \exp\newwrite\csname tf@#1\endcsname
377 \immediate\exp\openout\csname tf@#1\endcsname \jobname.#1\relax
378 \fi
379 \global\@nobeckfalse \endgroup
380 \addvspace{32\p@\@plus14\p@}%
381 }

\l@section Section spacing is more generous than for amsart
382 \def\l@section{\@tocline{1}{0pt}{1pc}{2pc}{}}

\l@section Amsart has too large spacing
383 \def\l@section{\@tocline{2}{0pt}{1pc}{3pc}{}}

\l@subsection Amsart has too large spacing
384 \def\l@subsection{\@tocline{2}{0pt}{1pc}{5pc}{}}

And hyperref
385 \let\@footnotemark@nolink\@footnotemark
386 \let\@footnotetext@nolink\@footnotetext
387 \RequirePackage[bookmarksnumbered,unicode]{hyperref}
388 \pdfstringdefDisableCommands{%
389 \def\unskip{}%
390 \def\textbullet{- }%
391 \def\textrightarrow{-> }%
392 \def\footnotemark{}%
393 }
394 \urlstyle{rm}
395 \ifcase\ACM@format@nr
396 \relax % manuscript
397 \or % acmsmall
398 \or % acmlarge
399 \or % acmtog
400 \or % sigconf
401 \or % siggraph
402 \or % sigplan
403 \urlstyle{sf}
404 \or % sigchi
405 \or % sigchi-a
406 \urlstyle{sf}
407 \fi
408 \if@ACM@screen
409 \hypersetup{colorlinks,
410 linkcolor=ACMRed,
411 citecolor=ACMPurple,

```

```

412     urlcolor=ACMDarkBlue,
413     filecolor=ACMDarkBlue}
414 \else
415   \hypersetup{hidelinks}
416 \fi
417 \RequirePackage{cleveref}

    Bibliography mangling.
418 \if@ACM@natbib
419   \let\cite\citeN\cite
420   \let\cite\citep
421   \let\citeANP\citeauthor
422   \let\citeNN\citeyearpar
423   \let\citeyearNP\citeyear
424   \let\citeyear\citeyearpar
425   \let\citeNP\citealt
426   \DeclareRobustCommand\citeA
427     {\begingroup\NAT@swafalse
428      \let\NAT@ctype\@ne\NAT@partrue\NAT@fullfalse\NAT@open\NAT@citetp}%
429   \providecommand\newblock{}%
430 \else
431   \AtBeginDocument{%
432     \let\shortcite\cite%
433     \providecommand\citename[1]{#1}}
434 \fi
435 \newcommand\shortcite[2][]{%
436   \ifNAT@numbers\cite[#1]{#2}\else\citeyear[#1]{#2}\fi}

```

`\bibliographystyle` Amsart redefines `\bibliographystyle` since it prefers AMS bibliography. We turn it back to  $\LaTeX$  definition:

```

437 \def\bibliographystyle#1{%
438   \ifx\@begindocumenthook\@undefined\else
439     \expandafter\AtBeginDocument
440   \fi
441   {\if@filesw
442     \immediate\write\@auxout{\string\bibstyle{#1}}%
443   \fi}}

```

#### Graphics and color

```

444 \RequirePackage{graphicx, xcolor}

```

We define ACM colors according to [7]:

```

445 \definecolor[named]{ACMBlue}{cmyk}{1,0.1,0,0.1}
446 \definecolor[named]{ACMYellow}{cmyk}{0,0.16,1,0}
447 \definecolor[named]{ACMOrange}{cmyk}{0,0.42,1,0.01}
448 \definecolor[named]{ACMRed}{cmyk}{0,0.90,0.86,0}
449 \definecolor[named]{ACMLightBlue}{cmyk}{0.49,0.01,0,0}
450 \definecolor[named]{ACMGreen}{cmyk}{0.20,0,1,0.19}
451 \definecolor[named]{ACMPurple}{cmyk}{0.55,1,0,0.15}
452 \definecolor[named]{ACMDarkBlue}{cmyk}{1,0.58,0,0.21}

```

Author draft mode

```
453 \if@ACM@authordraft
454   \RequirePackage{draftwatermark}
455   \SetWatermarkFontSize{0.5in}
456   \SetWatermarkColor[gray]{.9}
457   \SetWatermarkText{\parbox{12em}{\centering
458     Unpublished working draft\\
459     Not for distribution}}
460 \fi
```

### 3.6 Paper size and paragraphing

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

```
461 \RequirePackage{geometry}
462 \ifcase\ACM@format@nr
463 \relax % manuscript
464   \geometry{letterpaper,head=13pt,
465     marginparwidth=6pc,heightrounded}%
466 \or % acmsmall
467   \geometry{twoside=true,
468     includeheadfoot, head=13pt, foot=2pc,
469     paperwidth=6.75in, paperheight=10in,
470     top=58pt, bottom=44pt, inner=46pt, outer=46pt,
471     marginparwidth=2pc,heightrounded
472   }%
473 \or % acmlarge
474   \geometry{twoside=true, head=13pt, foot=2pc,
475     paperwidth=8.5in, paperheight=11in,
476     includeheadfoot,
477     top=78pt, bottom=114pt, inner=81pt, outer=81pt,
478     marginparwidth=4pc,heightrounded
479   }%
480 \or % acmtog
481   \geometry{twoside=true, head=13pt, foot=2pc,
482     paperwidth=8.5in, paperheight=11in,
483     includeheadfoot, columnsep=24pt,
484     top=52pt, bottom=75pt, inner=52pt, outer=52pt,
485     marginparwidth=2pc,heightrounded
486   }%
487 \or % sigconf
488   \geometry{twoside=true, head=13pt,
489     paperwidth=8.5in, paperheight=11in,
490     includeheadfoot, columnsep=2pc,
491     top=57pt, bottom=73pt, inner=54pt, outer=54pt,
492     marginparwidth=2pc,heightrounded
493   }%
494 \or % siggraph
```

```

495 \geometry{twoside=true, head=13pt,
496   paperwidth=8.5in, paperheight=11in,
497   includeheadfoot, columnsep=2pc,
498   top=57pt, bottom=73pt, inner=54pt, outer=54pt,
499   marginparwidth=2pc,heightrounded
500   }%
501 \or % sigplan
502 \geometry{twoside=true, head=13pt,
503   paperwidth=8.5in, paperheight=11in,
504   includeheadfoot=false, columnsep=2pc,
505   top=1in, bottom=1in, inner=0.75in, outer=0.75in,
506   marginparwidth=2pc,heightrounded
507   }%
508 \or % sigchi
509 \geometry{twoside=true, head=13pt,
510   paperwidth=8.5in, paperheight=11in,
511   includeheadfoot, columnsep=2pc,
512   top=66pt, bottom=73pt, inner=54pt, outer=54pt,
513   marginparwidth=2pc,heightrounded
514   }%
515 \or % sigchi-a
516 \geometry{twoside=false, head=13pt,
517   paperwidth=11in, paperheight=8.5in,
518   includeheadfoot, marginparsep=72pt,
519   marginparwidth=170pt, columnsep=20pt,
520   top=72pt, bottom=72pt, left=314pt, right=72pt
521   }%
522 \@mparswitchfalse
523 \reversemarginpar
524 \fi

\parindent Paragraphing
\parskip
525 \setlength\parindent{10\p@}
526 \setlength\parskip{\z@}
527 \ifcase\ACM@format@nr
528 \relax % manuscript
529 \or % acmsmall
530 \or % acmlarge
531 \or % acmtog
532 \setlength\parindent{9\p@}%
533 \or % sigconf
534 \or % siggraph
535 \or % sigplan
536 \or % sigchi
537 \or % sigchi-a
538 \fi

\normalparindent amsart 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.

```
539 \setlength\normalparindent{\parindent}
```

Footnotes require some consideration. We have several layers of footnotes: front-matter footnotes, “regular” footnotes and the special insert for `bibstrip`. In the old ACM classes `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 `bibstrip` from the rest of the paper. It is a full width rule.

```
540 \def\copyrightpermissionfootnoterule{\kern-3\p@
541   \hrule \@width \columnwidth \kern 2.6\p@}
```

```
542 \RequirePackage{manyfoot}
543 \SelectFootnoteRule[2]{copyrightpermission}
544 \DeclareNewFootnote{copyrightpermission}
```

`\footnoterule` Tschichold’s rules:

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

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

```
547 \def\endminipage{%
548   \par
549   \unskip
550   \ifvoid\@mpfootins\else
551     \vskip\skip\@mpfootins
552     \normalcolor
553     \unvbox\@mpfootins
554   \fi
555   \@minipagefalse   %% added 24 May 89
556   \color@endgroup
557   \egroup
558   \expandafter\@iiiparbox\@mpargs{\unvbox\@tempboxa}}
```

`\@makefnmark` We do not use indentation for footnotes

```
559 \def\@makefnmark{\noindent\@makefnmark}
```

`\@footnotetext` In `sigchi-a` mode our footnotes are on the margins!

```
560 \if@ACM@sigchiamode
561 \long\def\@footnotetext#1{\marginpar{%
562   \reset@font\small
563   \interlinepenalty\interfootnotelinepenalty
564   \protected@edef\@currentlabel{%
565     \csname p@footnote\endcsname\@thefnmark
566   }%
567   \color@begingroup
```



```

568 \makefnmark{\rule\z@{\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
569 \color@endgroup}}%
570 \fi
571 \fi

```

`\mpfootnotetext` We want the footnotes in minipages centered:

```

572 \long\def\mpfootnotetext#1{%
573 \global\setbox\@mpfootins\vbox{%
574 \unvbox\@mpfootins
575 \reset@font\footnotesize
576 \hsize\columnwidth
577 \@parboxrestore
578 \protected@edef\@currentlabel
579 {\csname p@mpfootnote\endcsname\@thefnmark}%
580 \color@begingroup\centering
581 \makefnmark{\rule\z@{\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
582 \color@endgroup}}
583 \fi

```

`\makefnmark` AMS classes use a buggy definition of `\makefnmark`. We revert to the standard one.

```

584 \def\makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}

```

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

```

585 \def\textbottom{\vskip \z@ \@plus 1pt}
586 \let\texttop\relax

```

### 3.7 Fonts

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

The code below is by Ross Moore.

```

587 \RequirePackage{iftex}
588 \ifPDFTeX
589 \input{glyphtounicode}
590 \pdfglyphtounicode{f_f}{FB00}
591 \pdfglyphtounicode{f_f_i}{FB03}
592 \pdfglyphtounicode{f_f_l}{FB04}
593 \pdfglyphtounicode{f_i}{FB01}
594 \pdfglyphtounicode{t_t}{00740074}
595 \pdfglyphtounicode{f_t}{00660074}
596 \pdfglyphtounicode{T_h}{00540068}
597 \pdfgentounicode=1
598 \fi
599 \RequirePackage{cmap}

```

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

```

600 \newif\if@ACM@newfonts
601 \@ACM@newfontstrue
602 \IfFileExists{libertine.sty}{\ClassWarning{\@classname}{You do not

```

```

603   have libertine package installed. Please upgrade your
604   TeX}\@ACM@newfontsfalse}
605 \IfFileExists{zi4.sty}{\ClassWarning{\@classname}{You do not
606   have zi4 package installed. Please upgrade your TeX}\@ACM@newfontsfalse}
607 \IfFileExists{newtxmath.sty}{\ClassWarning{\@classname}{You do not
608   have newtxmath package installed. Please upgrade your
609   TeX}\@ACM@newfontsfalse}

```

We use Libertine throughout.

```

610 \if@ACM@newfonts
611 \RequirePackage[tt=false, type1=true]{libertine}
612 \RequirePackage[varqu]{zi4}
613 \RequirePackage[libertine]{newtxmath}
614 \RequirePackage[T1]{fontenc}
615 \fi

```

The SIGCHI extended abstracts are sans serif:

```

616 \if@ACM@sigchiamode
617 \renewcommand{\familydefault}{\sfdefault}
618 \fi

```

### 3.8 Floats

We use caption package

```

619 \RequirePackage{caption, float}
620 \captionsetup[table]{position=top}
621 \if@ACM@journal
622   \captionsetup{labelfont={sf, small},
623     textfont={sf, small}, margin=\z@}
624   \captionsetup[figure]{name={Fig.}}
625 \else
626   \captionsetup{labelfont={bf},
627     textfont={bf}, labelsep=colon, margin=\z@}
628   \ifcase\ACM@format@nr
629   \relax % manuscript
630   \or % acmsmall
631   \or % acmlarge
632   \or % acmtog
633   \or % sigconf
634   \or % siggraph
635     \captionsetup{textfont={it}}
636   \or % sigplan
637     \captionsetup{labelfont={bf},
638       textfont={normalfont}, labelsep=period, margin=\z@}
639   \or % sigchi
640     \captionsetup[figure]{labelfont={bf, small},
641       textfont={bf, small}}
642   \or % sigchi-a
643     \captionsetup[figure]{labelfont={bf, small},
644       textfont={bf, small}}

```

```

645 \fi
646 \fi

sidebar The sidebar environment:
647 \newfloat{sidebar}{}{sbar}
648 \floatname{sidebar}{Sidebar}
649 \renewenvironment{sidebar}{\Collect@Body\@sidebar}{}

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

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

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

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

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

SIGCHI extended abstract provides 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
658 \newdimen\fulltextwidth
659 \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)
660 \if@ACM@sigchiamode
661 \def\@dblfloat{\bgroup\columnwidth=\fulltextwidth
662 \let\@endfloatbox\@endwidefloatbox
663 \def\@fpsadddefault{\def\@fps{tp}}%
664 \@float}
665 \fi

\end@dblfloat And the end. Just adding a \bgroup.
666 \if@ACM@sigchiamode
667 \def\end@dblfloat{%
668 \end@float\egroup}
669 \fi

```

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

```

670 \def\@endwidefloatbox{%
671   \par\vskip\z@skip
672   \@minipagefalse
673   \outer@nobreak
674   \egroup
675   \color@endbox
676   \global\setbox\@currbox=\vbox{\moveleft
677     \dimexpr(\fulltextwidth-\textwidth)\box\@currbox}%
678   \wd\@currbox=\textwidth
679 }
```

### 3.9 Lists

```

680 \ifcase\ACM@format@nr
681 \relax % manuscript
682 \or % acmsmall
683 \or % acmlarge
684 \or % acmtog
685 \or % sigconf
686 \or % siggraph
687 \or % sigplan
688 \def\labelenumi{\theenumi.}
689 \def\labelenumii{\theenumii.}
690 \def\labelenumiii{\theenumiii.}
691 \def\labelenumiv{\theenumiv.}
692 \or % sigchi
693 \or % sigchi-a
694 \fi
```

AMS uses generous margins for the lists. Note that `amsart` defines `\leftmargin` values for list levels at begin document, so we must redefine them in the same manner. Also, note that `amsart` redefines `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`.

```

695 \newdimen\@ACM@labelwidth
696 \AtBeginDocument{%
697   \setlength\labelsep{4pt}
698   \setlength{\@ACM@labelwidth}{6.5pt}
699
700   %% First-level list: when beginning after the first line of an
701   %% indented paragraph or ending before an indented paragraph, labels
702   %% should not hang to the left of the preceding/following text.
703   \setlength\leftmargini{\z@}
704   \addtolength\leftmargini{\parindent}
705   \addtolength\leftmargini{2\labelsep}
706   \addtolength\leftmargini{\@ACM@labelwidth}
707
708   %% Second-level and higher lists.
709   \setlength\leftmarginii{\z@}
```

```

710 \addtolength\leftmarginii{0.5\labelsep}
711 \addtolength\leftmarginii{\@ACM@labelwidth}
712 \setlength\leftmarginiii{\leftmarginii}
713 \setlength\leftmarginiv{\leftmarginiii}
714 \setlength\leftmarginv{\leftmarginiv}
715 \setlength\leftmarginvi{\leftmarginv}
716 \@listi}
717 \newskip\listisep
718 \listisep\smallskipamount
719 \def\@listI{\leftmargin\leftmargini
720 \labelwidth\leftmargini \advance\labelwidth-\labelsep
721 \listparindent\z@
722 \topsep\listisep}
723 \let\@listi\@listI
724 \def\@listii{\leftmargin\leftmarginii
725 \labelwidth\leftmarginii \advance\labelwidth-\labelsep
726 \topsep\z@skip}
727 \def\@listiii{\leftmargin\leftmarginiii
728 \labelwidth\leftmarginiii \advance\labelwidth-\labelsep}
729 \def\@listiv{\leftmargin\leftmarginiv
730 \labelwidth\leftmarginiv \advance\labelwidth-\labelsep}
731 \def\@listv{\leftmargin\leftmarginv
732 \labelwidth\leftmarginv \advance\labelwidth-\labelsep}
733 \def\@listvi{\leftmargin\leftmarginvi
734 \labelwidth\leftmarginvi \advance\labelwidth-\labelsep}

\descriptionlabel We do not use default colon as \amsart does:
735 \renewcommand{\descriptionlabel}[1]{\upshape\bfseries #1}

\description Make description environment indentation consistent with that of itemize and
enumerate environments.
736 \renewenvironment{description}{\list{}{%
737 \labelwidth\@ACM@labelwidth
738 \let\makelabel\descriptionlabel}%
739 }{
740 \endlist
741 }
742 \let\enddescription=\endlist % for efficiency

```

### 3.10 Top matter data

We use keyval interface to define journal title and relevant information

```

743 \define@choicekey*+{ACM}{acmJournal}[\@journalCode\@journalCode@nr]{%
744 CIE,%
745 CSUR,%
746 IMWUT,%
747 JACM,%
748 JDIQ,%
749 JEA,%

```

```

750 JERIC,%
751 JETC,%
752 JOCCH,%
753 PACMHCI,%
754 PACMPL,%
755 POMACS,%
756 TAAS,%
757 TACCESS,%
758 TACO,%
759 TALG,%
760 TALLIP,%
761 TAP,%
762 TCPS,%
763 TEAC,%
764 TECS,%
765 TIIS,%
766 TISSEC,%
767 TIST,%
768 TKDD,%
769 TMIS,%
770 TOCE,%
771 TOCHI,%
772 TOCL,%
773 TOCS,%
774 TOCT,%
775 TODAES,%
776 TODS,%
777 TOG,%
778 TOIS,%
779 TOIT,%
780 TOMACS,%
781 TOMM,%
782 TOMPECS,%
783 TOMS,%
784 TOPC,%
785 TOPS,%
786 TOPLAS,%
787 TOS,%
788 TOSEM,%
789 TOSN,%
790 TRETs,%
791 TSAS,%
792 TSC,%
793 TSLP,%
794 TWEB%
795 }{%
796 \ifcase\@journalCode@nr
797 \relax % CIE
798 \def\@journalName{ACM Computers in Entertainment}%
799 \def\@journalNameShort{ACM Comput. Entertain.}%

```

```

800 \def\@permissionCodeOne{1544-3574}%
801 \or % CSUR
802 \def\@journalName{ACM Computing Surveys}%
803 \def\@journalNameShort{ACM Comput. Surv.}%
804 \def\@permissionCodeOne{0360-0300}%
805 \or % IMMUT
806 \def\@journalName{Proceedings of the ACM on Interactive, Mobile,
807     Wearable and Ubiquitous Technologies}%
808 \def\@journalNameShort{Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.}%
809 \def\@permissionCodeOne{2474-9567}%
810 \or % JACM
811 \def\@journalName{Journal of the ACM}%
812 \def\@journalNameShort{J. ACM}%
813 \def\@permissionCodeOne{0004-5411}%
814 \or % JDIQ
815 \def\@journalName{ACM Journal of Data and Information Quality}%
816 \def\@journalNameShort{ACM J. Data Inform. Quality}%
817 \def\@permissionCodeOne{1936-1955}%
818 \or % JEA
819 \def\@journalName{ACM Journal of Experimental Algorithmics}%
820 \def\@journalNameShort{ACM J. Exp. Algor.}%
821 \def\@permissionCodeOne{1084-6654}%
822 \or % JERIC
823 \def\@journalName{ACM Journal of Educational Resources in Computing}%
824 \def\@journalNameShort{ACM J. Edu. Resources in Comput.}%
825 \def\@permissionCodeOne{1073-0516}%
826 \or % JETC
827 \def\@journalName{ACM Journal on Emerging Technologies in Computing Systems}%
828 \def\@journalNameShort{ACM J. Emerg. Technol. Comput. Syst.}%
829 \def\@permissionCodeOne{1550-4832}%
830 \or % JOCCH
831 \def\@journalName{ACM Journal on Computing and Cultural Heritage}%
832 \def\@journalNameShort{ACM J. Comput. Cult. Herit.}%
833 \or % PACMHCI
834 \def\@journalName{Proceedings of the ACM on Human-Computer Interaction}%
835 \def\@journalNameShort{Proc. ACM Hum.-Comput. Interact.}%
836 \def\@permissionCodeOne{2573-0142}%
837 \or % PACMPL
838 \def\@journalName{Proceedings of the ACM on Programming Languages}%
839 \def\@journalNameShort{Proc. ACM Program. Lang.}%
840 \def\@permissionCodeOne{2475-1421}%
841 \or % POMACS
842 \def\@journalName{Proceedings of the ACM on Measurement and Analysis of Computing Systems}%
843 \def\@journalNameShort{Proc. ACM Meas. Anal. Comput. Syst.}%
844 \def\@permissionCodeOne{2476-1249}%
845 \or % TAAS
846 \def\@journalName{ACM Transactions on Autonomous and Adaptive Systems}%
847 \def\@journalNameShort{ACM Trans. Autonom. Adapt. Syst.}%
848 \def\@permissionCodeOne{1556-4665}%
849 \or % TACCESS

```

```

850 \def\@journalName{ACM Transactions on Accessible Computing}%
851 \def\@journalNameShort{ACM Trans. Access. Comput.}%
852 \def\@permissionCodeOne{1936-7228}%
853 \or % TACO
854 \def\@journalName{ACM Transactions on Architecture and Code Optimization}%
855 \or % TALG
856 \def\@journalName{ACM Transactions on Algorithms}%
857 \def\@journalNameShort{ACM Trans. Algor.}%
858 \def\@permissionCodeOne{1549-6325}%
859 \or % TALLIP
860 \def\@journalName{ACM Transactions on Asian and Low-Resource Language Information Processing}%
861 \def\@journalNameShort{ACM Trans. Asian Low-Resour. Lang. Inf. Process.}%
862 \def\@permissionCodeOne{2375-4699}%
863 \or % TAP
864 \def\@journalName{ACM Transactions on Applied Perception}%
865 \or % TCPS
866 \def\@journalName{ACM Transactions on Cyber-Physical Systems}%
867 \or % TEAC
868 \def\@journalName{ACM Transactions on Economics and Computation}%
869 \or % TECS
870 \def\@journalName{ACM Transactions on Embedded Computing Systems}%
871 \def\@journalNameShort{ACM Trans. Embedd. Comput. Syst.}%
872 \def\@permissionCodeOne{1539-9087}%
873 \or % TIIS
874 \def\@journalName{ACM Transactions on Interactive Intelligent Systems}%
875 \def\@journalNameShort{ACM Trans. Interact. Intell. Syst.}%
876 \def\@permissionCodeOne{2160-6455}%
877 \or % TISSEC
878 \def\@journalName{ACM Transactions on Information and System Security}%
879 \def\@journalNameShort{ACM Trans. Info. Syst. Sec.}%
880 \def\@permissionCodeOne{1094-9224}%
881 \or % TIST
882 \def\@journalName{ACM Transactions on Intelligent Systems and Technology}%
883 \def\@journalNameShort{ACM Trans. Intell. Syst. Technol.}%
884 \def\@permissionCodeOne{2157-6904}%
885 \or % TKDD
886 \def\@journalName{ACM Transactions on Knowledge Discovery from Data}%
887 \def\@journalNameShort{ACM Trans. Knowl. Discov. Data.}%
888 \def\@permissionCodeOne{1556-4681}%
889 \or % TMIS
890 \def\@journalName{ACM Transactions on Management Information Systems}%
891 \def\@journalNameShort{ACM Trans. Manag. Inform. Syst.}%
892 \def\@permissionCodeOne{2158-656X}%
893 \or % TOCE
894 \def\@journalName{ACM Transactions on Computing Education}%
895 \def\@journalNameShort{ACM Trans. Comput. Educ.}%
896 \def\@permissionCodeOne{1946-6226}%
897 \or % TOCHI
898 \def\@journalName{ACM Transactions on Computer-Human Interaction}%
899 \def\@journalNameShort{ACM Trans. Comput.-Hum. Interact.}%

```



```

900 \def\@permissionCodeOne{1073-0516}%
901 \or % TOCL
902 \def\@journalName{ACM Transactions on Computational Logic}%
903 \def\@journalNameShort{ACM Trans. Comput. Logic}%
904 \def\@permissionCodeOne{1529-3785}%
905 \or % TOCS
906 \def\@journalName{ACM Transactions on Computer Systems}%
907 \def\@journalNameShort{ACM Trans. Comput. Syst.}%
908 \def\@permissionCodeOne{0734-2071}%
909 \or % TOCT
910 \def\@journalName{ACM Transactions on Computation Theory}%
911 \def\@journalNameShort{ACM Trans. Comput. Theory}%
912 \def\@permissionCodeOne{1942-3454}%
913 \or % TODAES
914 \def\@journalName{ACM Transactions on Design Automation of Electronic Systems}%
915 \def\@journalNameShort{ACM Trans. Des. Autom. Electron. Syst.}%
916 \def\@permissionCodeOne{1084-4309}%
917 \or % TODS
918 \def\@journalName{ACM Transactions on Database Systems}%
919 \def\@journalNameShort{ACM Trans. Datab. Syst.}%
920 \def\@permissionCodeOne{0362-5915}%
921 \or % TOG
922 \def\@journalName{ACM Transactions on Graphics}%
923 \def\@journalNameShort{ACM Trans. Graph.}%
924 \def\@permissionCodeOne{0730-0301}%
925 \or % TOIS
926 \def\@journalName{ACM Transactions on Information Systems}%
927 \def\@journalName{ACM Transactions on Information Systems}%
928 \def\@permissionCodeOne{1046-8188}%
929 \or % TOIT
930 \def\@journalName{ACM Transactions on Internet Technology}%
931 \def\@journalNameShort{ACM Trans. Internet Technol.}%
932 \def\@permissionCodeOne{1533-5399}%
933 \or % TOMACS
934 \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
935 \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
936 \def\@journalNameShort{ACM Trans. Model. Comput. Simul.}%
937 \or % TOMM
938 \def\@journalName{ACM Transactions on Multimedia Computing, Communications and Applications}%
939 \def\@journalNameShort{ACM Trans. Multimedia Comput. Commun. Appl.}%
940 \def\@permissionCodeOne{1551-6857}%
941 \def\@permissionCodeTwo{0100}%
942 \or % TOMPECS
943 \def\@journalName{ACM Transactions on Modeling and Performance Evaluation of Computing Systems}%
944 \def\@journalNameShort{ACM Trans. Model. Perform. Eval. Comput. Syst.}%
945 \def\@permissionCodeOne{2376-3639}%
946 \or % TOMS
947 \def\@journalName{ACM Transactions on Mathematical Software}%
948 \def\@journalNameShort{ACM Trans. Math. Softw.}%
949 \def\@permissionCodeOne{0098-3500}%

```

```

950 \or % TOPC
951   \def\@journalName{ACM Transactions on Parallel Computing}%
952   \def\@journalNameShort{ACM Trans. Parallel Comput.}%
953   \def\@permissionCodeOne{1539-9087}%
954 \or % TOPS
955   \def\@journalName{ACM Transactions on Privacy and Security}%
956   \def\@journalNameShort{ACM Trans. Priv. Sec.}%
957   \def\@permissionCodeOne{2471-2566}%
958 \or % TOPLAS
959   \def\@journalName{ACM Transactions on Programming Languages and Systems}%
960   \def\@journalNameShort{ACM Trans. Program. Lang. Syst.}%
961   \def\@permissionCodeOne{0164-0925}%
962 \or % TOS
963   \def\@journalName{ACM Transactions on Storage}%
964   \def\@journalNameShort{ACM Trans. Storage}%
965   \def\@permissionCodeOne{1553-3077}%
966 \or % TOSEM
967   \def\@journalName{ACM Transactions on Software Engineering and Methodology}%
968   \def\@journalNameShort{ACM Trans. Softw. Eng. Methodol.}%
969   \def\@permissionCodeOne{1049-331X}%
970 \or % TOSN
971   \def\@journalName{ACM Transactions on Sensor Networks}%
972   \def\@journalNameShort{ACM Trans. Sensor Netw.}%
973   \def\@permissionCodeOne{1550-4859}%
974 \or % TRET
975   \def\@journalName{ACM Transactions on Reconfigurable Technology and Systems}%
976   \def\@journalNameShort{ACM Trans. Reconfig. Technol. Syst.}%
977   \def\@permissionCodeOne{1936-7406}%
978 \or % TSAS
979   \def\@journalName{ACM Transactions on Spatial Algorithms and Systems}%
980   \def\@journalNameShort{ACM Trans. Spatial Algorithms Syst.}%
981   \def\@permissionCodeOne{2374-0353}%
982 \or % TSC
983   \def\@journalName{ACM Transactions on Social Computing}%
984   \def\@journalNameShort{ACM Trans. Soc. Comput.}%
985   \def\@permissionCodeOne{2469-7818}%
986 \or % TSLP
987   \def\@journalName{ACM Transactions on Speech and Language Processing}%
988   \def\@journalNameShort{ACM Trans. Speech Lang. Process.}%
989   \def\@permissionCodeOne{1550-4875}%
990 \or % TWEB
991   \def\@journalName{ACM Transactions on the Web}%
992   \def\@journalNameShort{ACM Trans. Web}%
993   \def\@permissionCodeOne{1559-1131}%
994 \fi
995 \ClassInfo{\@classname}{Using journal code \@journalCode}%
996 }{%
997 \ClassError{\@classname}{Incorrect journal #1}%
998 }%

```

`\acmJournal` And the syntactic sugar around it

```

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

    The defaults:
1000 \def\@journalCode@nr{0}
1001 \def\@journalName{}%
1002 \def\@journalNameShort{\@journalName}%
1003 \def\@permissionCodeOne{XXXX-XXXX}%
1004 \def\@permissionCodeTwo{}%

```

`\acmConference` This is the conference command

```

1005 \newcommand\acmConference[4][{}%
1006   \gdef\acmConference@shortname{#1}%
1007   \gdef\acmConference@name{#2}%
1008   \gdef\acmConference@date{#3}%
1009   \gdef\acmConference@venue{#4}%
1010   \ifx\acmConference@shortname\empty
1011     \gdef\acmConference@shortname{#2}%
1012   \fi}
1013 \acmConference[Conference'17]{ACM Conference}{July 2017}{Washington,
1014   DC, USA}

```

`\subtitle` The subtitle macro

```

1015 \def\subtitle#1{\def\@subtitle{#1}}
1016 \subtitle{}

```

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

```

1017 \newcount\num@authorgroups
1018 \num@authorgroups=0\relax

```

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

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

```

1019 \renewcommand\author[2][{}%
1020   \if@insideauthorgroup\else
1021     \global\advance\num@authorgroups by 1\relax
1022     \global\@insideauthorgrouptrue
1023   \fi
1024   \ifx\addresses\empty
1025     \if@ACM@anonymous
1026       \gdef\addresses{\@author{Anonymous Author(s)}}%
1027       \gdef\authors{Anonymous Author(s)}%
1028     \else
1029       \gdef\addresses{\@author{#2}}%
1030       \gdef\authors{#2}%
1031     \fi
1032   \else
1033     \if@ACM@anonymous\else

```

```

1034 \g@addto@macro\addresses{\and\@author{#2}}%
1035 \g@addto@macro\authors{\and#2}%
1036 \fi
1037 \fi
1038 \if@ACM@anonymous
1039 \ifx\shortauthors\@empty
1040 \gdef\shortauthors{Anon.}%
1041 \fi
1042 \else
1043 \def\@tempa{#1}%
1044 \ifx\@tempa\@empty
1045 \ifx\shortauthors\@empty
1046 \gdef\shortauthors{#2}%
1047 \else
1048 \g@addto@macro\shortauthors{\and#2}%
1049 \fi
1050 \else
1051 \ifx\shortauthors\@empty
1052 \gdef\shortauthors{#1}%
1053 \else
1054 \g@addto@macro\shortauthors{\and#1}%
1055 \fi
1056 \fi
1057 \fi}

```

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

```

1058 \newcommand{\affiliation}[2][{}]{%
1059 \global\@insideauthorgroupfalse
1060 \if@ACM@anonymous\else
1061 \g@addto@macro\addresses{\affiliation{#1}{#2}}%
1062 \fi}

```

`@ACM@affiliation@obeypunctuation` Whether to use author's punctuation (by default false = add American punctuation)

```

1063 \define@boolkey+{@ACM@affiliation@}{@ACM@affiliation@}{obeypunctuation}%
1064 [true]{}{\ClassError{\@classname}{obeypunctuation must be true or false}}

```

`\additionalaffiliation` Additional affiliations go to footnotes

```

1065 \def\additionalaffiliation#1{\authornote{\@additionalaffiliation{#1}}}

```

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

```

1066 \def\@additionalaffiliation#1{\bgroup
1067 \def\position##1{\ignorespaces}%
1068 \def\institution##1{##1\ignorespaces}%
1069 \def\department{\@ifnextchar[{\@department}{\@department[]}}%
1070 \def\@department[##1]##2{\unskip, ##2\ignorespaces}%
1071 \let\streetaddress\position
1072 \let\city\position
1073 \let\state\position

```

```

1074 \let\postcode\position
1075 \let\country\position
1076 Also with #1\unskip.\egroup}

\email The macro \email mimics \email from amsart. Agian it has an optional argument we
do not currently need, but keep for the possible future use.
1077 \renewcommand{\email}[2][{}]{%
1078 \if@ACM@anonymous\else
1079 \g@addto@macro\addresses{\email{#1}{#2}}%
1080 \fi}

\orcid Right now we do not typeset orcids

\@titlenotes The titlenotes
1081 \def\@titlenotes{}

\titlenote Adding note to the title
1082 \def\titlenote#1{%
1083 \g@addto@macro\@title{\footnotemark}%
1084 \if@ACM@anonymous
1085 \g@addto@macro\@titlenotes{%
1086 \stepcounter{footnote}\footnotetext{Title note}}%
1087 \else
1088 \g@addto@macro\@titlenotes{\stepcounter{footnote}\footnotetext{#1}}%
1089 \fi}

\@subtitlenotes The subtitlenotes
1090 \def\@subtitlenotes{}

\subtitlenote Adding note to the subtitle
1091 \def\subtitlenote#1{%
1092 \g@addto@macro\@subtitle{\footnotemark}%
1093 \if@ACM@anonymous
1094 \g@addto@macro\@subtitlenotes{%
1095 \stepcounter{footnote}\footnotetext{Subtitle note}}%
1096 \else
1097 \g@addto@macro\@subtitlenotes{%
1098 \stepcounter{footnote}\footnotetext{#1}}%
1099 \fi}

\@authornotes The authornotes
1100 \def\@authornotes{}

\authornote Adding note to the author
1101 \def\authornote#1{%
1102 \if@ACM@anonymous\else
1103 \g@addto@macro\addresses{\@authornotemark}%
1104 \g@addto@macro\@authornotes{%
1105 \stepcounter{footnote}\footnotetext{#1}}%
1106 \fi}

```

`\authornotemark` Adding footnote mark to authors

```

1107 \newcommand\authornotemark[1][\relax]{%
1108   \ifx#1\relax\relax\relax
1109   \g@addto@macro\addresses{\@authornotemark}%
1110   \else
1111   \g@addto@macro\addresses{\@authornotemark{#1}}%
1112   \fi}

```

`\acmVolume` The current volume

```

1113 \def\acmVolume#1{\def\@acmVolume{#1}}
1114 \acmVolume{1}

```

`\acmNumber` The current number

```

1115 \def\acmNumber#1{\def\@acmNumber{#1}}
1116 \acmNumber{1}

```

`\acmArticle` The current article

```

1117 \def\acmArticle#1{\def\@acmArticle{#1}}
1118 \acmArticle{1}

```

`\acmArticleSeq` The sequence number

```

1119 \def\acmArticleSeq#1{\def\@acmArticleSeq{#1}}
1120 \acmArticleSeq{\@acmArticle}

```

`\acmYear` The current year

```

1121 \def\acmYear#1{\def\@acmYear{#1}}
1122 \acmYear{\the\year}

```

`\acmMonth` The current month

```

1123 \def\acmMonth#1{\def\@acmMonth{#1}}
1124 \acmMonth{\the\month}

```

`\@acmPubDate` The publication date

```

1125 \def\@acmPubDate{\ifcase\@acmMonth\or
1126   January\or February\or March\or April\or May\or June\or
1127   July\or August\or September\or October\or November\or
1128   December\fi~\@acmYear}

```

`\acmPrice` The price

```

1129 \def\acmPrice#1{\def\@acmPrice{#1}}
1130 \acmPrice{15.00}

```

`\acmSubmissionID` The submission id

```

1131 \def\acmSubmissionID#1{\def\@acmSubmissionID{#1}}
1132 \acmSubmissionID{}

```

`\acmISBN` The book isbn

```

1133 \def\acmISBN#1{\def\@acmISBN{#1}}
1134 \acmISBN{978-x-xxxx-xxxx-x/YY/MM}

```

`\acmDOI` The paper doi  
1135 `\def\acmDOI#1{\def\acmDOI{#1}}`  
1136 `\acmDOI{10.1145/nnnnnnn.nnnnnnn}`

`\if@ACM@badge` Whether to print badge. Note that either left or right badge triggers it:  
1137 `\newif\if@ACM@badge`  
1138 `\@ACM@badgefalse`

`\@ACM@badge@width` The width of the badge  
1139 `\newlength\@ACM@badge@width`  
1140 `\setlength\@ACM@badge@width{5pc}`

`\@ACM@title@width` The width of the badge  
1141 `\newlength\@ACM@title@width`

`\@ACM@badge@skip` The space between the badge and the title  
1142 `\newlength\@ACM@badge@skip`  
1143 `\setlength\@ACM@badge@skip{1pc}`

`\acmBadgeR` Setting the right badge  
1144 `\newcommand\acmBadgeR[2][\@ACM@badgetrue`  
1145 `\def\acmBadgeR@url{#1}%`  
1146 `\def\acmBadgeR@image{#2}}`  
1147 `\def\acmBadgeR@url{}`  
1148 `\def\acmBadgeR@image{}`

`\acmBadgeL` Setting the left badge  
1149 `\newcommand\acmBadgeL[2][\@ACM@badgetrue`  
1150 `\def\acmBadgeL@url{#1}%`  
1151 `\def\acmBadgeL@image{#2}}`  
1152 `\def\acmBadgeL@url{}`  
1153 `\def\acmBadgeL@image{}`

`\startPage` The start page of the paper  
1154 `\def\startPage#1{\def\startPage{#1}}`  
1155 `\startPage{}`

`\terms` Terms are obsolete, we use CCS now.  
1156 `\def\terms#1{\ClassWarning{\@classname}{The command \string\terms{} is`  
1157 `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.  
1158 `\def\keywords#1{\def\keywords{#1}}`  
1159 `\keywords{}`

`abstract` Amsart puts abstract in the box. Since we do not know whether we will use two column mode, we prefer to save the text  
1160 `\renewenvironment{abstract}{\Collect@Body\@saveabstract}{}`

`\@saveabstract` And saving the abstract

```

1161 \long\def\@saveabstract#1{\long\gdef\@abstract{#1}}
1162 \@saveabstract{}
```

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

```

1163 \long\def\@empty{}
```

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

```

1164 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printccs}[true]{%
1165   \if@ACM@printccs
1166     \ClassInfo{\@classname}{Printing CCS}%
1167   \else
1168     \ClassInfo{\@classname}{Suppressing CCS}%
1169   \fi}{\ClassError{\@classname}{printccs must be true or false}}
```

`\if@ACM@printacmref` Whether to print ACM bib

```

1170 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printacmref}[true]{%
1171   \if@ACM@printacmref
1172     \ClassInfo{\@classname}{Printing bibformat}%
1173   \else
1174     \ClassInfo{\@classname}{Suppressing bibformat}%
1175   \fi}{\ClassError{\@classname}{printacmref must be true or false}}
```

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

```

1176 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printfolios}[true]{%
1177   \if@ACM@printfolios
1178     \ClassInfo{\@classname}{Printing folios}%
1179   \else
1180     \ClassInfo{\@classname}{Suppressing folios}%
1181   \fi}{\ClassError{\@classname}{printfolios must be true or false}}
```

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

```

1182 \define@cmdkey{@ACM@topmatter@}[@ACM@]{authorssperrow}[0]{%
1183   \IfInteger{#1}{\ClassInfo{\@classname}{Setting authorssperrow to
1184     #1}}{\ClassWarning{\@classname}{Parameter authorssperrow must be
1185     numerical. Ignoring the input #1}}\gdef\@ACM@authorssperrow{0}}
```

`\settopmatter` The usual syntactic sugar

```

1186 \def\settopmatter#1{\setkeys{@ACM@topmatter@}{#1}}
```

Now the settings

```

1187 \settopmatter{printccs=true, printacmref=true}
1188 \if@ACM@manuscript
1189   \settopmatter{printfolios=true}
1190 \else
1191   \if@ACM@journal
1192     \settopmatter{printfolios=true}
1193   \else
```



```

1194 \settopmatter{printfolios=false}
1195 \fi
1196 \fi
1197 \settopmatter{authorsperrow=0}

\@received The container for the paper history
1198 \def\@received{}

\received The \received command
1199 \newcommand\received[2][\def\@tempa{#1}%
1200 \ifx\@tempa\@empty
1201 \ifx\@received\@empty
1202 \gdef\@received{Received #2}%
1203 \else
1204 \g@addto@macro{\@received}{; revised #2}%
1205 \fi
1206 \else
1207 \ifx\@received\@empty
1208 \gdef\@received{#1 #2}%
1209 \else
1210 \g@addto@macro{\@received}{; #1 #2}%
1211 \fi
1212 \fi}
1213 \AtEndDocument{%
1214 \ifx\@received\@empty\else
1215 \par\bigskip\noindent\small\normalfont\@received\par
1216 \fi}

```

### 3.11 Concepts system

We exclude CCSXML stuff generated by the ACM system:

```

1217 \RequirePackage{comment}
1218 \excludecomment{CCSXML}

\@concepts This is the storage macro for concepts
1219 \let\@concepts\@empty

\ccsdesc The first argument is the significance, the second is the concept(s)
1220 \newcommand\ccsdesc[2][100]{%
1221 \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!
1222 \RequirePackage{textcomp}
1223 \def\ccsdesc@parse#1~#2~#3~{%
1224 \expandafter\ifx\csname CCS@General@#2\endcsname\relax
1225 \expandafter\gdef\csname CCS@General@#2\endcsname{\textbullet\
1226 \textbf{#2}}%

```

```

1227 \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{; }%
1228 \expandafter\gdef\csname CCS@Specific@#2\endcsname{%
1229 \g@addto@macro{\@concepts}{\csname CCS@General@#2\endcsname
1230 \csname CCS@Punctuation@#2\endcsname
1231 \csname CCS@Specific@#2\endcsname}%
1232 \fi
1233 \ifx#3\relax\relax\else
1234 \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{
1235 \textrightarrow\ }%
1236 \expandafter\g@addto@macro\expandafter{\csname CCS@Specific@#2\endcsname}{%
1237 \ifnum#1>499\textbf{#3}; \else
1238 \ifnum#1>299\textit{#3}; \else
1239 #3; \fi\fi}%
1240 \fi
1241 \ccsdesc@parse@finish}

```

```

\ccdesc@parse@finish Gobble everything to \ccsdesc@parse@end
1242 \def\ccsdesc@parse@finish#1\ccsdesc@parse@end{}

```

### 3.12 Copyright system

This is from acmcopyright.sty

```

\if@printcopyright A flag whether to print copyright symbol
1243 \newif\if@printcopyright
1244 \@printcopyrighttrue

```

```

\if@printpermission Whether to print permission block
1245 \newif\if@printpermission
1246 \@printpermissiontrue

```

```

\if@acmowned Whether ACM owns the rights to the paper
1247 \newif\if@acmowned
1248 \@acmownedtrue

```

Keys:

```

1249 \define@choicekey*{ACM@}{acmcopyrightmode}[%
1250 \acm@copyrightinput\acm@copyrightmode]{none,%
1251 acmcopyright,acmlicensed,rightsretained,%
1252 usgov,usgovmixed,cagov,cagovmixed,%
1253 licensedusgovmixed,%
1254 licensedcagov,licensedcagovmixed,othergov,licensedothergov}{%
1255 \@printpermissiontrue
1256 \@printcopyrighttrue
1257 \@acmownedtrue
1258 \ifnum\acm@copyrightmode=0\relax % none
1259 \@printpermissionfalse
1260 \@printcopyrightfalse
1261 \@acmownedfalse

```

```

1262 \fi
1263 \ifnum\acm@copyrightmode=2\relax % acmlicensed
1264 \@acmownedfalse
1265 \fi
1266 \ifnum\acm@copyrightmode=3\relax % rightsretained
1267 \@acmownedfalse
1268 \acmPrice{}%
1269 \fi
1270 \ifnum\acm@copyrightmode=4\relax % usgov
1271 \@printpermissiontrue
1272 \@printcopyrightfalse
1273 \@acmownedfalse
1274 \acmPrice{}%
1275 \fi
1276 \ifnum\acm@copyrightmode=6\relax % cagov
1277 \@acmownedfalse
1278 \fi
1279 \ifnum\acm@copyrightmode=8\relax % licensedusgovmixed
1280 \@acmownedfalse
1281 \fi
1282 \ifnum\acm@copyrightmode=9\relax % licensedcagov
1283 \@acmownedfalse
1284 \fi
1285 \ifnum\acm@copyrightmode=10\relax % licensedcagovmixed
1286 \@acmownedfalse
1287 \fi
1288 \ifnum\acm@copyrightmode=11\relax % othergov
1289 \@acmownedtrue
1290 \fi
1291 \ifnum\acm@copyrightmode=12\relax % licensedothergov
1292 \@acmownedfalse
1293 \fi}

```

\setcopyright This is the syntactic sugar around setting keys.

```

1294 \def\setcopyright#1{\setkeys{ACM@}{acmcopyrightmode=#1}}
1295 \setcopyright{acmcopyright}

```

\@copyrightowner Here is the owner of the copyright

```

1296 \def\@copyrightowner{%
1297 \ifcase\acm@copyrightmode\relax % none
1298 \or % acmcopyright
1299 Association for Computing Machinery.
1300 \or % acmlicensed
1301 Copyright held by the owner/author(s). Publication rights licensed to
1302 Association for Computing Machinery.
1303 \or % rightsretained
1304 Copyright held by the owner/author(s).
1305 \or % usgov
1306 \or % usgovmixed
1307 Association for Computing Machinery.

```

```

1308 \or % cagov
1309 Crown in Right of Canada.
1310 \or %cagovmixed
1311 Association for Computing Machinery.
1312 \or %licensedusgovmixed
1313 Copyright held by the owner/author(s). Publication rights licensed to
1314 Association for Computing Machinery.
1315 \or % licensedcagov
1316 Crown in Right of Canada. Publication rights licensed to
1317 Association for Computing Machinery.
1318 \or %licensedcagovmixed
1319 Copyright held by the owner/author(s). Publication rights licensed to
1320 Association for Computing Machinery.
1321 \or % othergov
1322 Association for Computing Machinery.
1323 \or % licensedothergov
1324 Copyright held by the owner/author(s). Publication rights licensed to
1325 Association for Computing Machinery.
1326 \fi}

```

\@formatdoi Print a clickable doi

```

1327 \def\@formatdoi#1{\url{https://doi.org/#1}}

```

\@copyrightpermission The canned permission block.

```

1328 \def\@copyrightpermission{%
1329 \ifcase\acm@copyrightmode\relax % none
1330 \or % acmcopyright
1331 Permission to make digital or hard copies of all or part of this
1332 work for personal or classroom use is granted without fee provided
1333 that copies are not made or distributed for profit or commercial
1334 advantage and that copies bear this notice and the full citation on
1335 the first page. Copyrights for components of this work owned by
1336 others than ACM must be honored. Abstracting with credit is
1337 permitted. To copy otherwise, or republish, to post on servers or to
1338 redistribute to lists, requires prior specific permission
1339 and\hspace*{.5pt}/or a fee. Request permissions from
1340 permissions@acm.org.
1341 \or % acmlicensed
1342 Permission to make digital or hard copies of all or part of this
1343 work for personal or classroom use is granted without fee provided
1344 that copies are not made or distributed for profit or commercial
1345 advantage and that copies bear this notice and the full citation on
1346 the first page. Copyrights for components of this work owned by
1347 others than the author(s) must be honored. Abstracting with credit
1348 is permitted. To copy otherwise, or republish, to post on servers
1349 or to redistribute to lists, requires prior specific permission
1350 and\hspace*{.5pt}/or a fee. Request permissions from
1351 permissions@acm.org.
1352 \or % rightsretained
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```

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1356 and that copies bear this notice and the full citation on the first  
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1358 honored. For all other uses, contact the  
1359 owner\hspace\*{.5pt}/author(s).

1360 \or % usgov  
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1363 redistribution is allowed, provided that the article citation is  
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1366 \or % usgovmixed  
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1386 \or % cagovmixed  
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1438 only.

1439 \fi}

\copyrightyear By default, the copyright year is the same as \acmYear, but one can override this:

1440 \def\copyrightyear#1{\def\@copyrightyear{#1}}

1441 \copyrightyear{\@acmYear}

\@teaserfigures The teaser figures container

1442 \def\@teaserfigures{}

teaserfigure The teaser figure

1443 \newenvironment{teaserfigure}{\Collect@Body\@saveteaser}{{}}

\@saveteaser Saving the teaser

1444 \long\def\@saveteaser#1{\g@addto@macro\@teaserfigures{\@teaser{#1}}}

\thanks We redefine amsart \thanks, so the anonymous key works

```

1445 \renewcommand{\thanks}[1]{%
1446   \ifnotempty{#1}{%
1447     \if@ACM@anonymous
1448       \g@addto@macro\thankses{\thanks{A note}}%
1449     \else
1450       \g@addto@macro\thankses{\thanks{#1}}%
1451     \fi}}

```

### 3.13 Typesetting top matter

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

```

1452 \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 thankses. The latter refer to the paper itself, and therefore belong to the copy-right/permission block. By the way, this was the default behavior of the old ACM classes.

```

1453 \def\maketitle{%
1454   \if@ACM@anonymous
1455     % Anonymize omission of \author-s
1456     \ifnum\num@authorgroups=0\author{}\fi
1457   \fi
1458   \begingroup
1459   \let\@footnotemark\@footnotemark@nolink
1460   \let\@footnotetext\@footnotetext@nolink
1461   \renewcommand\thefootnote{\@fnsymbol\c@footnote}%
1462   \global\@topnum\z@ % this prevents floats from falling
1463                       % at the top of page 1
1464   \global\@botnum\z@ % we do not want them to be on bottom either
1465   \hsize=\textwidth
1466   \def\@makefnmark{\hbox{\@textsuperscript{\@thefnmark}}}%
1467   \mktitle\if@ACM@sigchiamode\else\mkauthors\fi\mkteasers
1468   \@printtopmatter
1469   \if@ACM@sigchiamode\mkauthors\fi
1470   \setcounter{footnote}{0}%
1471   \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}%
1472   \@titlenotes
1473   \@subtitlenotes
1474   \@authornotes
1475   \let\@makefnmark\relax \let\@thefnmark\relax
1476   \let\@makefntext\noindent
1477   \ifx\@empty\thankses\else
1478     \footnotetextcopyrightpermission{%
1479       \def\par{\let\par\@par}\parindent\z@\@setthanks}%
1480   \fi

```

```

1481 \footnotetextcopyrightpermission{%
1482   \if@ACM@authordraft
1483     \raisebox{-2ex}{\z@\z@}{\makebox[0pt][l]{\large\bfseries
1484       Unpublished
1485       working draft. Not for distribution}}}%
1486   \color[gray]{0.9}%
1487 \fi
1488 \parindent\z@\parskip0.1\baselineskip
1489 \if@ACM@authorversion\else
1490   \if@printpermission\@copyrightpermission\par\fi
1491 \fi
1492 \if@ACM@manuscript\else
1493   \if@ACM@journal\else % Print the conference information
1494     {\itshape \acmConference@shortname, \acmConference@date, \acmConference@venue}\par
1495   \fi
1496 \fi
1497 \if@printcopyright
1498   \copyright\ \@copyrightyear\ \@copyrightowner\\
1499 \else
1500   \@copyrightyear.\
1501 \fi
1502 \if@ACM@manuscript
1503   Manuscript submitted to ACM\\
1504 \else
1505   \if@ACM@authorversion
1506     This is the author's version of the work. It is posted here for
1507     your personal use. Not for redistribution. The definitive Version
1508     of Record was published in
1509     \if@ACM@journal
1510       \emph{\@journalName}%
1511     \else
1512       \emph{Proceedings of \acmConference@name, \acmConference@date}%
1513     \fi
1514     \ifx\@acmDOI\@empty
1515       .
1516     \else
1517       , \@formatdoi{\@acmDOI}.
1518     \fi\\
1519   \else
1520     \if@ACM@journal
1521       \@permissionCodeOne/\@acmYear/\@acmMonth-ART\@acmArticle
1522       \ifx\@acmPrice\@empty\else\ $\@acmPrice\fi\\
1523       \@formatdoi{\@acmDOI}%
1524     \else % Conference
1525       ACM~ISBN~\@acmISBN
1526       \ifx\@acmPrice\@empty.\else\dots\$\@acmPrice\fi\\
1527       \@formatdoi{\@acmDOI}%
1528     \fi
1529   \fi
1530 \fi}

```



```

1531 \endgroup
1532 \setcounter{footnote}{0}%
1533 \@mkabstract
1534 \if@ACM@printccs
1535   \ifx\@concepts\@empty\else\bgroup
1536     {\@specialsection{CCS Concepts}%
1537      \@concepts\par}\egroup
1538   \fi
1539 \fi
1540 \ifx\@keywords\@empty\else\bgroup
1541   {\if@ACM@journal
1542     \@specialsection{Additional Key Words and Phrases}%
1543     \else
1544       \@specialsection{Keywords}%
1545     \fi
1546     \@keywords}\par\egroup
1547 \fi
1548 \andify\authors
1549 \andify\shortauthors
1550 \global\let\authors=\authors
1551 \global\let\shortauthors=\shortauthors
1552 \if@ACM@printacmref
1553   \@mkbibcitation
1554 \fi
1555 \hypersetup{pdfauthor={\authors},
1556             pdftitle={\@title},
1557             pdfsubject={\@concepts},
1558             pdfkeywords={\@keywords}}%
1559 \@printendtopmatter
1560 \@afterindentfalse
1561 \@afterheading
1562 }

```

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

```

1563 \def\@specialsection#1{%
1564   \ifcase\ACM@format@nr
1565     \relax % manuscript
1566     \par\medskip\small\noindent#1: %
1567   \or % acmsmall
1568     \par\medskip\small\noindent#1: %
1569   \or % acmlarge
1570     \par\medskip\small\noindent#1: %
1571   \or % acmtog
1572     \par\medskip\small\noindent#1: %
1573   \or % sigconf
1574     \section*{#1}%
1575   \or % siggraph
1576     \section*{#1}%
1577   \or % sigplan
1578     \paragraph*{#1}%

```

```

1579 \or % sigchi
1580   \section*{#1}%
1581 \or % sigchi-a
1582   \section*{#1}%
1583 \fi}

```

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

```

1584 \def\@printtopmatter{%
1585   \ifx\@startPage\@empty
1586     \gdef\@startPage{1}%
1587   \else
1588     \setcounter{page}{\@startPage}%
1589   \fi
1590   \thispagestyle{firstpagestyle}%
1591   \noindent
1592   \ifcase\ACM@format@nr
1593   \relax % manuscript
1594     \box\mkttitle@bx\par
1595     \noindent\hrulefill\par
1596   \or % acmsmall
1597     \box\mkttitle@bx\par
1598     \noindent\hrulefill\par
1599   \or % acmlarge
1600     \box\mkttitle@bx\par
1601     \noindent\hrulefill\par
1602   \or % acmtog
1603     \twocolumn[\box\mkttitle@bx]%
1604   \or % sigconf
1605     \twocolumn[\box\mkttitle@bx]%
1606   \or % siggraph
1607     \twocolumn[\box\mkttitle@bx]%
1608   \or % sigplan
1609     \twocolumn[\box\mkttitle@bx]%
1610   \or % sigchi
1611     \twocolumn[\box\mkttitle@bx]%
1612   \or % sigchi-a
1613     \par\box\mkttitle@bx\par\bigskip
1614     \if@ACM@badge
1615       \marginpar{\noindent
1616         \ifx\@acmBadgeL@image\@empty\else
1617           \href{\@acmBadgeL@url}{%
1618             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}%
1619           \hskip\@ACM@badge@skip
1620         \fi
1621         \ifx\@acmBadgeR@image\@empty\else
1622           \href{\@acmBadgeR@url}{%
1623             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}%
1624         \fi}%

```

```

1625     \fi
1626     \fi
1627 }

\@mktitle The title of the article
1628 \def\@mktitle{%
1629   \ifcase\ACM@format@nr
1630     \relax % manuscript
1631     \@mktitle@i
1632   \or % acmsmall
1633     \@mktitle@i
1634   \or % acmlarge
1635     \@mktitle@i
1636   \or % acmtog
1637     \@mktitle@i
1638   \or % sigconf
1639     \@mktitle@iii
1640   \or % siggraph
1641     \@mktitle@iii
1642   \or % sigplan
1643     \@mktitle@iii
1644   \or % sigchi
1645     \@mktitle@iii
1646   \or % sigchi-a
1647     \@mktitle@iv
1648   \fi
1649 }

\@titlefont The font to typeset title
1650 \def\@titlefont{%
1651   \ifcase\ACM@format@nr
1652     \relax % manuscript
1653     \LARGE\bfseries\sffamily
1654   \or % acmsmall
1655     \LARGE\bfseries\sffamily
1656   \or % acmlarge
1657     \LARGE\bfseries\sffamily
1658   \or % acmtog
1659     \Huge\sffamily
1660   \or % sigconf
1661     \Huge\sffamily\bfseries
1662   \or % siggraph
1663     \Huge\sffamily\bfseries
1664   \or % sigplan
1665     \Huge\bfseries
1666   \or % sigchi
1667     \Huge\sffamily\bfseries
1668   \or % sigchi-a
1669     \Huge\bfseries
1670   \fi}

```

\@subtitlefont The font to typeset title

```
1671 \def\@subtitlefont{\normalsize
1672   \ifcase\ACM@format@nr
1673   \relax % manuscript
1674   \mdseries
1675   \or % acmsmall
1676   \mdseries
1677   \or % acmlarge
1678   \mdseries
1679   \or % acmtog
1680   \LARGE
1681   \or % sigconf
1682   \LARGE\mdseries
1683   \or % siggraph
1684   \LARGE\mdseries
1685   \or % sigplan
1686   \LARGE\mdseries
1687   \or % sigchi
1688   \LARGE\mdseries
1689   \or % sigchi-a
1690   \mdseries
1691   \fi}
```

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

```
1692 \def\@mktitle@i{\hsize=\textwidth
1693   \@ACM@title@width=\hsize
1694   \ifx\@acmBadgeL@image\@empty\else
1695     \advance\@ACM@title@width by -\@ACM@badge@width
1696     \advance\@ACM@title@width by -\@ACM@badge@skip
1697   \fi
1698   \ifx\@acmBadgeR@image\@empty\else
1699     \advance\@ACM@title@width by -\@ACM@badge@width
1700     \advance\@ACM@title@width by -\@ACM@badge@skip
1701   \fi
1702   \setbox\mktitle@bx=\vbox{\noindent\@titlefont
1703     \ifx\@acmBadgeL@image\@empty\else
1704       \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeL@url}{%
1705         \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
1706       \hspace\@ACM@badge@skip
1707     \fi
1708     \parbox[t]{\@ACM@title@width}{\raggedright
1709       \@titlefont\noindent
1710       \@title
1711     \ifx\@subtitle\@empty\else
1712       \par\noindent{\@subtitlefont\@subtitle}
1713     \fi}%
1714     \ifx\@acmBadgeR@image\@empty\else
1715       \hspace\@ACM@badge@skip
1716       \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeR@url}{%
1717         \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
1718     \fi}
```

```

1718 \fi
1719 \par\bigskip}}%

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

\mktitle@iii The version of \mktitle for sigproc. Note that since the title is centered, we leave the
space for the left badge even if only the right badge is defined.
1720 \def\mktitle@iii{\hsize=\textwidth
1721 \setbox\mktitle@bx=\vbox{\@titlefont\centering
1722 \ACM@title@width=\hsize
1723 \if@ACM@badge
1724 \advance\ACM@title@width by -2\ACM@badge@width
1725 \advance\ACM@title@width by -2\ACM@badge@skip
1726 \parbox[b]{\ACM@badge@width}{\strut
1727 \ifx\acmBadgeL@image\empty\else
1728 \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\acmBadgeL@url}{%
1729 \includegraphics[width=\ACM@badge@width]{\acmBadgeL@image}}}%
1730 \fi}%
1731 \hskip\ACM@badge@skip
1732 \fi
1733 \parbox[t]{\ACM@title@width}{\centering\@titlefont
1734 \@title
1735 \ifx\@subtitle\empty\else
1736 \par\noindent{\@subtitlefont\@subtitle}
1737 \fi
1738 }%
1739 \if@ACM@badge
1740 \hskip\ACM@badge@skip
1741 \parbox[b]{\ACM@badge@width}{\strut
1742 \ifx\acmBadgeR@image\empty\else
1743 \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\acmBadgeR@url}{%
1744 \includegraphics[width=\ACM@badge@width]{\acmBadgeR@image}}}%
1745 \fi}%
1746 \fi
1747 \par\bigskip}}%

```

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

```

1748 \def\mktitle@iv{\hsize=\textwidth
1749 \setbox\mktitle@bx=\vbox{\raggedright\leftskip5pc\@titlefont
1750 \noindent\leavevmode\leaders\hrule height 2pt\hfill\kern0pt\par
1751 \noindent\@title
1752 \ifx\@subtitle\empty\else
1753 \par\noindent\@subtitlefont\@subtitle
1754 \fi
1755 \par\bigskip}}%

```

\ACM@addtoaddress The macro adds an item to 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 on the end of the line. We use the magic cleaders trick for this.

```

1756 \newbox\@ACM@commabox
1757 \def\@ACM@addtoaddress#1{%
1758   \ifvmode\else
1759     \if@ACM@affiliation@obexpunctuation\else
1760     \setbox\@ACM@commabox=\hbox{, }%
1761     \unskip\cleaders\copy\@ACM@commabox\hskip\wd\@ACM@commabox
1762     \fi\fi
1763   #1}

```

|  |  |
|--|--|
| \institution<br>\position<br>\department<br>\streetaddress<br>\city<br>\state<br>\postcode<br>\country | <p>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...</p> <pre> 1764 \def\streetaddress#1{\unskip\ignorespaces} 1765 \def\postcode#1{\unskip\ignorespaces} 1766 \if@ACM@journal 1767   \def\position#1{\unskip\ignorespaces} 1768   \def\institution#1{#1\ignorespaces} 1769   \def\city#1{\unskip\ignorespaces} 1770   \def\state#1{\unskip\ignorespaces} 1771   \newcommand\department[2][0]{} 1772   \def\country#1{\if@ACM@affiliation@obexpunctuation\else, \fi#1\ignorespaces} 1773 \else 1774   \def\position#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}% 1775   \def\institution#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}% 1776   \newcommand\department[2][0]{\if@ACM@affiliation@obexpunctuation 1777     #2\else#2\par\fi}% 1778 % \def\streetaddress#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}% 1779 \let\city\@ACM@addtoaddress 1780 \let\state\@ACM@addtoaddress 1781 % \def\postcode#1{\if@ACM@affiliation@obexpunctuation#1\else\unskip\space#1\fi}% 1782 \let\country\@ACM@addtoaddress 1783 \fi </pre> |
|--|--|

|             |   |
|-------------|---|
| \@mkauthors | <p>Typesetting authors</p> <pre> 1784 \def\@mkauthors{\begingroup 1785   \hsize=\textwidth 1786   \ifcase\ACM@format@nr 1787   \relax % manuscript 1788     \@mkauthors@i 1789   \or % acmsmall 1790     \@mkauthors@i 1791   \or % acmlarge 1792     \@mkauthors@i 1793   \or % acmtog 1794     \@mkauthors@i 1795   \or % sigconf 1796     \@mkauthors@iii </pre> |
|-------------|---|

```

1797 \or % siggraph
1798   \mkauthors@iii
1799 \or % sigplan
1800   \mkauthors@iii
1801 \or % sigchi
1802   \mkauthors@iii
1803 \or % sigchi-a
1804   \mkauthors@iv
1805 \fi
1806 \endgroup
1807 }

```

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

```

1808 \def\@authorfont{\Large\sffamily}

```

\@affiliationfont Font for affiliations

```

1809 \def\@affiliationfont{\normalsize\normalfont}

```

Adjusting fonts for different formats

```

1810 \ifcase\ACM@format@nr
1811 \relax % manuscript
1812 \or % acmsmall
1813   \def\@authorfont{\large\sffamily}
1814   \def\@affiliationfont{\small\normalfont}
1815 \or % acmlarge
1816 \or % acmtog
1817   \def\@authorfont{\LARGE\sffamily}
1818   \def\@affiliationfont{\large}
1819 \or % sigconf
1820   \def\@authorfont{\LARGE}
1821   \def\@affiliationfont{\large}
1822 \or % siggraph
1823   \def\@authorfont{\normalsize\normalfont}
1824   \def\@affiliationfont{\normalsize\normalfont}
1825 \or % sigplan
1826   \def\@authorfont{\Large\normalfont}
1827   \def\@affiliationfont{\normalsize\normalfont}
1828 \or % sigchi
1829   \def\@authorfont{\bfseries}
1830   \def\@affiliationfont{\mdseries}
1831 \or % sigchi-a
1832   \def\@authorfont{\bfseries}
1833   \def\@affiliationfont{\mdseries}
1834 \fi

```

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

```

1835 \def\@typeset@author@line{%
1836   \andify\@currentauthors\par\noindent

```

```

1837 \@currentauthors\def\@currentauthors{%
1838 \ifx\@currentaffiliations\@empty\else
1839 \andify\@currentaffiliations
1840 \unskip, {\@currentaffiliations}\par
1841 \fi
1842 \def\@currentaffiliations{}}

```

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

```

1843 \def\mkauthors@i{%
1844 \def\@currentauthors{%
1845 \def\@currentaffiliations{%
1846 \global\let\and\@typeset@author@line
1847 \def\@author##1{%
1848 \ifx\@currentauthors\@empty
1849 \gdef\@currentauthors{\@authorfont\MakeTextUppercase{##1}}%
1850 \else
1851 \g@addto@macro{\@currentauthors}{\and\MakeTextUppercase{##1}}%
1852 \fi
1853 \gdef\and{}}%
1854 \def\email##1##2{%
1855 \def\affiliation##1##2{%
1856 \def\@tempa{##2}\ifx\@tempa\@empty\else
1857 \ifx\@currentaffiliations\@empty
1858 \gdef\@currentaffiliations{%
1859 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
1860 \setkeys{@ACM@affiliation@}{##1}%
1861 \@affiliationfont##2}%
1862 \else
1863 \g@addto@macro{\@currentaffiliations}{\and
1864 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
1865 \setkeys{@ACM@affiliation@}{##1}##2}%
1866 \fi
1867 \fi
1868 \global\let\and\@typeset@author@line}%
1869 \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par\medskip
1870 \noindent\addresses\@typeset@author@line
1871 \par\medskip}%
1872 }

```

\mkauthors@ii \@mkauthors@iI was version used in acmtog. No longer necessary

\author@bx The box to put individual author to

```
1873 \newbox\author@bx
```

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

```
1874 \newdimen\author@bx@wd
```

\author@bx@sep The separation between the author boxes



```

1875 \newskip\author@bx@sep
1876 \author@bx@sep=1pc\relax

```

\@typeset@author@bx Typesetting the box with authors. Note that in SIGCHI-A the box is not centered.

```

1877 \def\@typeset@author@bx{\bgroup\hsize=\author@bx@wd\def\and{\par}%
1878 \global\setbox\author@bx=\vtop{\if@ACM@sigchiamode\else\centering\fi
1879 \@authorfont\@currentauthors\par\@affiliationfont
1880 \@currentaffiliation}\egroup
1881 \box\author@bx\hspace{\author@bx@sep}%
1882 \gdef\@currentauthors{}}%
1883 \gdef\@currentaffiliation{}}

```

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

```

1884 \def\@mkauthors@iii{%

```

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

```

1885 \author@bx@wd=\textwidth\relax
1886 \advance\author@bx@wd by -\author@bx@sep\relax
1887 \ifnum\@ACM@authorsperrow>0\relax
1888 \divide\author@bx@wd by \@ACM@authorsperrow\relax
1889 \else
1890 \ifcase\@num@authorgroups
1891 \relax % 0?
1892 \or % 1=one author per row
1893 \or % 2=two authors per row
1894 \divide\author@bx@wd by \@num@authorgroups\relax
1895 \or % 3=three authors per row
1896 \divide\author@bx@wd by \@num@authorgroups\relax
1897 \or % 4=two authors per row (!)
1898 \divide\author@bx@wd by 2\relax
1899 \else % three authors per row
1900 \divide\author@bx@wd by 3\relax
1901 \fi
1902 \fi
1903 \advance\author@bx@wd by -\author@bx@sep\relax

```

Now, parsing of \addresses:

```

1904 \gdef\@currentauthors{}}%
1905 \gdef\@currentaffiliation{}}%
1906 \def\@author##1{\ifx\@currentauthors\@empty
1907 \gdef\@currentauthors{\par##1}%
1908 \else
1909 \g@addto@macro\@currentauthors{\par##1}%
1910 \fi
1911 \gdef\and{}}%
1912 \def\@email##1##2{\ifx\@currentaffiliation\@empty
1913 \gdef\@currentaffiliation{\noexpand\url{##2}}%

```

```

1914 \else
1915   \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
1916 \fi}%
1917 \def\affiliation##1##2{\ifx\@currentaffiliation\empty
1918   \gdef\@currentaffiliation{%
1919     \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
1920     \setkeys{@ACM@affiliation@}{##1}##2}%
1921 \else
1922   \g@addto@macro\@currentaffiliation{\par
1923     \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
1924     \setkeys{@ACM@affiliation@}{##1}##2}%
1925 \fi
1926 \global\let\and\@typeset@author@bx
1927 }%

```

Actual typesetting is done by \and macro:

```

1928 \hsize=\textwidth
1929 \global\setbox\mktitle@bx=\vbox{\noindent
1930   \box\mktitle@bx\par\medskip\leavevmode
1931   \lineskip=1pc\relax\centering\hspace*{-1em}%
1932   \addresses\let\and\@typeset@author@bx\and\par\bigskip}}

```

\@mkauthors@iv The sigchia version. Now we put authors in the main text, and no more than 2 authors per line, unless overridden.

```

1933 \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.

```

1934 \author@bx@wd=\columnwidth\relax
1935 \advance\author@bx@wd by -\author@bx@sep\relax
1936 \ifnum\@ACM@authorsperrrow>0\relax
1937   \divide\author@bx@wd by \@ACM@authorsperrrow\relax
1938 \else
1939   \ifcase\@num@authorgroups
1940     \relax % 0?
1941     \or % 1=one author per row
1942     \else % 2=two authors per row
1943       \divide\author@bx@wd by 2\relax
1944   \fi
1945 \fi
1946 \advance\author@bx@wd by -\author@bx@sep\relax

```

Now, parsing of \addresses:

```

1947 \gdef\@currentauthors{}%
1948 \gdef\@currentaffiliation{}%
1949 \def\@author##1{\ifx\@currentauthors\empty
1950   \gdef\@currentauthors{\par##1}%
1951 \else

```

```

1952 \g@addto@macro\@currentauthors{\par##1}%
1953 \fi
1954 \gdef\and{}}%
1955 \def\email##1##2{\ifx\@currentaffiliation\@empty
1956 \gdef\@currentaffiliation{\nolinkurl{##2}}%
1957 \else
1958 \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
1959 \fi}%
1960 \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
1961 \gdef\@currentaffiliation{%
1962 \setkeys{@ACM@affiliation@}{obexpunctuation=false}%
1963 \setkeys{@ACM@affiliation@}{##1}##2}%
1964 \else
1965 \g@addto@macro\@currentaffiliation{\par
1966 \setkeys{@ACM@affiliation@}{obexpunctuation=false}%
1967 \setkeys{@ACM@affiliation@}{##1}##2}%
1968 \fi
1969 \global\let\and\@typeset@author@bx}%
1970 %

```

Actual typesetting is done by \and macro

```

1971 \bgroup\hsize=\columnwidth
1972 \par\raggedright\leftskip=\z@
1973 \lineskip=1pc\noindent
1974 \addresses\let\and\@typeset@author@bx\and\par\bigskip\egroup}

```

\@authornotemark Adding footnotemark to authors. This version adds “normal” footnotemark.

```

1975 \def\@authornotemark{\g@addto@macro\@currentauthors{\footnotemark\relax}}

```

\@@authornotemark Adding footnotemark to authors with the given number

```

1976 \def\@@authornotemark#1{\g@addto@macro\@currentauthors{\footnotemark[#1]}}

```

\@mkteasers Typesetting teasers

```

1977 \def\@mkteasers{%
1978 \ifx\@teaserfigures\@empty\else
1979 \def\@teaser##1{\par\bigskip\bgroup
1980 \captionsetup{type=figure}##1\egroup\par}
1981 \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par
1982 \noindent\@teaserfigures\par\medskip}%
1983 \fi}

```

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

```

1984 \def\@setaddresses{}

```

\@mkabstract Typesetting abstract

```

1985 \def\@mkabstract{\bgroup
1986 \ifx\@abstract\@empty\else
1987 {\phantomsection\addcontentsline{toc}{section}{Abstract}%
1988 \if@ACM@journal

```

```

1989     \small\noindent
1990     \else
1991         \section*{Abstract}%
1992     \fi
1993     \ignorespaces\@abstract\par}%
1994 \fi\egroup}

```

\@mkbibcitation Print bibcitation format

```

1995 \def\@mkbibcitation{\bgroup
1996   \def\footnotemark{}}%
1997   \def\{\unskip{} \ignorespaces}%
1998   \def\footnote{\ClassError{\@classname}{Please do note use footnotes
1999     inside \string\title{} or \string\author{} command! Use
2000     \string\titlenote{} or \string\authornote{} instead!}}%
2001   \par\medskip\small\noindent{\bfseries ACM Reference Format:}\par\nobreak
2002   \noindent\authors. \@acmYear. \@title.
2003   \if@ACM@journal
2004       \textit{\@journalNameShort}
2005       \@acmVolume, \@acmNumber, Article~\@acmArticle\ (\@acmPubDate),
2006       \ref{TotPages}~pages.
2007   \else
2008       In \textit{Proceedings of \@acmConference@name, \@acmConference@venue,
2009         \@acmConference@date
2010         \ifx\acmConference@name\acmConference@shortname\else
2011           \ (\acmConference@shortname)\fi
2012         ,} \ref{TotPages}~pages.
2013   \fi\par
2014   \noindent\@formatdoi{\@acmDOI}
2015 \par\egroup}

```

\@printendtopmatter End the top matter

```

2016 \def\@printendtopmatter{\par\medskip
2017   \ifcase\ACM@format@nr
2018     \relax % manuscript
2019     \noindent\hrulefill\par\medskip
2020   \or % acmsmall
2021     \noindent\hrulefill\par\medskip
2022   \or % acmlarge
2023     \noindent\hrulefill\par\medskip
2024   \or % acmtog
2025     \par\bigskip
2026   \or % sigconf
2027     \par\bigskip
2028   \or % siggraph
2029     \par\bigskip
2030   \or % sigplan
2031     \par\bigskip
2032   \or % sigchi
2033     \par\bigskip
2034   \or % sigchi-a

```

```

2035 \fi
2036 }

```

\setthanks We redefine \setthanks using \long

```

2037 \def\setthanks{\long\def\thanks##1{\par##1\@addpunct.}\thankses}

```

### 3.14 Headers and Footers

We use fancyhdr for our headers and footers:

```

2038 \RequirePackage{fancyhdr}

```

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

```

2039 \if@ACM@review
2040 \newsavebox{\ACM@linecount@bx}
2041 \newlength\ACM@linecount@bxht
2042 \newcount\ACM@linecount
2043 \ACM@linecount\@ne\relax
2044 \def\ACM@mk@linecount{%
2045   \savebox{\ACM@linecount@bx}[4em][t]{\parbox[t]{4em}{%
2046     \setlength{\ACM@linecount@bxht}{-\baselineskip}%
2047     \loop{\color{red}\scriptsize\the\ACM@linecount}\
2048       \global\advance\ACM@linecount by \@ne
2049       \addtolength{\ACM@linecount@bxht}{\baselineskip}%
2050       \ifdim\ACM@linecount@bxht<\textheight\repeat}}%
2051 \fi

```

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

```

2052 \def\ACM@linecountL{%
2053   \if@ACM@review
2054     \ACM@mk@linecount
2055     \begin{picture}(0,0)%
2056       \put(-26,-22){\usebox{\ACM@linecount@bx}}%
2057     \end{picture}%
2058   \fi}

```

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

```

2059 \def\ACM@linecountR{%
2060   \if@ACM@review
2061     \ACM@mk@linecount
2062     \begin{picture}(0,0)%
2063       \put(20,-22){\usebox{\ACM@linecount@bx}}%
2064     \end{picture}%
2065   \fi}

```

\ACM@timestamp The timestamp system

```

2066 \if@ACM@timestamp
2067 % Subtracting 30 from \time gives us the effect of rounding-down despite
2068 % \numexpr rounding to nearest
2069 \newcounter{ACM@time@hours}

```

```

2070 \setcounter{ACM@time@hours}{\numexpr (\time - 30) / 60 \relax}
2071 \newcounter{ACM@time@minutes}
2072 \setcounter{ACM@time@minutes}{\numexpr \time - \theACM@time@hours * 60 \relax}
2073 \newcommand\ACM@timestamp{%
2074   \footnotesize%
2075   \the\year-\two@digits{\the\month}-\two@digits{\the\day}{ }%
2076   \two@digits{\theACM@time@hours}:\two@digits{\theACM@time@minutes}{ }%
2077   page~\thepage\ (pp. \@startPage-\pageref*{TotPages})%
2078   \ifx\@acmSubmissionID\@empty\relax\else
2079     ~Submission~ID: \@acmSubmissionID
2080   \fi
2081 }
2082 \fi

```

\@shortauthors Even if the author redefined \@shortauthors, we do not print them in the anonymous mode in the headers:

```

2083 \def\@shortauthors{\if@ACM@anonymous Anon.\else\shortauthors\fi}

```

\@headfootfont The font to typeset header and footer text.

```

2084 \def\@headfootfont{%
2085   \ifcase\ACM@format@nr
2086   \relax % manuscript
2087   \sffamily
2088   \or % acmsmall
2089   \sffamily
2090   \or % acmlarge
2091   \sffamily
2092   \or % acmtog
2093   \sffamily
2094   \or % sigconf
2095   \sffamily
2096   \or % siggraph
2097   \sffamily
2098   \or % sigplan
2099   \sffamily
2100   \or % sigchi
2101   \sffamily
2102   \or % sigchi-a
2103   \sffamily
2104   \fi}

```

standardpagestyle The pagestyle for all pages but the first one

```

2105 \fancypagestyle{standardpagestyle}{%
2106   \fancyhf{}%
2107   \renewcommand{\headrulewidth}{\z@}%
2108   \renewcommand{\footrulewidth}{\z@}%
2109   \ifcase\ACM@format@nr
2110   \relax % manuscript
2111   \fancyhead[LE]{\ACM@linecountL\if@ACM@printfolios\thepage\fi}%

```

```

2112 \fancyhead[R0]{\if@ACM@printfolios\thepage\fi}%
2113 \fancyhead[RE]{\@shortauthors}%
2114 \fancyhead[LO]{\ACM@linecountL\shorttitle}%
2115 \fancyfoot[R0,LE]{\footnotesize Manuscript submitted to ACM}%
2116 \or % acmsmall
2117 \fancyhead[LE]{\ACM@linecountL\@headfootfont\@acmArticle\if@ACM@printfolios:\thepage\fi}%
2118 \fancyhead[R0]{\@headfootfont\@acmArticle\if@ACM@printfolios:\thepage\fi}%
2119 \fancyhead[RE]{\@headfootfont\@shortauthors}%
2120 \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2121 \fancyfoot[R0,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
2122 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2123 \or % acmlarge
2124 \fancyhead[LE]{\ACM@linecountL\@headfootfont
2125 \@acmArticle\if@ACM@printfolios:\thepage\fi\quad\textbullet\quad\@shortauthors}%
2126 \fancyhead[LO]{\ACM@linecountL}%
2127 \fancyhead[R0]{\@headfootfont
2128 \shorttitle\quad\textbullet\quad\@acmArticle\if@ACM@printfolios:\thepage\fi}%
2129 \fancyfoot[R0,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
2130 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2131 \or % acmtog
2132 \fancyhead[LE]{\ACM@linecountL\@headfootfont
2133 \@acmArticle\if@ACM@printfolios:\thepage\fi\quad\textbullet\quad\@shortauthors}%
2134 \fancyhead[LO]{\ACM@linecountL}%
2135 \fancyhead[RE]{\ACM@linecountR}%
2136 \fancyhead[R0]{\@headfootfont
2137 \shorttitle\quad\textbullet\quad\@acmArticle\if@ACM@printfolios:\thepage\fi\ACM@linecountR}%
2138 \fancyfoot[R0,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
2139 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2140 \else % Proceedings
2141 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2142 \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2143 \fancyhead[RE]{\@headfootfont\@shortauthors\ACM@linecountR}%
2144 \fancyhead[LE]{\ACM@linecountL\@headfootfont\acmConference@shortname,
2145 \acmConference@date, \acmConference@venue}%
2146 \fancyhead[R0]{\@headfootfont\acmConference@shortname,
2147 \acmConference@date, \acmConference@venue\ACM@linecountR}%
2148 \fi
2149 \if@ACM@sigchiamode
2150 \fancyheadoffset[L]{\dimexpr(\marginparsep+\marginparwidth)}%
2151 \fi
2152 \if@ACM@timestamp
2153 \fancyfoot[LO,RE]{\ACM@timestamp}
2154 \fi
2155 }
2156 \pagestyle{standardpagestyle}

```

```

\@folio@wd Folio blob width, height, offsets and max number
\@folio@ht 2157 \newdimen\@folio@wd
\@folio@voffset 2158 \@folio@wd=\z@
\@folio@max 2159 \newdimen\@folio@ht

```

```

2160 \@folio@ht=\z@
2161 \newdimen\@folio@voffset
2162 \@folio@voffset=\z@
2163 \def\@folio@max{1}
2164 \ifcase\ACM@format@nr
2165 \relax % manuscript
2166 \or % acmsmall
2167   \@folio@wd=45.75pt\relax
2168   \@folio@ht=1.25in\relax
2169   \@folio@voffset=.2in\relax
2170   \def\@folio@max{8}
2171 \or % acmlarge
2172   \@folio@wd=43.25pt\relax
2173   \@folio@ht=79pt\relax
2174   \@folio@voffset=-.55in\relax
2175   \def\@folio@max{10}
2176 \fi

```

\@folioblob The macro to typeset the folio blob.

```

2177 \def\@folioblob{\@tempcnta=\@acmArticleSeq\relax
First, we calculate \@acmArticleSeq modulo \@folio@max
2178 \loop
2179   \ifnum\@tempcnta>\@folio@max\relax
2180     \advance\@tempcnta by - \@folio@max
2181   \repeat
2182   \advance\@tempcnta by -1\relax
2183   \@tempdima=\@folio@ht\relax
2184   \multiply\@tempdima by \the\@tempcnta\relax
2185   \advance\@tempdima by -\@folio@voffset\relax
2186   \begin{picture}(0,0)
2187     \makebox[\z@]{\raisebox{-\@tempdima}{%
2188       \rlap{%
2189         \raisebox{-0.45\@folio@ht}{\z@}\z@}%
2190         \rule{\@folio@wd}{\@folio@ht}}}%
2191     \parbox{\@folio@wd}{%
2192       \centering
2193       \textcolor{white}{\LARGE\bfseries\sffamily\@acmArticle}}}%
2194   \end{picture}}
2195

```

firstpagestyle The pagestyle for the first page only.

```

2196 \fancypagestyle{firstpagestyle}{%
2197   \fancyhf{}%
2198   \renewcommand{\headrulewidth}{\z@}%
2199   \renewcommand{\footrulewidth}{\z@}%
2200   \ifcase\ACM@format@nr
2201   \relax % manuscript
2202   \fancyhead[L]{\ACM@linecountL}%
2203   \fancyfoot[RO,LE]{\if@ACM@printfolios\small\thepage\fi}%

```



```

2204 \fancyfoot[RE,LO]{\footnotesize Manuscript submitted to ACM}%
2205 \or % acmsmall
2206 \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
2207 \@acmNumber, Article \@acmArticle. Publication date:
2208 \@acmPubDate.}%
2209 \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2210 \fancyhead[LO]{\ACM@linecountL}%
2211 \fancyhead[RO]{\@folioblob}%
2212 \fancyheadoffset[RO,LE]{0.6\@folio@wd}%
2213 \or % acmlarge
2214 \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
2215 \@acmNumber, Article \@acmArticle. Publication date:
2216 \@acmPubDate.}%
2217 \fancyhead[RO]{\@folioblob}%
2218 \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2219 \fancyhead[LO]{\ACM@linecountL}%
2220 \fancyheadoffset[RO,LE]{1.4\@folio@wd}%
2221 \or % acmtog
2222 \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
2223 \@acmNumber, Article \@acmArticle. Publication date:
2224 \@acmPubDate.}%
2225 \fancyhead[L]{\ACM@linecountL}%
2226 \fancyhead[R]{\ACM@linecountR}%
2227 \else % Conference proceedings
2228 \fancyhead[L]{\ACM@linecountL}%
2229 \fancyhead[R]{\ACM@linecountR}%
2230 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2231 \fi
2232 \if@ACM@timestamp
2233 \ifnum\ACM@format@nr=0\relax % Manuscript
2234 \fancyfoot[LO,RE]{\ACM@timestamp\quad
2235 \footnotesize Manuscript submitted to ACM}
2236 \else
2237 \fancyfoot[LO,RE]{\ACM@timestamp}
2238 \fi
2239 \fi
2240 }

```

### 3.15 Sectioning

Sectioning is different for different levels

```

2241 \renewcommand\section{\@startsection{section}{1}{\z@}%
2242 {-0.75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2243 {.25\baselineskip}%
2244 {\@secfont}}
2245 \renewcommand\subsection{\@startsection{subsection}{2}{\z@}%
2246 {-0.75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2247 {.25\baselineskip}%
2248 {\@subsecfont}}

```

```

2249 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{10pt}%
2250 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2251 {-3.5\p@}%
2252 {\@subsubsecfont\@adddotafter}}
2253 \renewcommand\paragraph{\@startsection{paragraph}{4}{\parindent}%
2254 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2255 {-3.5\p@}%
2256 {\@parfont\@adddotafter}}
2257 \renewcommand\part{\@startsection{part}{9}{\z@}%
2258 {-10\p@ \@plus -4\p@ \@minus -2\p@}%
2259 {4\p@}%
2260 {\@parfont}}

\section@raggedright Special version of \raggedright compatible with \MakeUppercase
2261 \def\section@raggedright{\@rightskip\@flushglue
2262 \rightskip\@rightskip
2263 \leftskip\z@skip
2264 \parindent\z@}

\@secfont Fonts for sections etc. are different for different formats.
\@subsecfont
\@subsubsecfont
\@parfont
2265 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
2266 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
2267 \def\@subsubsecfont{\sffamily\itshape}
2268 \def\@parfont{\itshape}
2269 \setcounter{secnumdepth}{3}
2270 \ifcase\ACM@format@nr
2271 \relax % manuscript
2272 \or % acmsmall
2273 \or % acmlarge
2274 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
2275 \def\@subsecfont{\sffamily\large\section@raggedright}
2276 \or % acmtog
2277 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
2278 \def\@subsecfont{\sffamily\large\section@raggedright}
2279 \or % sigconf
2280 \def\@secfont{\bfseries\Large\section@raggedright\MakeTextUppercase}
2281 \def\@subsecfont{\bfseries\Large\section@raggedright}
2282 \or % siggraph
2283 \def\@secfont{\bfseries\sffamily\Large\section@raggedright\MakeTextUppercase}
2284 \def\@subsecfont{\bfseries\sffamily\Large\section@raggedright}
2285 \or % sigplan
2286 \def\@secfont{\bfseries\Large\section@raggedright}
2287 \def\@subsecfont{\bfseries\section@raggedright}
2288 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{\z@}%
2289 {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2290 {.25\baselineskip}%
2291 {\@subsubsecfont}}
2292 \def\@subsubsecfont{\bfseries\section@raggedright}
2293 \renewcommand\paragraph{\@startsection{paragraph}{4}{\z@}%
2294 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%

```

```

2295 {-3.5\p@}%
2296 {\@parfont\@addspaceafter}}
2297 \def\@parfont{\bfseries\itshape}
2298 \renewcommand\subparagraph{\@startsection{subparagraph}{5}{\z@}%
2299 {-1.5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2300 {-3.5\p@}%
2301 {\@subparfont\@addspaceafter}}
2302 \def\@subparfont{\itshape}
2303 \or % sigchi
2304 \setcounter{secnumdepth}{1}
2305 \def\@secfont{\bfseries\sffamily\section@raggedright\MakeTextUppercase}
2306 \def\@subsecfont{\bfseries\sffamily\section@raggedright}
2307 \or % sigchi-a
2308 \setcounter{secnumdepth}{0}
2309 \def\@secfont{\bfseries\sffamily\section@raggedright\MakeTextUppercase}
2310 \def\@subsecfont{\bfseries\sffamily\section@raggedright}
2311 \fi

```

\@adddotafter Add punctuation after the command

```
2312 \def\@adddotafter#1{#1\@addpunct{.}}
```

\@addspaceafter Add space after the command

```
2313 \def\@addspaceafter#1{#1\@addpunct{\enspace}}
```

### 3.16 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.

```
2314 \providecommand*\@dotsep{4.5}
```

### 3.17 Theorems

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

```
2315 \def\@acmplainbodyfont{\itshape}
```

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

```
2316 \def\@acmplainindent{\parindent}
```

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

```
2317 \def\@acmplainheadfont{\scshape}
```

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

```
2318 \def\@acmplainnotefont{\@empty}
```

Customization of acmplain theorem style:

```

2319 \ifcase\ACM@format@nr
2320 \relax % manuscript
2321 \or % acmsmall
2322 \or % acmlarge
2323 \or % acmtog
2324 \or % sigconf
2325 \or % siggraph
2326 \or % sigplan
2327 \def\@acmplainbodyfont{\itshape}
2328 \def\@acmplainindent{\z@}
2329 \def\@acmplainheadfont{\bfseries}
2330 \def\@acmplainnotefont{\normalfont}
2331 \or % sigchi
2332 \or % sigchi-a
2333 \fi

```

acmplain The acmplain theorem style

```

2334 \newtheoremstyle{acmplain}%
2335 { .5\baselineskip \@plus.2\baselineskip
2336   \@minus.2\baselineskip}% space above
2337 { .5\baselineskip \@plus.2\baselineskip
2338   \@minus.2\baselineskip}% space below
2339 {\@acmplainbodyfont}% body font
2340 {\@acmplainindent}% indent amount
2341 {\@acmplainheadfont}% head font
2342 { .}% punctuation after head
2343 { .5em}% spacing after head
2344 {\thmname{#1}\thmnumber{ #2}\thmnote{ {\@acmplainnotefont{#3}}}}% head spec

```

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

```
2345 \def\@acmdefinitionbodyfont{\normalfont}
```

\@acmdefinitionindent The amount to indent the acmdefinition theorem style.

```
2346 \def\@acmdefinitionindent{\parindent}
```

\@acmdefinitionheadfont The font to typeset the acmdefinition theorem style head.

```
2347 \def\@acmdefinitionheadfont{\itshape}
```

\@acmdefinitionnotefont The font to typeset the acmdefinition theorem style note.

```
2348 \def\@acmdefinitionnotefont{\@empty}
```

Customization of acmdefinition theorem style:

```

2349 \ifcase\ACM@format@nr
2350 \relax % manuscript
2351 \or % acmsmall
2352 \or % acmlarge
2353 \or % acmtog
2354 \or % sigconf

```

```

2355 \or % siggraph
2356 \or % sigplan
2357 \def\acmdefinitionbodyfont{\normalfont}
2358 \def\acmdefinitionindent{\z@}
2359 \def\acmdefinitionheadfont{\bfseries}
2360 \def\acmdefinitionnotefont{\normalfont}
2361 \or % sigchi
2362 \or % sigchi-a
2363 \fi

acmdefinition The acmdefinition theorem style
2364 \newtheoremstyle{acmdefinition}%
2365   {.5\baselineskip\@plus.2\baselineskip
2366     \@minus.2\baselineskip}% space above
2367   {.5\baselineskip\@plus.2\baselineskip
2368     \@minus.2\baselineskip}% space below
2369   {\acmdefinitionbodyfont}% body font
2370   {\acmdefinitionindent}% indent amount
2371   {\acmdefinitionheadfont}% head font
2372   {.}% punctuation after head
2373   {.5em}% spacing after head
2374   {\thmname{#1}\thmnumber{ #2}\thmnote{ {\acmdefinitionnotefont{#3}}}}% head spec

The definitions for theorems:
2375 \theoremstyle{acmplain}
2376 \newtheorem{theorem}{Theorem}[section]
2377 \newtheorem{conjecture}[theorem]{Conjecture}
2378 \newtheorem{proposition}[theorem]{Proposition}
2379 \newtheorem{lemma}[theorem]{Lemma}
2380 \newtheorem{corollary}[theorem]{Corollary}
2381 \theoremstyle{acmdefinition}
2382 \newtheorem{example}[theorem]{Example}
2383 \newtheorem{definition}[theorem]{Definition}
2384 \theoremstyle{acmplain}

\@proofnamefont The font to typeset the proof name.
2385 \def\@proofnamefont{\scshape}

\@proofindent Whether or not to indent proofs.
2386 \def\@proofindent{\indent}

Customization of proof environment.
2387 \ifcase\ACM@format@nr
2388 \relax % manuscript
2389 \or % acmsmall
2390 \or % acmlarge
2391 \or % acmtog
2392 \or % sigconf
2393 \or % siggraph

```

```

2394 \or % sigplan
2395 \def\@proofnamefont{\itshape}
2396 \def\@proofindent{\noindent}
2397 \or % sigchi
2398 \or % sigchi-a
2399 \fi

proof We want some customization of proof environment.

2400 \renewenvironment{proof}[1][\proofname]{\par
2401 \pushQED{\qed}%
2402 \normalfont \topsep6\p@\@plus6\p@\relax
2403 \trivlist
2404 \item[\@proofindent\hskip\labelsep
2405 {\@proofnamefont #1\@addpunct{.}}]\ignorespaces
2406 }{%
2407 \popQED\endtrivlist\@endpfalse
2408 }

```

### 3.18 Acknowledgments

```

\acks This is a comment-like structure

2409 \specialcomment{acks}{%
2410 \begingroup
2411 \section*{Acknowledgments}
2412 \phantomsection\addcontentsline{toc}{section}{Acknowledgments}
2413 }{%
2414 \endgroup
2415 }

```

\grantsponsor We just typeset the name of the sponsor

```

2416 \def\grantsponsor#1#2#3{#2}

```

\grantnum

```

2417 \newcommand\grantnum[3][\]{#3%
2418 \def\@tempa{#1}\ifx\@tempa\@empty\else\space(\url{#1})\fi}

```

### 3.19 Conditional typesetting

We use the comment package for conditional typesetting:

```

2419 \if@ACM@screen
2420 \includecomment{screenonly}
2421 \excludecomment{printonly}
2422 \else
2423 \excludecomment{screenonly}
2424 \includecomment{printonly}
2425 \fi
2426 \if@ACM@anonymous
2427 \excludecomment{anonsuppress}

```

```

2428 \excludecomment{acks}
2429 \else
2430 \includecomment{anonsuppress}
2431 \fi

```

### 3.20 Additional bibliography commands

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

```

2432 \newcommand\showeprint[2][arxiv]{%
2433   \def\@tempa{#1}%
2434   \ifx\@tempa\@empty\def\@tempa{arxiv}\fi
2435   \def\@tempb{arxiv}%
2436   \ifx\@tempa\@tempb
2437     arXiv:\href{http://arxiv.org/abs/#2}{#2}\else arXiv:#2%
2438   \fi}

```

### 3.21 End of Class

```

2439 \normalsize\normalfont\frenchspacing
2440 \end{class}

```

## References

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## Change History

|       |   |    |       |  |    |
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