

L^AT_EX Class for *Association for Computing Machinery**

Boris Veytsman[†]

2017/04/23, v1.35

Abstract

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

Contents

1	Introduction	3
2	User's guide	3
2.1	Installation	3
2.2	Invocation and options	5
2.3	Topmatter commands	7
2.4	Algorithms	17
2.5	Figures and tables	18
2.6	Theorems	19
2.7	Online-only and offline-only material	19
2.8	Note about anonymous mode	20
2.9	Acknowledgments	20
2.10	Bibliography	21
2.11	Colors	23
2.12	Other notable packages and typographic remarks	24
2.13	A note for wizards: <code>acmart-preload-hook.tex</code>	24
3	Implementation	26
3.1	Identification	26
3.2	Preload	26
3.3	Options	26
3.4	Setting switches	29

*©2016–2017, Association for Computing Machinery

[†]borisv@lk.net, boris@varphi.com

3.5	Loading base class and package	30
3.6	Paper size and paragraphing	37
3.7	Fonts	40
3.8	Floats	40
3.9	Lists	42
3.10	Top matter data	43
3.11	Concepts system	54
3.12	Copyright system	55
3.13	Typesetting top matter	59
3.14	Headers and Footers	73
3.15	Sectioning	78
3.16	TOC Lists	80
3.17	Theorems	80
3.18	Acknowledgments	82
3.19	Conditional typesetting	83
3.20	Additional bibliography commands	83
3.21	End of Class	83

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 profession¹. It was one of the early adopters of T_EX 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^AT_EX package.

The package uses only free T_EX packages and fonts included in T_EXLive, MikT_EX and other popular T_EX 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_EX 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_EX 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^AT_EX can find them (see [?] or the documentation for your T_EX system).
3. Update the database of file names. Again, see [?] or the documentation for your T_EX 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).

¹<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_EX distributions (T_EXLive, MacT_EX, MikT_EX) of 2015 and later, so you probably have them installed. Just in case here is the list of these packages:

- *amscs*, <http://www.ctan.org/pkg/amscs>
- *amsfonts*, <http://www.ctan.org/pkg/amsfonts>
- *amsmath*, <http://www.ctan.org/pkg/amsmath>
- *binhex*, <http://www.ctan.org/pkg/binhex>
- *caption*, <http://www.ctan.org/pkg/caption>
- *comment*, <http://www.ctan.org/pkg/comment>
- *cm-super*, <http://www.ctan.org/pkg/cm-super>
- *cmap*, <http://www.ctan.org/pkg/cmap>
- *draftwatermark*, <http://www.ctan.org/pkg/draftwatermark>
- *environ*, <http://www.ctan.org/pkg/environ>
- *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>
- *latex-tools*, <http://www.ctan.org/pkg/latex-tools>
- *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>
- *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>

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, 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, PACMPL, 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` [?].

`\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
JOCCH	ACM Journal on Computing and Cultural Heritage
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 the this command 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 (with a SIG format) 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 \TeX), 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).

`\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 numerical,
`\acmYear` 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: `\acmBadgerR[<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}
```

Table 4: Parameters for `\setcopyright` command

Parameter	Meaning
<code>none</code>	The copyright and permission information is not typeset (this is the option for some ACM conferences).
<code>acmcopyright</code>	The authors transfer the copyright to ACM (the “traditional” choice).
<code>acmlicensed</code>	The authors retain the copyright but license the publication rights to ACM.
<code>rightsretained</code>	The authors retain the copyright and publication rights to themselves or somebody else.
<code>usgov</code>	All the authors are employees of the US Government.
<code>usgovmixed</code>	Some authors are employees of the US Government.
<code>cagov</code>	All the authors are employees of the Canadian Government.
<code>cagovmixed</code>	Some authors are employees of the Canadian Government.

`\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 .

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)

`teaserfigure` A special kind of figure is used for many two-column conference proceedings. This figure is placed just after the authors, but before the main text. The environment `teaserfigure` is used for these figures. This environment must be used *before* `\maketitle`, for example,

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

`\settopmatter` Some information in the top matter is printed for certain journals or proceedings and suppressed for others. You 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}
```

`\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 now several good packages for typesetting algorithms [?, ?, ?], 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 types 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` [?] 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 [?]. 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
sourcernote. This is a table sourcernote. This is a table
sourcernote.

\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
screenonly

 Some supplementary material in ACM publication is put online, but not in the printed

version. The text inside the environment `screenonly` will be typeset only when the option `screen` (see Section 2.2) is set to `true`. Conversely, the text inside the environment `printonly` is typeset only when this option is set to `false`. For example

```
\section{Supplementary materials}

\begin{printonly}
  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{\sponsorID}{\name}{\url}
\grantnum[\url]{\sponsorID}{\number}.
```

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

At present $\{\langle sponsorID \rangle\}$ is chosen by the authors and can be an arbitrary key, in the same way the label of `\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_{TeX} 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_{TeX} 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",
}

```

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 [?]: 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* [?] is recommended for complex figures with several subplots or subfigures that require separate subcaptioning. The packages *nomencl* [?] and *glossaries* [?] 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 `sloppy` environment might help—but beware the results might be, well, sloppy.

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 [2017/04/23 v1.35 Typesetting articles for Association of
7 Computing Machinery]
```

And the driver code:

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

3.2 Preload

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}
```

format The possible formats

```

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

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

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

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

\if@ACM@natbib@override

```

```

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

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

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

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

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

```

```

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

```

3.4 Setting switches

```

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

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

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

```

Setting up switches

```

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

```

3.5 Loading base class and package

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

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

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

```
175 \RequirePackage{totpages}
```

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

```
176 \RequirePackage{environ}
```

We use `setspace` for doublespacing

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

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

```
181 \if@ACM@natbib
182 \RequirePackage{natbib}
183 \renewcommand{\bibsection}{%
184   \section*{\refname}%
185   \phantomsection\addcontentsline{toc}{section}{\refname}%
186 }
```

```

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

```

```

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

```

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

```

261 \newcommand{\bibstyle@acmauthoryear}{%
262 \setcitestyle{%
263 authoryear,%
264 open={},close={}},citesep={;},%
265 aysep={},yysep={},%
266 noteseq={, }}

```

`\bibstyle@acmnumeric` The default numeric format:

```

267 \newcommand{\bibstyle@acmnumeric}{%
268 \setcitestyle{%
269 numbers,sort&compress,%
270 open={},close={}},citesep={},%
271 noteseq={, }}

```

The default is numeric:

```

272 \if@ACM@natbib
273 \citestyle{acmnumeric}
274 \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:

```

275 \def\@startsection#1#2#3#4#5#6{%

```



```

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

```

```

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

```

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

```

367 \def\@starttoc#1#2{\begingroup
368     \setTrue{#1}%
369     \par\removelastskip\vskip\z@skip
370     \@startsection{section}\@M\z@{\linespacing\@plus\linespacing}%
371     {.5\linespacing}{\centering\contentsnamefont}{#2}%
372     \@input{\jobname.#1}%
373     \if@files

```

```

374 \exp\newwrite\csname tf@#1\endcsname
375 \immediate\exp\openout\csname tf@#1\endcsname \jobname.#1\relax
376 \fi
377 \global\@nobreakfalse \endgroup
378 \addvspace{32\p@\@plus14\p@}%
379 }

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

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

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

Bibliography mangling.
414 \if@ACM@natbib
415 \let\cite\cite

```

```

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

```

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

```

433 \def\bibliographystyle#1{%
434   \ifx\@begindocumenthook\@undefined\else
435     \expandafter\AtBeginDocument
436   \fi
437   {\if@filesw
438     \immediate\write\@auxout{\string\bibstyle{#1}}}%
439   \fi}}

```

Graphics and color

```

440 \RequirePackage{graphicx, xcolor}

```

We define ACM colors according to [?]:

```

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

```

Author draft mode

```

449 \if@ACM@authordraft
450   \RequirePackage{draftwatermark}
451   \SetWatermarkFontSize{0.5in}
452   \SetWatermarkColor[gray]{.9}
453   \SetWatermarkText{\parbox{12em}{\centering
454     Unpublished working draft\
455     Not for distribution}}
456 \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>.

```
457 \RequirePackage{geometry}
458 \ifcase\ACM@format@nr
459 \relax % manuscript
460   \geometry{letterpaper,head=13pt,
461     marginparwidth=6pc}%
462 \or % acmsmall
463   \geometry{twoside=true,
464     includeheadfoot, head=13pt, foot=2pc,
465     paperwidth=6.75in, paperheight=10in,
466     top=58pt, bottom=44pt, inner=46pt, outer=46pt,
467     marginparwidth=2pc
468   }%
469 \or % acmlarge
470   \geometry{twoside=true, head=13pt, foot=2pc,
471     paperwidth=8.5in, paperheight=11in,
472     includeheadfoot,
473     top=78pt, bottom=114pt, inner=81pt, outer=81pt,
474     marginparwidth=4pc
475   }%
476 \or % acmtog
477   \geometry{twoside=true, head=13pt, foot=2pc,
478     paperwidth=8.5in, paperheight=11in,
479     includeheadfoot, columnsep=24pt,
480     top=52pt, bottom=75pt, inner=52pt, outer=52pt,
481     marginparwidth=2pc
482   }%
483 \or % sigconf
484   \geometry{twoside=true, head=13pt,
485     paperwidth=8.5in, paperheight=11in,
486     includeheadfoot, columnsep=2pc,
487     top=57pt, bottom=73pt, inner=54pt, outer=54pt,
488     marginparwidth=2pc
489   }%
490 \or % siggraph
491   \geometry{twoside=true, head=13pt,
492     paperwidth=8.5in, paperheight=11in,
493     includeheadfoot, columnsep=2pc,
494     top=57pt, bottom=73pt, inner=54pt, outer=54pt,
495     marginparwidth=2pc
496   }%
497 \or % sigplan
498   \geometry{twoside=true, head=13pt,
499     paperwidth=8.5in, paperheight=11in,
500     includeheadfoot=false, columnsep=2pc,
501     top=1in, bottom=1in, inner=0.75in, outer=0.75in,
```

```

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

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

```

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.

```

535 \def\copyrightpermissionfootnoterule{\kern-3\p@
536   \hrule \@width \columnwidth \kern 2.6\p@}

537 \RequirePackage{manyfoot}
538 \SelectFootnoteRule[2]{copyrightpermission}
539 \DeclareNewFootnote{copyrightpermission}

```

```

\footnoterule Tschichold's rules:
540 \def\footnoterule{\kern-3\p@
541   \hrule \@width 4pc \kern 2.6\p@}

\endminipage We do not use footnote rules in minipages
542 \def\endminipage{%
543   \par
544   \unskip
545   \ifvoid\@mpfootins\else
546     \vskip\skip\@mpfootins
547     \normalcolor
548     \unvbox\@mpfootins
549   \fi
550   \@minipagefalse %% added 24 May 89
551   \color@endgroup
552   \egroup
553   \expandafter\@iiiparbox\@mpargs{\unvbox\@tempboxa}}

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

\@footnotetext In sigchi-a mode our footnotes are on the margins!
555 \if@ACM@sigchiamode
556 \long\def\@footnotetext#1{\marginpar{%
557   \reset@font\small
558   \interlinepenalty\interfootnotelinepenalty
559   \protected@edef\@currentlabel{%
560     \csname p@footnote\endcsname\@thefnmark
561   }%
562   \color@begingroup
563     \@makefnmark{%
564       \rule{z@footnotesep}{\ignorespaces#1\@finalstrut\strutbox}%
565     \color@endgroup}}%
566 \fi

\@mpfootnotetext We want the footnotes in minipages centered:
567 \long\def\@mpfootnotetext#1{%
568   \global\setbox\@mpfootins\vbox{%
569     \unvbox\@mpfootins
570     \reset@font\footnotesize
571     \hsize\columnwidth
572     \@parboxrestore
573     \protected@edef\@currentlabel
574       {\csname p@mpfootnote\endcsname\@thefnmark}%
575     \color@begingroup\centering
576       \@makefnmark{%
577         \rule{z@footnotesep}{\ignorespaces#1\@finalstrut\strutbox}%
578       \color@endgroup}}

```

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

```
579 \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}
```

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

```
580 \def\@textbottom{\vskip \z@ \@plus 1pt}
```

```
581 \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.

```
582 \RequirePackage{iftex}
```

```
583 \ifPDFTeX
```

```
584 \input{glyphtounicode}
```

```
585 \pdfgentounicode=1
```

```
586 \fi
```

```
587 \RequirePackage{cmap}
```

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

```
588 \newif\if@ACM@newfonts
```

```
589 \@ACM@newfontstrue
```

```
590 \IfFileExists{libertine.sty}{\ClassWarning{\@classname}{You do not  
591 have libertine package installed. Please upgrade your
```

```
592 TeX}\@ACM@newfontsfalse}
```

```
593 \IfFileExists{zi4.sty}{\ClassWarning{\@classname}{You do not  
594 have zi4 package installed. Please upgrade your TeX}\@ACM@newfontsfalse}
```

```
595 \IfFileExists{newtxmath.sty}{\ClassWarning{\@classname}{You do not  
596 have newtxmath package installed. Please upgrade your
```

```
597 TeX}\@ACM@newfontsfalse}
```

We use Libertine throughout.

```
598 \if@ACM@newfonts
```

```
599 \RequirePackage[tt=false, type1=true]{libertine}
```

```
600 \RequirePackage[varqu]{zi4}
```

```
601 \RequirePackage[libertine]{newtxmath}
```

```
602 \RequirePackage[T1]{fontenc}
```

```
603 \fi
```

The SIGCHI extended abstracts are sans serif:

```
604 \if@ACM@sigchiamode
```

```
605 \renewcommand{\familydefault}{\sfdefault}
```

```
606 \fi
```

3.8 Floats

We use caption package

```
607 \RequirePackage{caption, float}
```

```
608 \captionsetup[table]{position=top}
```



```

609 \if@ACM@journal
610   \captionsetup{labelfont={sf}, small},
611   textfont={sf, small}, margin=\z@}
612   \captionsetup[figure]{name={Fig.}}
613 \else
614   \captionsetup{labelfont={bf},
615     textfont={bf}, labelsep=colon, margin=\z@}
616   \ifcase\ACM@format@nr
617   \relax % manuscript
618   \or % acmsmall
619   \or % acmlarge
620   \or % acmtog
621   \or % sigconf
622   \or % siggraph
623     \captionsetup{textfont={it}}
624   \or % sigplan
625     \captionsetup{labelfont={bf},
626       textfont={normalfont}, labelsep=period, margin=\z@}
627   \or % sigchi
628     \captionsetup[figure]{labelfont={bf}, small},
629     textfont={bf, small}}
630   \or % sigchi-a
631     \captionsetup[figure]{labelfont={bf}, small},
632     textfont={bf, small}}
633   \fi
634 \fi

```

sidebar The sidebar environment:

```

635 \newfloat{sidebar}{}{sbar}
636 \floatname{sidebar}{Sidebar}
637 \renewenvironment{sidebar}{}{\Collect@Body\@sidebar}{}

```

\@sidebar The processing of the saved text

```

638 \long\def\@sidebar#1{\bgroup\captionsetup{type=sidebar}%
639   \marginpar{\small#1}\egroup}

```

marginfigure The marginfigure environment:

```

640 \newenvironment{marginfigure}{}{\Collect@Body\@marginfigure}{}

```

\@marginfigure The processing of the saved text

```

641 \long\def\@marginfigure#1{\bgroup\captionsetup{type=figure}%
642   \marginpar{\centering\small#1}\egroup}

```

margintable The margintable environment:

```

643 \newenvironment{margintable}{}{\Collect@Body\@margintable}{}

```

\@margintable The processing of the saved text

```

644 \long\def\@margintable#1{\bgroup\captionsetup{type=table}%
645   \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
646 \newdimen\fulltextwidth
647 \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)
648 \if@ACM@sigchiamode
649 \def\@dblfloat{\bgroup\columnwidth=\fulltextwidth
650 \let\@endfloatbox\@endwidefloatbox
651 \def\@fpsaddddefault{\def\@fps{tp}}}%
652 \@float}
653 \fi

\end@dblfloat And the end. Just adding a \bgroup.
654 \if@ACM@sigchiamode
655 \def\end@dblfloat{%
656 \end@float\egroup}
657 \fi

\@endwidefloatbox This is the end of a wide box - we basically move everything to the left
658 \def\@endwidefloatbox{%
659 \par\vskip\z@skip
660 \@minipagefalse
661 \outer@nobreak
662 \egroup
663 \color@endbox
664 \global\setbox\@currbox=\vbox{\moveleft
665 \dimexpr(\fulltextwidth-\textwidth)\box\@currbox}%
666 \wd\@currbox=\textwidth
667 }
```

3.9 Lists

```
668 \ifcase\ACM@format@nr
669 \relax % manuscript
670 \or % acmsmall
671 \or % acmlarge
672 \or % acmtog
673 \or % sigconf
674 \or % siggraph
675 \or % sigplan
676 \def\labelenumi{\theenumi.}
677 \def\labelenumii{\theenumii.}
678 \def\labelenumiii{\theenumiii.}
679 \def\labelenumiv{\theenumiv.}
680 \or % sigchi
```

```

681 \or % sigchi-a
682 \fi

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

\description AMS uses additional indent of 6pt. Frank recommends dropping it.
684 \renewenvironment{description}{\list{}{%
685     \itemindent-12\p@
686     \labelwidth\z@ \let\makelabel\descriptionlabel}%
687 }{
688     \endlist
689 }
690 \let\enddescription=\endlist % for efficiency

```

3.10 Top matter data

We use keyval interface to define journal title and relevant information

```

691 \define@choicekey*+{ACM}{acmJournal}[\@journalCode\@journalCode@nr]{%
692   CIE,%
693   CSUR,%
694   IMWUT,%
695   JACM,%
696   JDIQ,%
697   JEA,%
698   JERIC,%
699   JETC,%
700   JOCCH,%
701   PACMPL,%
702   POMACS,%
703   TAAS,%
704   TACCESS,%
705   TACO,%
706   TALG,%
707   TALLIP,%
708   TAP,%
709   TCPS,%
710   TEAC,%
711   TECS,%
712   TIIS,%
713   TISSEC,%
714   TIST,%
715   TKDD,%
716   TMIS,%
717   TOCE,%
718   TOCHI,%
719   TOCL,%
720   TOCS,%
721   TOCT,%

```

```

722 TODAES,%
723 TODS,%
724 TOG,%
725 TOIS,%
726 TOIT,%
727 TOMACS,%
728 TOMM,%
729 TOMPECS,%
730 TOMS,%
731 TOPC,%
732 TOPS,%
733 TOPLAS,%
734 TOS,%
735 TOSEM,%
736 TOSN,%
737 TRETTS,%
738 TSAS,%
739 TSC,%
740 TSLP,%
741 TWEB%
742 }{%
743 \ifcase\@journalCode@nr
744 \relax % CIE
745 \def\@journalName{ACM Computers in Entertainment}%
746 \def\@journalNameShort{ACM Comput. Entertain.}%
747 \def\@permissionCodeOne{1544-3574}%
748 \or % CSUR
749 \def\@journalName{ACM Computing Surveys}%
750 \def\@journalNameShort{ACM Comput. Surv.}%
751 \def\@permissionCodeOne{0360-0300}%
752 \or % IMWUT
753 \def\@journalName{Proceedings of the ACM on Interactive, Mobile,
754 Wearable and Ubiquitous Technologies}%
755 \def\@journalNameShort{Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.}%
756 \def\@permissionCodeOne{2474-9567}%
757 \or % JACM
758 \def\@journalName{Journal of the ACM}%
759 \def\@journalNameShort{J. ACM}%
760 \def\@permissionCodeOne{0004-5411}%
761 \or % JDIQ
762 \def\@journalName{ACM Journal of Data and Information Quality}%
763 \def\@journalNameShort{ACM J. Data Inform. Quality}%
764 \def\@permissionCodeOne{1936-1955}%
765 \or % JEA
766 \def\@journalName{ACM Journal of Experimental Algorithmics}%
767 \def\@journalNameShort{ACM J. Exp. Algor.}%
768 \def\@permissionCodeOne{1084-6654}%
769 \or % JERIC
770 \def\@journalName{ACM Journal of Educational Resources in Computing}%
771 \def\@journalNameShort{ACM J. Edu. Resources in Comput.}%

```

```

772 \def\@permissionCodeOne{1073-0516}%
773 \or % JETC
774 \def\@journalName{ACM Journal on Emerging Technologies in Computing Systems}%
775 \def\@journalNameShort{ACM J. Emerg. Technol. Comput. Syst.}%
776 \def\@permissionCodeOne{1550-4832}%
777 \or % JOCCH
778 \def\@journalName{ACM Journal on Computing and Cultural Heritage}%
779 \def\@journalName{ACM J. Comput. Cult. Herit.}%
780 \or % PACMPL
781 \def\@journalName{Proceedings of the ACM on Programming Languages}%
782 \def\@journalName{Proc. ACM Program. Lang.}%
783 \def\@permissionCodeOne{2475-1421}%
784 \or % POMACS
785 \def\@journalName{Proceedings of the ACM on Measurement and Analysis of Computing Systems}%
786 \def\@journalName{Proc. ACM Meas. Anal. Comput. Syst.}%
787 \def\@permissionCodeOne{2476-1249}%
788 \or % TAAS
789 \def\@journalName{ACM Transactions on Autonomous and Adaptive Systems}%
790 \def\@journalNameShort{ACM Trans. Autonom. Adapt. Syst.}%
791 \def\@permissionCodeOne{1556-4665}%
792 \or % TACCESS
793 \def\@journalName{ACM Transactions on Accessible Computing}%
794 \def\@journalNameShort{ACM Trans. Access. Comput.}%
795 \def\@permissionCodeOne{1936-7228}%
796 \or % TACO
797 \def\@journalName{ACM Transactions on Architecture and Code Optimization}%
798 \or % TALG
799 \def\@journalName{ACM Transactions on Algorithms}%
800 \def\@journalNameShort{ACM Trans. Algor.}%
801 \def\@permissionCodeOne{1549-6325}%
802 \or % TALLIP
803 \def\@journalName{ACM Transactions on Asian and Low-Resource Language Information Processing}%
804 \def\@journalNameShort{ACM Trans. Asian Low-Resour. Lang. Inf. Process.}%
805 \def\@permissionCodeOne{2375-4699}%
806 \or % TAP
807 \def\@journalName{ACM Transactions on Applied Perception}%
808 \or % TCPS
809 \def\@journalName{ACM Transactions on Cyber-Physical Systems}%
810 \or % TEAC
811 \def\@journalName{ACM Transactions on Economics and Computation}%
812 \or % TECS
813 \def\@journalName{ACM Transactions on Embedded Computing Systems}%
814 \def\@journalNameShort{ACM Trans. Embedd. Comput. Syst.}%
815 \def\@permissionCodeOne{1539-9087}%
816 \or % TIIS
817 \def\@journalName{ACM Transactions on Interactive Intelligent Systems}%
818 \def\@journalNameShort{ACM Trans. Interact. Intell. Syst.}%
819 \def\@permissionCodeOne{2160-6455}%
820 \or % TISSEC
821 \def\@journalName{ACM Transactions on Information and System Security}%

```

```

822 \def\@journalNameShort{ACM Trans. Info. Syst. Sec.}%
823 \def\@permissionCodeOne{1094-9224}%
824 \or % TIST
825 \def\@journalName{ACM Transactions on Intelligent Systems and Technology}%
826 \def\@journalNameShort{ACM Trans. Intell. Syst. Technol.}%
827 \def\@permissionCodeOne{2157-6904}%
828 \or % TKDD
829 \def\@journalName{ACM Transactions on Knowledge Discovery from Data}%
830 \def\@journalNameShort{ACM Trans. Knowl. Discov. Data.}%
831 \def\@permissionCodeOne{1556-4681}%
832 \or % TMIS
833 \def\@journalName{ACM Transactions on Management Information Systems}%
834 \def\@journalNameShort{ACM Trans. Manag. Inform. Syst.}%
835 \def\@permissionCodeOne{2158-656X}%
836 \or % TOCE
837 \def\@journalName{ACM Transactions on Computing Education}%
838 \def\@journalNameShort{ACM Trans. Comput. Educ.}%
839 \def\@permissionCodeOne{1946-6226}%
840 \or % TOCHI
841 \def\@journalName{ACM Transactions on Computer-Human Interaction}%
842 \def\@journalNameShort{ACM Trans. Comput.-Hum. Interact.}%
843 \def\@permissionCodeOne{1073-0516}%
844 \or % TOCL
845 \def\@journalName{ACM Transactions on Computational Logic}%
846 \def\@journalNameShort{ACM Trans. Comput. Logic}%
847 \def\@permissionCodeOne{1529-3785}%
848 \or % TOCS
849 \def\@journalName{ACM Transactions on Computer Systems}%
850 \def\@journalNameShort{ACM Trans. Comput. Syst.}%
851 \def\@permissionCodeOne{0734-2071}%
852 \or % TOCT
853 \def\@journalName{ACM Transactions on Computation Theory}%
854 \def\@journalNameShort{ACM Trans. Comput. Theory}%
855 \def\@permissionCodeOne{1942-3454}%
856 \or % TODAES
857 \def\@journalName{ACM Transactions on Design Automation of Electronic Systems}%
858 \def\@journalNameShort{ACM Trans. Des. Autom. Electron. Syst.}%
859 \def\@permissionCodeOne{1084-4309}%
860 \or % TODS
861 \def\@journalName{ACM Transactions on Database Systems}%
862 \def\@journalNameShort{ACM Trans. Datab. Syst.}%
863 \def\@permissionCodeOne{0362-5915}%
864 \or % TOG
865 \def\@journalName{ACM Transactions on Graphics}%
866 \def\@journalNameShort{ACM Trans. Graph.}%
867 \def\@permissionCodeOne{0730-0301}%
868 \or % TOIS
869 \def\@journalName{ACM Transactions on Information Systems}%
870 \def\@journalName{ACM Transactions on Information Systems}%
871 \def\@permissionCodeOne{1046-8188}%

```

```

872 \or % TOIT
873   \def\@journalName{ACM Transactions on Internet Technology}%
874   \def\@journalNameShort{ACM Trans. Internet Technol.}%
875   \def\@permissionCodeOne{1533-5399}%
876 \or % TOMACS
877   \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
878   \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
879   \def\@journalNameShort{ACM Trans. Model. Comput. Simul.}%
880 \or % TOMM
881   \def\@journalName{ACM Transactions on Multimedia Computing, Communications and Applications}%
882   \def\@journalNameShort{ACM Trans. Multimedia Comput. Commun. Appl.}%
883   \def\@permissionCodeOne{1551-6857}%
884   \def\@permissionCodeTwo{0100}%
885 \or % TOMPECS
886   \def\@journalName{ACM Transactions on Modeling and Performance Evaluation of Computing Systems}%
887   \def\@journalNameShort{ACM Trans. Model. Perform. Eval. Comput. Syst.}%
888   \def\@permissionCodeOne{2376-3639}%
889 \or % TOMS
890   \def\@journalName{ACM Transactions on Mathematical Software}%
891   \def\@journalNameShort{ACM Trans. Math. Softw.}%
892   \def\@permissionCodeOne{0098-3500}%
893 \or % TOPC
894   \def\@journalName{ACM Transactions on Parallel Computing}%
895   \def\@journalNameShort{ACM Trans. Parallel Comput.}%
896   \def\@permissionCodeOne{1539-9087}%
897 \or % TOPS
898   \def\@journalName{ACM Transactions on Privacy and Security}%
899   \def\@journalNameShort{ACM Trans. Priv. Sec.}%
900   \def\@permissionCodeOne{2471-2566}%
901 \or % TOPLAS
902   \def\@journalName{ACM Transactions on Programming Languages and Systems}%
903   \def\@journalNameShort{ACM Trans. Program. Lang. Syst.}%
904   \def\@permissionCodeOne{0164-0925}%
905 \or % TOS
906   \def\@journalName{ACM Transactions on Storage}%
907   \def\@journalNameShort{ACM Trans. Storage}%
908   \def\@permissionCodeOne{1553-3077}%
909 \or % TOSEM
910   \def\@journalName{ACM Transactions on Software Engineering and Methodology}%
911   \def\@journalNameShort{ACM Trans. Softw. Eng. Methodol.}%
912   \def\@permissionCodeOne{1049-331X}%
913 \or % TOSN
914   \def\@journalName{ACM Transactions on Sensor Networks}%
915   \def\@journalNameShort{ACM Trans. Sensor Netw.}%
916   \def\@permissionCodeOne{1550-4859}%
917 \or % TRET
918   \def\@journalName{ACM Transactions on Reconfigurable Technology and Systems}%
919   \def\@journalNameShort{ACM Trans. Reconfig. Technol. Syst.}%
920   \def\@permissionCodeOne{1936-7406}%
921 \or % TSAS

```

```

922 \def\@journalName{ACM Transactions on Spatial Algorithms and Systems}%
923 \def\@journalNameShort{ACM Trans. Spatial Algorithms Syst.}%
924 \def\@permissionCodeOne{2374-0353}%
925 \or % TSC
926 \def\@journalName{ACM Transactions on Social Computing}%
927 \def\@journalNameShort{ACM Trans. Soc. Comput.}%
928 \def\@permissionCodeOne{2469-7818}%
929 \or % TSLP
930 \def\@journalName{ACM Transactions on Speech and Language Processing}%
931 \def\@journalNameShort{ACM Trans. Speech Lang. Process.}%
932 \def\@permissionCodeOne{1550-4875}%
933 \or % TWEB
934 \def\@journalName{ACM Transactions on the Web}%
935 \def\@journalNameShort{ACM Trans. Web}%
936 \def\@permissionCodeOne{1559-1131}%
937 \fi
938 \ClassInfo{\@classname}{Using journal code \@journalCode}%
939 }{%
940 \ClassError{\@classname}{Incorrect journal #1}%
941 }%

\acmJournal And the syntactic sugar around it
942 \def\acmJournal#1{\setkeys{ACM}{acmJournal=#1}}

The defaults:
943 \def\@journalCode@nr{0}
944 \def\@journalName{}%
945 \def\@journalNameShort{\@journalName}%
946 \def\@permissionCodeOne{XXXX-XXXX}%
947 \def\@permissionCodeTwo{}%

\acmConference This is the conference command
948 \newcommand\acmConference[4][{}]{%
949 \gdef\acmConference@shortname{#1}%
950 \gdef\acmConference@name{#2}%
951 \gdef\acmConference@date{#3}%
952 \gdef\acmConference@venue{#4}%
953 \ifx\acmConference@shortname\empty
954 \gdef\acmConference@shortname{#2}%
955 \fi}
956 \acmConference[Conference'17]{ACM Conference}{July 2017}{Washington,
957 DC, USA}

\subtitle The subtitle macro
958 \def\subtitle#1{\def\@subtitle{#1}}
959 \subtitle{}

\num@authorgroups The total number of “groups”. Each group is several authors with the same affiliations(s)
960 \newcount\num@authorgroups
961 \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

```

962 \renewcommand\author[2][{}%
963   \if@insideauthorgroup\else
964     \global\advance\num@authorgroups by 1\relax
965     \global\@insideauthorgrouptrue
966   \fi
967   \ifx\addresses\@empty
968     \if@ACM@anonymous
969       \gdef\addresses{\@author{Anonymous Author(s)}}%
970       \gdef\authors{Anonymous Author(s)}%
971     \else
972       \gdef\addresses{\@author{#2}}%
973       \gdef\authors{#2}%
974     \fi
975   \else
976     \if@ACM@anonymous\else
977       \g@addto@macro\addresses{\and\@author{#2}}%
978       \g@addto@macro\authors{\and#2}%
979     \fi
980   \fi
981   \if@ACM@anonymous
982     \ifx\shortauthors\@empty
983       \gdef\shortauthors{Anon.}%
984     \fi
985   \else
986     \def\@tempa{#1}%
987     \ifx\@tempa\@empty
988       \ifx\shortauthors\@empty
989         \gdef\shortauthors{#2}%
990       \else
991         \g@addto@macro\shortauthors{\and#2}%
992       \fi
993     \else
994       \ifx\shortauthors\@empty
995         \gdef\shortauthors{#1}%
996       \else
997         \g@addto@macro\shortauthors{\and#1}%
998       \fi
999     \fi
1000   \fi}

```

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

```

1001 \newcommand{\affiliation}[2][{}%
1002   \global\@insideauthorgroupfalse
1003   \if@ACM@anonymous\else

```

```

1004 \g@addto@macro\addresses{\affiliation{#1}{#2}}%
1005 \fi}

@ACM@affiliation@obeypunctuation Whether to use author's punctuation (by default false = add American punctuation)
1006 \define@boolkey+{@ACM@affiliation@}{@ACM@affiliation@}{obeypunctuation}%
1007 [true]{}{\ClassError{\classname}{obeypunctuation must be true or false}}

\additionalaffiliation Additional affiliations go to footnotes
1008 \def\additionalaffiliation#1{\authornote{\@additionalaffiliation{#1}}}

\@additionalaffiliation Process additionalaffiliation inside \authornote
1009 \def\@additionalaffiliation#1{\bgroup
1010 \def\position##1{\ignorespaces}%
1011 \def\institution##1{##1\ignorespaces}%
1012 \def\department{\@ifnextchar[{\@department}{\@department[]}}%
1013 \def\@department[##1]##2{\unskip, ##2\ignorespaces}%
1014 \let\streetaddress\position
1015 \let\city\position
1016 \let\state\position
1017 \let\postcode\position
1018 \let\country\position
1019 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.
1020 \renewcommand{\email}[2][{}]{%
1021 \if@ACM@anonymous\else
1022 \g@addto@macro\addresses{\email{#1}{#2}}%
1023 \fi}

\orcid Right now we do not typeset orcid's gobble

\@titlenotes The titlenotes
1024 \def\@titlenotes{}

\titlenote Adding note to the title
1025 \def\titlenote#1{%
1026 \g@addto@macro\@title{\footnotemark}%
1027 \if@ACM@anonymous
1028 \g@addto@macro\@titlenotes{%
1029 \stepcounter{footnote}\footnotetext{Title note}}%
1030 \else
1031 \g@addto@macro\@titlenotes{\stepcounter{footnote}\footnotetext{#1}}%
1032 \fi}

\@subtitlenotes The subtitlenotes
1033 \def\@subtitlenotes{}

```

`\subtitlenote` Adding note to the subtitle

```

1034 \def\subtitlenote#1{%
1035   \g@addto@macro\@subtitle{\footnotemark}%
1036   \if@ACM@anonymous
1037     \g@addto@macro\@subtitlenotes{%
1038       \stepcounter{footnote}\footnotetext{Subtitle note}}%
1039   \else
1040     \g@addto@macro\@subtitlenotes{%
1041       \stepcounter{footnote}\footnotetext{#1}}%
1042   \fi}

```

`\@authornotes` The author notes

```

1043 \def\@authornotes{}

```

`\authornote` Adding note to the author

```

1044 \def\authornote#1{%
1045   \if@ACM@anonymous\else
1046     \g@addto@macro\addresses{\@authornotemark}
1047     \g@addto@macro\@authornotes{%
1048       \stepcounter{footnote}\footnotetext{#1}}%
1049   \fi}

```

`\acmVolume` The current volume

```

1050 \def\acmVolume#1{\def\@acmVolume{#1}}
1051 \acmVolume{1}

```

`\acmNumber` The current number

```

1052 \def\acmNumber#1{\def\@acmNumber{#1}}
1053 \acmNumber{1}

```

`\acmArticle` The current article

```

1054 \def\acmArticle#1{\def\@acmArticle{#1}}
1055 \acmArticle{1}

```

`\acmArticleSeq` The sequence number

```

1056 \def\acmArticleSeq#1{\def\@acmArticleSeq{#1}}
1057 \acmArticleSeq{\@acmArticle}

```

`\acmYear` The current year

```

1058 \def\acmYear#1{\def\@acmYear{#1}}
1059 \acmYear{\the\year}

```

`\acmMonth` The current month

```

1060 \def\acmMonth#1{\def\@acmMonth{#1}}
1061 \acmMonth{\the\month}

```

\acmPubDate The publication date
1062 \def\acmPubDate{\ifcase\acmMonth\or
1063 January\or February\or March\or April\or May\or June\or
1064 July\or August\or September\or October\or November\or
1065 December\fi~\acmYear}

\acmPrice The price
1066 \def\acmPrice#1{\def\acmPrice{#1}}
1067 \acmPrice{15.00}

\acmSubmissionID The submission id
1068 \def\acmSubmissionID#1{\def\acmSubmissionID{#1}}
1069 \acmSubmissionID{}

\acmISBN The book isbn
1070 \def\acmISBN#1{\def\acmISBN{#1}}
1071 \acmISBN{978-x-xxxx-xxxx-x/YY/MM}

\acmDOI The paper doi
1072 \def\acmDOI#1{\def\acmDOI{#1}}
1073 \acmDOI{10.1145/nnnnnnn.nnnnnnn}

\if@ACM@badge Whether to print badge. Note that either left or right badge triggers it:
1074 \newif\if@ACM@badge
1075 \@ACM@badgefalse

\@ACM@badge@width The width of the badge
1076 \newlength\@ACM@badge@width
1077 \setlength\@ACM@badge@width{5pc}

\@ACM@title@width The width of the badge
1078 \newlength\@ACM@title@width

\@ACM@badge@skip The space between the badge and the title
1079 \newlength\@ACM@badge@skip
1080 \setlength\@ACM@badge@skip{1pc}

\acmBadgeR Setting the right badge
1081 \newcommand\acmBadgeR[2][\@ACM@badgetrue
1082 \def\acmBadgeR@url{#1}%
1083 \def\acmBadgeR@image{#2}}
1084 \def\acmBadgeR@url{
1085 \def\acmBadgeR@image{}

\acmBadgeL Setting the left badge
1086 \newcommand\acmBadgeL[2][\@ACM@badgetrue
1087 \def\acmBadgeL@url{#1}%
1088 \def\acmBadgeL@image{#2}}
1089 \def\acmBadgeL@url{
1090 \def\acmBadgeL@image{}

`\startPage` The start page of the paper

```

1091 \def\startPage#1{\def\@startPage{#1}}
1092 \startPage{}

```

`\terms` Terms are obsolete, we use CCS now.

```

1093 \def\terms#1{\ClassWarning{\@classname}{The command \string\terms{} is
1094     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.

```

1095 \def\keywords#1{\def\@keywords{#1}}
1096 \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

```

1097 \renewenvironment{abstract}{\Collect@Body\@saveabstract}{}

```

`\@saveabstract` And saving the abstract

```

1098 \long\def\@saveabstract#1{\long\gdef\@abstract{#1}}
1099 \@saveabstract{}

```

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

```

1100 \long\def\@empty{}

```

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

```

1101 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printccs}[true]{%
1102     \if@ACM@printccs
1103         \ClassInfo{\@classname}{Printing CCS}%
1104     \else
1105         \ClassInfo{\@classname}{Suppressing CCS}%
1106     \fi}{\ClassError{\@classname}{printccs must be true or false}}

```

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

```

1107 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printacmref}[true]{%
1108     \if@ACM@printacmref
1109         \ClassInfo{\@classname}{Printing bibformat}%
1110     \else
1111         \ClassInfo{\@classname}{Suppressing bibformat}%
1112     \fi}{\ClassError{\@classname}{printacmref must be true or false}}

```

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

```

1113 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printfolios}[true]{%
1114     \if@ACM@printfolios
1115         \ClassInfo{\@classname}{Printing folios}%
1116     \else
1117         \ClassInfo{\@classname}{Suppressing folios}%
1118     \fi}{\ClassError{\@classname}{printfolios must be true or false}}

```

`\settopmatter` The usual syntactic sugar

```

1119 \def\settopmatter#1{\setkeys{@ACM@topmatter@}{#1}}

    Now the settings
1120 \settopmatter{printccs=true, printacmref=true}
1121 \if@ACM@manuscript
1122   \settopmatter{printfolios=true}
1123 \else
1124   \if@ACM@journal
1125     \settopmatter{printfolios=true}
1126   \else
1127     \settopmatter{printfolios=false}
1128   \fi
1129 \fi

```

`\@received` The container for the paper history

```

1130 \def\@received{}

```

`\received` The `\received` command

```

1131 \newcommand\received[2][\def\@tempa{#1}%
1132   \ifx\@tempa\@empty
1133     \ifx\@received\@empty
1134       \gdef\@received{Received #2}%
1135     \else
1136       \g@addto@macro{\@received}{; revised #2}%
1137     \fi
1138   \else
1139     \ifx\@received\@empty
1140       \gdef\@received{#1 #2}%
1141     \else
1142       \g@addto@macro{\@received}{; #1 #2}%
1143     \fi
1144   \fi}
1145 \AtEndDocument{%
1146   \ifx\@received\@empty\else
1147     \par\bigskip\noindent\small\normalfont\@received\par
1148   \fi}

```

3.11 Concepts system

We exclude CCSXML stuff generated by the ACM system:

```

1149 \RequirePackage{comment}
1150 \excludecomment{CCSXML}

```

`\@concepts` This is the storage macro for concepts

```

1151 \let\@concepts\@empty

```

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

```

1152 \newcommand\ccsdesc[2][100]{%
1153   \ccsdesc@parse#1~#2~}

\ccsdesc@parse The parser of the expression Significance~General~Specific (we need textcomp for
\\textrightarrow):
1154 \RequirePackage{textcomp}
1155 \def\ccsdesc@parse#1~#2~#3~{%
1156   \expandafter\ifx\csname CCS@#2\endcsname\relax
1157     \expandafter\gdef\csname CCS@#2\endcsname{\textbullet\ \textbf{#2} \textrightarrow\ }%
1158     \g@addto@macro{\@concepts}{\csname CCS@#2\endcsname}\fi
1159   \expandafter\g@addto@macro\expandafter{\csname CCS@#2\endcsname}{%
1160     \ifnum#1>499\textbf{#3}; \else
1161     \ifnum#1>299\textit{#3}; \else
1162     #3; \fi\fi}}

```

3.12 Copyright system

This is from `acmcopyright.sty`

`\if@printcopyright` A flag whether to print copyright symbol

```

1163 \newif\if@printcopyright
1164 \@printcopyrighttrue

```

`\if@printpermission` Whether to print permission block

```

1165 \newif\if@printpermission
1166 \@printpermissiontrue

```

`\if@acmowned` Whether ACM owns the rights to the paper

```

1167 \newif\if@acmowned
1168 \@acmownedtrue

```

Keys:

```

1169 \define@choicekey*{ACM@}{acmcopyrightmode}[%
1170   \acm@copyrightinput\acm@copyrightmode]{none,acmcopyright,acmlicensed,%
1171   rightsretained,usgov,usgovmixed,cagov,cagovmixed,%
1172   licensedusgovmixed,licensedcagovmixed,othergov,licensedothergov}{%
1173   \@printpermissiontrue
1174   \@printcopyrighttrue
1175   \@acmownedtrue
1176   \ifnum\acm@copyrightmode=0\relax % none
1177   \@printpermissionfalse
1178   \@printcopyrightfalse
1179   \@acmownedfalse
1180   \fi
1181   \ifnum\acm@copyrightmode=2\relax % acmlicensed
1182   \@acmownedfalse
1183   \fi

```

```

1184 \ifnum\acm@copyrightmode=3\relax % rightsretained
1185 \@acmownedfalse
1186 \acmPrice{}%
1187 \fi
1188 \ifnum\acm@copyrightmode=4\relax % usgov
1189 \@printpermissiontrue
1190 \@printcopyrightfalse
1191 \@acmownedfalse
1192 \acmPrice{}%
1193 \fi
1194 \ifnum\acm@copyrightmode=6\relax % cagov
1195 \@acmownedfalse
1196 \fi
1197 \ifnum\acm@copyrightmode=8\relax % licensedusgovmixed
1198 \@acmownedfalse
1199 \fi
1200 \ifnum\acm@copyrightmode=9\relax % licensedcagovmixed
1201 \@acmownedfalse
1202 \fi
1203 \ifnum\acm@copyrightmode=10\relax % othergov
1204 \@acmownedtrue
1205 \fi
1206 \ifnum\acm@copyrightmode=11\relax % licensedothergov
1207 \@acmownedfalse
1208 \fi}

```

\setcopyright This is the syntactic sugar around setting keys.

```

1209 \def\setcopyright#1{\setkeys{ACM@}{acmcopyrightmode=#1}}
1210 \setcopyright{acmcopyright}

```

\@copyrightowner Here is the owner of the copyright

```

1211 \def\@copyrightowner{%
1212 \ifcase\acm@copyrightmode\relax % none
1213 \or % acmcopyright
1214 Association for Computing Machinery.
1215 \or % acmlicensed
1216 Copyright held by the owner/author(s). Publication rights licensed to
1217 Association for Computing Machinery.
1218 \or % rightsretained
1219 Copyright held by the owner/author(s).
1220 \or % usgov
1221 \or % usgovmixed
1222 Association for Computing Machinery.
1223 \or % cagov
1224 Crown in Right of Canada.
1225 \or %cagovmixed
1226 Association for Computing Machinery.
1227 \or %licensedusgovmixed
1228 Copyright held by the owner/author(s). Publication rights licensed to
1229 Association for Computing Machinery.

```



```

1230 \or %licensedcagovmixed
1231 Copyright held by the owner/author(s). Publication rights licensed to
1232 Association for Computing Machinery.
1233 \or % othergov
1234 Association for Computing Machinery.
1235 \or % licensedothergov
1236 Copyright held by the owner/author(s). Publication rights licensed to
1237 Association for Computing Machinery.
1238 \fi}

```

\@formatdoi Print a clickable doi

```

1239 \def\@formatdoi#1{\url{https://doi.org/#1}}

```

\@copyrightpermission The canned permission block.

```

1240 \def\@copyrightpermission{%
1241   \ifcase\acm@copyrightmode\relax % none
1242   \or % acmcopyright
1243     Permission to make digital or hard copies of all or part of this
1244     work for personal or classroom use is granted without fee provided
1245     that copies are not made or distributed for profit or commercial
1246     advantage and that copies bear this notice and the full citation on
1247     the first page. Copyrights for components of this work owned by
1248     others than ACM must be honored. Abstracting with credit is
1249     permitted. To copy otherwise, or republish, to post on servers or to
1250     redistribute to lists, requires prior specific permission
1251     and\hspace*{.5pt}/or a fee. Request permissions from
1252     permissions@acm.org.
1253   \or % acmlicensed
1254     Permission to make digital or hard copies of all or part of this
1255     work for personal or classroom use is granted without fee provided
1256     that copies are not made or distributed for profit or commercial
1257     advantage and that copies bear this notice and the full citation on
1258     the first page. Copyrights for components of this work owned by
1259     others than the author(s) must be honored. Abstracting with credit
1260     is permitted. To copy otherwise, or republish, to post on servers
1261     or to redistribute to lists, requires prior specific permission
1262     and\hspace*{.5pt}/or a fee. Request permissions from
1263     permissions@acm.org.
1264   \or % rightsretained
1265     Permission to make digital or hard copies of part or all of this work
1266     for personal or classroom use is granted without fee provided that
1267     copies are not made or distributed for profit or commercial advantage
1268     and that copies bear this notice and the full citation on the first
1269     page. Copyrights for third-party components of this work must be
1270     honored. For all other uses, contact the
1271     owner\hspace*{.5pt}/author(s).
1272   \or % usgov
1273     This paper is authored by an employee(s) of the United States
1274     Government and is in the public domain. Non-exclusive copying or
1275     redistribution is allowed, provided that the article citation is

```

1276 given and the authors and agency are clearly identified as its
1277 source.

1278 \or % usgovmixed

1279 ACM acknowledges that this contribution was authored or co-authored
1280 by an employee, or contractor of the national government. As such,
1281 the Government retains a nonexclusive, royalty-free right to
1282 publish or reproduce this article, or to allow others to do so, for
1283 Government purposes only. Permission to make digital or hard copies
1284 for personal or classroom use is granted. Copies must bear this
1285 notice and the full citation on the first page. Copyrights for
1286 components of this work owned by others than ACM must be
1287 honored. To copy otherwise, distribute, republish, or post,
1288 requires prior specific permission and\hspace*{.5pt}/or a
1289 fee. Request permissions from permissions@acm.org.

1290 \or % cagov

1291 This article was authored by employees of the Government of Canada.
1292 As such, the Canadian government retains all interest in the
1293 copyright to this work and grants to ACM a nonexclusive,
1294 royalty-free right to publish or reproduce this article, or to allow
1295 others to do so, provided that clear attribution is given both to
1296 the authors and the Canadian government agency employing them.
1297 Permission to make digital or hard copies for personal or classroom
1298 use is granted. Copies must bear this notice and the full citation
1299 on the first page. Copyrights for components of this work owned by
1300 others than the Canadian Government must be honored. To copy
1301 otherwise, distribute, republish, or post, requires prior specific
1302 permission and\hspace*{.5pt}/or a fee. Request permissions from
1303 permissions@acm.org.

1304 \or % cagovmixed

1305 ACM acknowledges that this contribution was co-authored by an
1306 affiliate of the national government of Canada. As such, the Crown
1307 in Right of Canada retains an equal interest in the copyright.
1308 Reprints must include clear attribution to ACM and the author's
1309 government agency affiliation. Permission to make digital or hard
1310 copies for personal or classroom use is granted. Copies must bear
1311 this notice and the full citation on the first page. Copyrights for
1312 components of this work owned by others than ACM must be honored.
1313 To copy otherwise, distribute, republish, or post, requires prior
1314 specific permission and\hspace*{.5pt}/or a fee. Request permissions
1315 from permissions@acm.org.

1316 \or % licensedusgovmixed

1317 Publication rights licensed to ACM\@. ACM acknowledges that this
1318 contribution was authored or co-authored by an employee, contractor
1319 or affiliate of the United States government. As such, the
1320 Government retains a nonexclusive, royalty-free right to publish or
1321 reproduce this article, or to allow others to do so, for Government
1322 purposes only.

1323 \or % licensedcagovmixed

1324 Publication rights licensed to ACM\@. ACM acknowledges that this
1325 contribution was authored or co-authored by an employee, contractor

```

1326 or affiliate of the national government of Canada. As such, the
1327 Government retains a nonexclusive, royalty-free right to publish or
1328 reproduce this article, or to allow others to do so, for Government
1329 purposes only.
1330 \or % othergov
1331 ACM acknowledges that this contribution was authored or co-authored
1332 by an employee, contractor or affiliate of a national government. As
1333 such, the Government retains a nonexclusive, royalty-free right to
1334 publish or reproduce this article, or to allow others to do so, for
1335 Government purposes only.
1336 \or % licensedothergov
1337 Publication rights licensed to ACM\@. ACM acknowledges that this
1338 contribution was authored or co-authored by an employee, contractor
1339 or affiliate of a national government. As such, the Government
1340 retains a nonexclusive, royalty-free right to publish or reproduce
1341 this article, or to allow others to do so, for Government purposes
1342 only.
1343 \fi}

\copyrightyear By default, the copyright year is the same as \acmYear, but one can override this:
1344 \def\copyrightyear#1{\def\@copyrightyear{#1}}
1345 \copyrightyear{\@acmYear}

\@teaserfigures The teaser figures container
1346 \def\@teaserfigures{}

teaserfigure The teaser figure
1347 \newenvironment{teaserfigure}{\Collect@Body\@saveteaser}{}

\@saveteaser Saving the teaser
1348 \long\def\@saveteaser#1{\g@addto@macro\@teaserfigures{\@teaser{#1}}}

\thanks We redefine amsart \thanks, so the anonymous key works
1349 \renewcommand{\thanks}[1]{%
1350 \@ifnotempty{#1}{%
1351 \if@ACM@anonymous
1352 \g@addto@macro\thankses{\thanks{A note}}%
1353 \else
1354 \g@addto@macro\thankses{\thanks{#1}}%
1355 \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}].
1356 \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 copyright/permission block. By the way, this was the default behavior of the old ACM classes.

```

1357 \def\maketitle{%
1358   \if@ACM@anonymous
1359     % Anonymize omission of \author-s
1360     \ifnum\num@authorgroups=0\author{}\fi
1361   \fi
1362   \begingroup
1363   \let\@footnotemark\@footnotemark@nolink
1364   \let\@footnotetext\@footnotetext@nolink
1365   \renewcommand\thefootnote{\@fnsymbol\c@footnote}%
1366   \global\@topnum\z@ % this prevents floats from falling
1367                       % at the top of page 1
1368   \global\@botnum\z@ % we do not want them to be on bottom either
1369   \hsize=\textwidth
1370   \def\@makefnmark{\hbox{\@textsuperscript{\@thefnmark}}}%
1371   \mktitle\if@ACM@sigchiamode\else\mkauthors\fi\mkteasers
1372   \@printtopmatter
1373   \if@ACM@sigchiamode\mkauthors\fi
1374   \setcounter{footnote}{0}%
1375   \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}%
1376   \@titlenotes
1377   \@subtitlenotes
1378   \@authornotes
1379   \let\@makefnmark\relax \let\@thefnmark\relax
1380   \let\@makefnmark\relax \let\@thefnmark\relax
1381   \ifx\@empty\thankses\else
1382     \footnotetextcopyrightpermission{%
1383       \def\par{\let\par\@par}\parindent\z@\@setthanks}%
1384   \fi
1385   \iffalse %!! added for CCS submission
1386   \footnotetextcopyrightpermission{%
1387     \if@ACM@authordraft
1388       \raisebox{-2ex}{\z@}{\z@}{\makebox[0pt][l]{\large\bfseries
1389         Unpublished
1390         working draft. Not for distribution}}}%
1391     \color[gray]{0.9}%
1392   \fi
1393   \parindent\z@\parskip0.1\baselineskip
1394   \if@ACM@authorversion\else
1395     \if@printpermission\@copyrightpermission\par\fi
1396   \fi
1397   \if@ACM@manuscript\else
1398     \if@ACM@journal\else % Print the conference information
1399       {\itshape \acmConference@shortname, \acmConference@date, \acmConference@venue}\par
1400     \fi
1401   \fi

```

```

1402 \if@printcopyright
1403   \copyright\ \@copyrightyear\ \@copyrightowner\
1404 \else
1405   \@copyrightyear.\
1406 \fi
1407 \if@ACM@manuscript
1408   Manuscript submitted to ACM\
1409 \else
1410   \if@ACM@authorversion
1411     This is the author's version of the work. It is posted here for
1412     your personal use. Not for redistribution. The definitive Version
1413     of Record was published in
1414     \if@ACM@journal
1415       \emph{\@journalName}%
1416     \else
1417       \emph{Proceedings of \@acmConference@name, \@acmConference@date}%
1418     \fi
1419     \ifx\@acmDOI\@empty
1420       .
1421     \else
1422       , \@formatdoi{\@acmDOI}.
1423     \fi\
1424   \else
1425     \if@ACM@journal
1426       \@permissionCodeOne/\@acmYear/\@acmMonth-ART\@acmArticle
1427       \ifx\@acmPrice\@empty\else\ $\@acmPrice\fi\
1428       \@formatdoi{\@acmDOI}%
1429     \else % Conference
1430       %%! Not supposed to change this, but can't figure out a better way to remove it
1431       %% ACM~ISBN~\@acmISBN
1432       %% \ifx\@acmPrice\@empty.\else\dots$\@acmPrice\fi\
1433       %% \@formatdoi{\@acmDOI}%
1434     \fi
1435   \fi
1436 \fi}
1437 \fi %!
1438 \endgroup
1439 \setcounter{footnote}{0}%
1440 \mkabstract
1441 \if@ACM@printccs
1442   \ifx\@concepts\@empty\else\bgroup
1443     {\@specialsection{CCS Concepts}%
1444     \@concepts\par}\egroup
1445   \fi
1446 \fi
1447 \ifx\@keywords\@empty\else\bgroup
1448   {\if@ACM@journal
1449     \@specialsection{Additional Key Words and Phrases}%
1450   \else
1451     \@specialsection{Keywords}%

```

```

1452     \fi
1453     \@keywords}\par\egroup
1454 \fi
1455 \andify\authors
1456 \andify\shortauthors
1457 \global\let\authors=\authors
1458 \global\let\shortauthors=\shortauthors
1459 \if@ACM@printacmref
1460     \mkbibcitation
1461 \fi
1462 \hypersetup{pdfauthor={\authors},
1463     pdftitle={\@title}, pdfkeywords={\@concepts}}%
1464 \@printendtopmatter
1465 \@afterindentfalse
1466 \@afterheading
1467 }

```

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

```

1468 \def\@specialsection#1{%
1469     \ifcase\ACM@format@nr
1470     \relax % manuscript
1471     \par\medskip\small\noindent#1: %
1472     \or % acmsmall
1473     \par\medskip\small\noindent#1: %
1474     \or % acmlarge
1475     \par\medskip\small\noindent#1: %
1476     \or % acmtog
1477     \par\medskip\small\noindent#1: %
1478     \or % sigconf
1479     \section*{#1}%
1480     \or % siggraph
1481     \section*{#1}%
1482     \or % sigplan
1483     \paragraph*{#1}%
1484     \or % sigchi
1485     \section*{#1}%
1486     \or % sigchi-a
1487     \section*{#1}%
1488     \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 `\mktitle` since we want them on the margins.

```

1489 \def\@printtopmatter{%
1490     \ifx\@startPage\@empty
1491     \gdef\@startPage{1}%
1492     \else
1493     \setcounter{page}{\@startPage}%
1494     \fi

```

```

1495 \thispagestyle{firstpagestyle}%
1496 \noindent
1497 \ifcase\ACM@format@nr
1498 \relax % manuscript
1499 \box\mktitle@bx\par
1500 \noindent\hrulefill\par
1501 \or % acmsmall
1502 \box\mktitle@bx\par
1503 \noindent\hrulefill\par
1504 \or % acmlarge
1505 \box\mktitle@bx\par
1506 \noindent\hrulefill\par
1507 \or % acmtog
1508 \twocolumn[\box\mktitle@bx]%
1509 \or % sigconf
1510 \twocolumn[\box\mktitle@bx]%
1511 \or % siggraph
1512 \twocolumn[\box\mktitle@bx]%
1513 \or % sigplan
1514 \twocolumn[\box\mktitle@bx]%
1515 \or % sigchi
1516 \twocolumn[\box\mktitle@bx]%
1517 \or % sigchi-a
1518 \par\box\mktitle@bx\par\bigskip
1519 \if@ACM@badge
1520 \marginpar{\noindent
1521 \ifx\@acmBadgeL@image\empty\else
1522 \href{\@acmBadgeL@url}{%
1523 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}%
1524 \hskip\@ACM@badge@skip
1525 \fi
1526 \ifx\@acmBadgeR@image\empty\else
1527 \href{\@acmBadgeR@url}{%
1528 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}%
1529 \fi}%
1530 \fi
1531 \fi
1532 }

```

\@mktitle The title of the article

```

1533 \def\@mktitle{%
1534 \ifcase\ACM@format@nr
1535 \relax % manuscript
1536 \@mktitle@i
1537 \or % acmsmall
1538 \@mktitle@i
1539 \or % acmlarge
1540 \@mktitle@i
1541 \or % acmtog
1542 \@mktitle@i

```

```

1543 \or % sigconf
1544     \@mkttitle@iii
1545 \or % siggraph
1546     \@mkttitle@iii
1547 \or % sigplan
1548     \@mkttitle@iii
1549 \or % sigchi
1550     \@mkttitle@iii
1551 \or % sigchi-a
1552     \@mkttitle@iv
1553 \fi
1554 }

\@titlefont The font to typeset title
1555 \def\@titlefont{%
1556     \ifcase\ACM@format@nr
1557     \relax % manuscript
1558     \LARGE\bfseries\sffamily
1559 \or % acmsmall
1560     \LARGE\bfseries\sffamily
1561 \or % acmlarge
1562     \LARGE\bfseries\sffamily
1563 \or % acmtog
1564     \Huge\sffamily
1565 \or % sigconf
1566     \Huge\sffamily\bfseries
1567 \or % siggraph
1568     \Huge\sffamily\bfseries
1569 \or % sigplan
1570     \Huge\bfseries
1571 \or % sigchi
1572     \Huge\sffamily\bfseries
1573 \or % sigchi-a
1574     \Huge\bfseries
1575 \fi}

\@subtitlefont The font to typeset title
1576 \def\@subtitlefont{\normalsize
1577     \ifcase\ACM@format@nr
1578     \relax % manuscript
1579     \mdseries
1580 \or % acmsmall
1581     \mdseries
1582 \or % acmlarge
1583     \mdseries
1584 \or % acmtog
1585     \LARGE
1586 \or % sigconf
1587     \LARGE\mdseries
1588 \or % siggraph

```



```

1589 \LARGE\mdseries
1590 \or % sigplan
1591 \LARGE\mdseries
1592 \or % sigchi
1593 \LARGE\mdseries
1594 \or % sigchi-a
1595 \mdseries
1596 \fi}

```

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

```

1597 \def\mktitle@i{\hsize=\textwidth
1598 \ACM@title@width=\hsize
1599 \ifx\acmBadgeL@image\empty\else
1600 \advance\ACM@title@width by -\ACM@badge@width
1601 \advance\ACM@title@width by -\ACM@badge@skip
1602 \fi
1603 \ifx\acmBadgeR@image\empty\else
1604 \advance\ACM@title@width by -\ACM@badge@width
1605 \advance\ACM@title@width by -\ACM@badge@skip
1606 \fi
1607 \setbox\mktitle@bx=\vbox{\noindent\@titlefont
1608 \ifx\acmBadgeL@image\empty\else
1609 \raisebox{-.5\baselineskip}{\z@\z@{\href{\acmBadgeL@url}{%
1610 \includegraphics[width=\ACM@badge@width]{\acmBadgeL@image}}}%
1611 \hskip\ACM@badge@skip
1612 \fi
1613 \parbox[t]{\ACM@title@width}{\raggedright
1614 \@titlefont\noindent
1615 \@title
1616 \ifx\@subtitle\empty\else
1617 \par\noindent{\@subtitlefont\@subtitle}
1618 \fi}%
1619 \ifx\acmBadgeR@image\empty\else
1620 \hskip\ACM@badge@skip
1621 \raisebox{-.5\baselineskip}{\z@\z@{\href{\acmBadgeR@url}{%
1622 \includegraphics[width=\ACM@badge@width]{\acmBadgeR@image}}}%
1623 \fi
1624 \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.

```

1625 \def\mktitle@iii{\hsize=\textwidth
1626 \setbox\mktitle@bx=\vbox{\@titlefont\centering
1627 \ACM@title@width=\hsize
1628 \if\ACM@badge
1629 \advance\ACM@title@width by -2\ACM@badge@width
1630 \advance\ACM@title@width by -2\ACM@badge@skip
1631 \parbox[b]{\ACM@badge@width}{\strut

```

```

1632         \ifx\@acmBadgeL@image\@empty\else
1633             \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeL@url}{%
1634                 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
1635         \fi}%
1636     \hskip\@ACM@badge@skip
1637 \fi
1638 \parbox[t]{\@ACM@title@width}{\centering\@titlefont
1639     \@title
1640     \ifx\@subtitle\@empty\else
1641         \par\noindent{\@subtitlefont\@subtitle}
1642     \fi
1643 }%
1644 \if@ACM@badge
1645     \hskip\@ACM@badge@skip
1646     \parbox[b]{\@ACM@badge@width}{\strut
1647         \ifx\@acmBadgeR@image\@empty\else
1648             \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeR@url}{%
1649                 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
1650         \fi}%
1651 \fi
1652 \par\bigskip}}%

```

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

```

1653 \def\@mktitle@iv{\hsize=\textwidth
1654     \setbox\mktitle@bx=\vbox{\raggedright\leftskip5pc\@titlefont
1655         \noindent\leavevmode\leaders\hrule height 2pt\hfill\kern0pt\par
1656         \noindent\@title
1657         \ifx\@subtitle\@empty\else
1658             \par\noindent\@subtitlefont\@subtitle
1659         \fi
1660     \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.

```

1661 \newbox\@ACM@commabox
1662 \def\@ACM@addtoaddress#1{%
1663     \ifvmode\else
1664         \if@ACM@affiliation@obeypunctuation\else
1665             \setbox\@ACM@commabox=\hbox{, }%
1666             \unskip\cleaders\copy\@ACM@commabox\hskip\wd\@ACM@commabox
1667         \fi\fi
1668     #1}

```

<p>\institution</p> <p>\position</p> <p>\department</p> <p>\streetaddress</p> <p>\city</p> <p>\state</p> <p>\postcode</p> <p>\country</p>	<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> <p>We follow the strange American tradition of no comma before zip code.</p> <pre> 1669 \if@ACM@journal 1670 \let\position\@gobble 1671 \def\institution#1{#1\ignorespaces}% 1672 \newcommand\department[2][0]{}% 1673 \let\streetaddress\@gobble 1674 \let\city\@gobble 1675 \let\state\@gobble 1676 \let\postcode\@gobble 1677 \let\country\@gobble 1678 \else 1679 \def\position#1{\if@ACM@affiliation@obeypunctuation#1\else#1\par\fi}% 1680 \def\institution#1{\if@ACM@affiliation@obeypunctuation#1\else#1\par\fi}% 1681 \newcommand\department[2][0]{\if@ACM@affiliation@obeypunctuation 1682 #2\else#2\par\fi}% 1683 \def\streetaddress#1{\if@ACM@affiliation@obeypunctuation#1\else#1\par\fi}% 1684 \let\city\@ACM@addtoaddress 1685 \let\state\@ACM@addtoaddress 1686 \def\postcode#1{\if@ACM@affiliation@obeypunctuation#1\else\unskip\space#1\fi}% 1687 \let\country\@ACM@addtoaddress 1688 \fi </pre>
<p>\@mkauthors</p>	<p>Typesetting authors</p> <pre> 1689 \def\@mkauthors{\begingroup 1690 \hsize=\textwidth 1691 \ifcase\ACM@format@nr 1692 \relax % manuscript 1693 \@mkauthors@i 1694 \or % acmsmall 1695 \@mkauthors@i 1696 \or % acmlarge 1697 \@mkauthors@i 1698 \or % acmtog 1699 \@mkauthors@i 1700 \or % sigconf 1701 \@mkauthors@iii 1702 \or % siggraph 1703 \@mkauthors@iii 1704 \or % sigplan 1705 \@mkauthors@iii 1706 \or % sigchi 1707 \@mkauthors@iii 1708 \or % sigchi-a 1709 \@mkauthors@iv 1710 \fi 1711 \endgroup </pre>

```

1712 }

\@authorfont Somehow different conferences use different fonts for author names. Why?
1713 \def\@authorfont{\Large\sffamily}

\@affiliationfont Font for affiliations
1714 \def\@affiliationfont{\normalsize\normalfont}

Adjusting fonts for different formats
1715 \ifcase\ACM@format@nr
1716 \relax % manuscript
1717 \or % acmsmall
1718 \def\@authorfont{\large\sffamily}
1719 \def\@affiliationfont{\small\normalfont}
1720 \or % acmlarge
1721 \or % acmtog
1722 \def\@authorfont{\LARGE\sffamily}
1723 \def\@affiliationfont{\large}
1724 \or % sigconf
1725 \def\@authorfont{\LARGE}
1726 \def\@affiliationfont{\large}
1727 \or % siggraph
1728 \def\@authorfont{\normalsize\normalfont}
1729 \def\@affiliationfont{\normalsize\normalfont}
1730 \or % sigplan
1731 \def\@authorfont{\Large\normalfont}
1732 \def\@affiliationfont{\normalsize\normalfont}
1733 \or % sigchi
1734 \def\@authorfont{\bfseries}
1735 \def\@affiliationfont{\mdseries}
1736 \or % sigchi-a
1737 \def\@authorfont{\bfseries}
1738 \def\@affiliationfont{\mdseries}
1739 \fi

\@typeset@author@line At this point we have \@currentauthors and \@currentaffiliations. We typeset
them in the journal style
1740 \def\@typeset@author@line{%
1741 \andify\@currentauthors\par\noindent
1742 \@currentauthors\def\@currentauthors{}%
1743 \ifx\@currentaffiliations\@empty\else
1744 \andify\@currentaffiliations
1745 \unskip, {\@currentaffiliations}\par
1746 \fi
1747 \def\@currentaffiliations{}}

\@mkauthors@i This is version used in most journal formats. Note that \and between authors with the
same affiliation becomes _and_:
1748 \def\@mkauthors@i{%

```

```

1749 \def\@currentauthors{}%
1750 \def\@currentaffiliations{}%
1751 \global\let\and\@typeset@author@line
1752 \def\@author##1{%
1753   \ifx\@currentauthors\@empty
1754     \gdef\@currentauthors{\@authorfont\MakeUppercase{##1}}%
1755   \else
1756     \g@addto@macro{\@currentauthors}{\and\MakeUppercase{##1}}%
1757   \fi
1758   \gdef\and{}%
1759 \def\email##1##2{%
1760 \def\affiliation##1##2{%
1761   \def\@tempa{##2}\ifx\@tempa\@empty\else
1762     \ifx\@currentaffiliations\@empty
1763       \gdef\@currentaffiliations{%
1764         \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
1765         \setkeys{@ACM@affiliation@}{##1}%
1766         \@affiliationfont##2}%
1767     \else
1768       \g@addto@macro{\@currentaffiliations}{\and
1769         \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
1770         \setkeys{@ACM@affiliation@}{##1}##2}%
1771     \fi
1772   \fi
1773   \global\let\and\@typeset@author@line}%
1774 \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par\medskip
1775 \noindent\addresses\@typeset@author@line
1776 \par\medskip}%
1777 }

```

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

\author@bx The box to put individual author to
1778 \newbox\author@bx

\author@bx@wd The width of the author box
1779 \newdimen\author@bx@wd

\author@bx@sep The separation between the author boxes
1780 \newskip\author@bx@sep
1781 \author@bx@sep=1pc\relax

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

```

1782 \def\@typeset@author@bx{\bgroup\hsize=\author@bx@wd\def\and{\par}%
1783 \global\setbox\author@bx=\vtop{\if@ACM@sigchiamode\else\centering\fi
1784   \@authorfont\@currentauthors\par\@affiliationfont
1785   \@currentaffiliation}\egroup
1786 \box\author@bx\hspace{\author@bx@sep}%
1787 \gdef\@currentauthors{}%
1788 \gdef\@currentaffiliation{}}

```

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

```
1789 \def\mkauthors@iii{%
```

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

```
1790 \author@bx@wd=\textwidth\relax
1791 \advance\author@bx@wd by -\author@bx@sep\relax
1792 \ifcase\num@authorgroups
1793 \relax % 0?
1794 \or % 1=one author per row
1795 \or % 2=two authors per row
1796 \divide\author@bx@wd by \num@authorgroups\relax
1797 \or % 3=three authors per row
1798 \divide\author@bx@wd by \num@authorgroups\relax
1799 \or % 4=two authors per row (!)
1800 \divide\author@bx@wd by 2\relax
1801 \else % three authors per row
1802 \divide\author@bx@wd by 3\relax
1803 \fi
1804 \advance\author@bx@wd by -\author@bx@sep\relax
```

Now, parsing of `\addresses`:

```
1805 \gdef\@currentauthors{}%
1806 \gdef\@currentaffiliation{}%
1807 \def\@author##1{\ifx\@currentauthors\@empty
1808 \gdef\@currentauthors{\par##1}%
1809 \else
1810 \g@addto@macro\@currentauthors{\par##1}%
1811 \fi
1812 \gdef\and{}}%
1813 \def\email##1##2{\ifx\@currentaffiliation\@empty
1814 \gdef\@currentaffiliation{\nolinkurl{##2}}%
1815 \else
1816 \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
1817 \fi}%
1818 \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
1819 \gdef\@currentaffiliation{%
1820 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
1821 \setkeys{@ACM@affiliation@}{##1}##2}%
1822 \else
1823 \g@addto@macro\@currentaffiliation{\par
1824 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
1825 \setkeys{@ACM@affiliation@}{##1}##2}%
1826 \fi
1827 \global\let\and\@typeset@author@bx
1828 }%
```

Actual typesetting is done by `\and` macro:

```

1829 \hsize=\textwidth
1830 \global\setbox\mktitle@bx=\vbox{\noindent
1831   \box\mktitle@bx\par\medskip\leavevmode
1832   \lineskip=1pc\relax\centering\hspace*{-1em}%
1833   \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.

```
1834 \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.

```

1835 \author@bx@wd=\columnwidth\relax
1836 \advance\author@bx@wd by -\author@bx@sep\relax
1837 \ifcase\num@authorgroups
1838 \relax % 0?
1839 \or % 1=one author per row
1840 \else % 2=two authors per row
1841   \divide\author@bx@wd by 2\relax
1842 \fi
1843 \advance\author@bx@wd by -\author@bx@sep\relax

```

Now, parsing of \addresses:

```

1844 \gdef\@currentauthors{}%
1845 \gdef\@currentaffiliation{}%
1846 \def\@author##1{\ifx\@currentauthors\@empty
1847   \gdef\@currentauthors{\par##1}%
1848 \else
1849   \g@addto@macro\@currentauthors{\par##1}%
1850 \fi
1851 \gdef\and{}}%
1852 \def\email##1##2{\ifx\@currentaffiliation\@empty
1853   \gdef\@currentaffiliation{\nolinkurl{##2}}%
1854 \else
1855   \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
1856 \fi}%
1857 \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
1858   \gdef\@currentaffiliation{%
1859     \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
1860     \setkeys{@ACM@affiliation@}{##1}##2}%
1861 \else
1862   \g@addto@macro\@currentaffiliation{\par
1863     \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
1864     \setkeys{@ACM@affiliation@}{##1}##2}%
1865 \fi
1866 \global\let\and\@typeset@author@bx}%
1867 %

```

Actual typesetting is done by \and macro

```

1868 \bgroup\hsize=\columnwidth
1869 \par\raggedright\leftskip=\z@
1870 \lineskip=1pc\noindent
1871 \addresses\let\and\@typeset@author@bx\and\par\bigskip\egroup}

\@authornotemark Adding footnotemark to authors
1872 \def\@authornotemark{\g@addto@macro\@currentauthors{\footnotemark}}

\@mkteasers Typesetting teasers
1873 \def\@mkteasers{%
1874   \ifx\@teaserfigures\@empty\else
1875     \def\@teaser##1{\par\bigskip\bgroup
1876       \captionsetup{type=figure}##1\egroup\par}
1877     \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par
1878       \noindent\@teaserfigures\par\medskip}%
1879     \fi}

\@setaddresses This is an amsart macro, which we do not need.
1880 \def\@setaddresses{}

\@mkabstract Typesetting abstract
1881 \def\@mkabstract{\bgroup
1882   \ifx\@abstract\@empty\else
1883     {\phantomsection\addcontentsline{toc}{section}{Abstract}%
1884     \if@ACM@journal
1885       \small\noindent
1886     \else
1887       \section*{Abstract}%
1888     \fi
1889     \ignorespaces\@abstract\par}%
1890   \fi\egroup}

\@mkbibcitation Print bibcitation format
1891 \def\@mkbibcitation{\bgroup
1892   \def\footnotemark{}}%
1893   \def\{\unskip{} \ignorespaces}%
1894   \def\footnote{\ClassError{\@classname}{Please do not use footnotes
1895     inside \string\title{} or \string\author{} command! Use
1896     \string\titlenote{} or \string\authornote{} instead!}}%
1897   \par\medskip\small\noindent{\bfseries ACM Reference format:}\par\nobreak
1898   \noindent\authors. \@acmYear. \@title.
1899   \if@ACM@journal
1900     \textit{\@journalNameShort}
1901     \@acmVolume, \@acmNumber, Article~\@acmArticle\ (\@acmPubDate),
1902     \ref{TotPages}~pages.
1903   \else
1904     In \textit{Proceedings of \acmConference@name}, \acmConference@venue,
1905     \acmConference@date
1906     \if\acmConference@name\acmConference@shortname\else

```



```

1907      \ (\acmConference@shortname)\fi
1908      ,} \ref{TotPages}~pages.
1909 \fi\par
1910 \noindent\@formatdoi{\@acmDOI}
1911 \par\egroup}

```

\@printendtopmatter End the top matter

```

1912 \def\@printendtopmatter{\par\medskip
1913   \ifcase\ACM@format@nr
1914   \relax % manuscript
1915   \noindent\hrulefill\par\medskip
1916   \or % acmsmall
1917   \noindent\hrulefill\par\medskip
1918   \or % acmlarge
1919   \noindent\hrulefill\par\medskip
1920   \or % acmtog
1921   \par\bigskip
1922   \or % sigconf
1923   \par\bigskip
1924   \or % siggraph
1925   \par\bigskip
1926   \or % sigplan
1927   \par\bigskip
1928   \or % sigchi
1929   \par\bigskip
1930   \or % sigchi-a
1931   \fi
1932 }

```

\@setthanks We redefine \@setthanks using \long

```

1933 \def\@setthanks{\long\def\thanks##1{\par##1\@addpunct.}\thankses}

```

3.14 Headers and Footers

We use fancyhdr for our headers and footers:

```

1934 \RequirePackage{fancyhdr}

```

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

```

1935 \if@ACM@review
1936   \newsavebox{\ACM@linecount@bx}
1937   \newlength\ACM@linecount@bxht
1938   \newcount\ACM@linecount
1939   \ACM@linecount\@ne\relax
1940   \def\ACM@mk@linecount{%
1941     \savebox{\ACM@linecount@bx}[4em][t]{\parbox[t]{4em}{%
1942       \setlength{\ACM@linecount@bxht}{-\baselineskip}%
1943       \loop{\color{ACMRed}\scriptsize\the\ACM@linecount}\
1944         \global\advance\ACM@linecount by \@ne
1945       \addtolength{\ACM@linecount@bxht}{\baselineskip}%

```

```

1946         \ifdim\ACM@linecount@bxht<\textheight\repeat}}}
1947 \fi

\ACM@linecountL How to display the box on the left
1948 \def\ACM@linecountL{%
1949   \if@ACM@review
1950     \ACM@mk@linecount
1951     \begin{picture}(0,0)%
1952       \put(-26,-22){\usebox{\ACM@linecount@bx}}%
1953     \end{picture}%
1954   \fi}

\ACM@linecountR How to display the box on the right
1955 \def\ACM@linecountR{%
1956   \if@ACM@review
1957     \ACM@mk@linecount
1958     \begin{picture}(0,0)%
1959       \put(20,-22){\usebox{\ACM@linecount@bx}}%
1960     \end{picture}%
1961   \fi}

\ACM@timestamp The timestamp system
1962 \if@ACM@timestamp
1963   % Subtracting 30 from \time gives us the effect of rounding-down despite
1964   % \numexpr rounding to nearest
1965   \newcounter{ACM@time@hours}
1966   \setcounter{ACM@time@hours}{\numexpr (\time - 30) / 60 \relax}
1967   \newcounter{ACM@time@minutes}
1968   \setcounter{ACM@time@minutes}{\numexpr \time - \theACM@time@hours * 60 \relax}
1969   \newcommand\ACM@timestamp{%
1970     \footnotesize%
1971     \the\year-\two@digits{\the\month}-\two@digits{\the\day}{ }%
1972     \two@digits{\theACM@time@hours}:\two@digits{\theACM@time@minutes}{ }%
1973     page~\thepage\ (pp. \@startPage-\pageref*{TotPages})%
1974     \ifx\@acmSubmissionID\@empty\relax\else
1975       ~Submission~ID: \@acmSubmissionID
1976     \fi
1977   }
1978 \fi

\@shortauthors Even if the author redefined \shortauthors, we do not print them in the anonymous
mode in the headers:
1979 \def\@shortauthors{\if@ACM@anonymous Anon.\else\shortauthors\fi}

\@headfootfont The font to typeset header and footer text.
1980 \def\@headfootfont{%
1981   \ifcase\ACM@format@nr
1982     \relax % manuscript
1983     \sffamily

```

```

1984 \or % acmsmall
1985 \sffamily
1986 \or % acmlarge
1987 \sffamily
1988 \or % acmtog
1989 \sffamily
1990 \or % sigconf
1991 \sffamily
1992 \or % siggraph
1993 \sffamily
1994 \or % sigplan
1995 \sffamily
1996 \or % sigchi
1997 \sffamily
1998 \or % sigchi-a
1999 \sffamily
2000 \fi}

```

standardpagestyle The pagestyle for all pages but the first one

```

2001 \fancypagestyle{standardpagestyle}{%
2002 \fancyhf{}%
2003 \renewcommand{\headrulewidth}{\z@}%
2004 \renewcommand{\footrulewidth}{\z@}%
2005 \ifcase\ACM@format@nr
2006 \relax % manuscript
2007 \fancyhead[LE]{\ACM@linecountL\if@ACM@printfolios\thepage\fi}%
2008 \fancyhead[RO]{\if@ACM@printfolios\thepage\fi}%
2009 \fancyhead[RE]{\@shortauthors}%
2010 \fancyhead[LO]{\ACM@linecountL\shorttitle}%
2011 \fancyfoot[RO,LE]{\footnotesize Manuscript submitted to ACM}%
2012 \or % acmsmall
2013 \fancyhead[LE]{\ACM@linecountL\@headfootfont\@acmArticle\if@ACM@printfolios:\thepage\fi}%
2014 \fancyhead[RO]{\@headfootfont\@acmArticle\if@ACM@printfolios:\thepage\fi}%
2015 \fancyhead[RE]{\@headfootfont\@shortauthors}%
2016 \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2017 \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
2018 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2019 \or % acmlarge
2020 \fancyhead[LE]{\ACM@linecountL\@headfootfont
2021 \@acmArticle\if@ACM@printfolios:\thepage\fi\quad\textbullet\quad\@shortauthors}%
2022 \fancyhead[LO]{\ACM@linecountL}%
2023 \fancyhead[RO]{\@headfootfont
2024 \shorttitle\quad\textbullet\quad\@acmArticle\if@ACM@printfolios:\thepage\fi}%
2025 \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
2026 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2027 \or % acmtog
2028 \fancyhead[LE]{\ACM@linecountL\@headfootfont
2029 \@acmArticle\if@ACM@printfolios:\thepage\fi\quad\textbullet\quad\@shortauthors}%
2030 \fancyhead[LO]{\ACM@linecountL}%
2031 \fancyhead[RE]{\ACM@linecountR}%

```

```

2032 \fancyhead[R0]{\@headfootfont
2033 \shorttitle\quad\textbullet\quad\@acmArticle\if@ACM@printfolios:\thepage\fi\ACM@linecountR}%
2034 \fancyfoot[R0,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
2035 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2036 \else % Proceedings
2037 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2038 \fancyhead[L0]{\ACM@linecountL\@headfootfont\shorttitle}%
2039 \fancyhead[RE]{\@headfootfont\@shortauthors\ACM@linecountR}%
2040 \fancyhead[LE]{\ACM@linecountL\@headfootfont\acmConference@shortname,
2041 \acmConference@date, \acmConference@venue}%
2042 \fancyhead[R0]{\@headfootfont\acmConference@shortname,
2043 \acmConference@date, \acmConference@venue\ACM@linecountR}%
2044 \fi
2045 \if@ACM@sigchiamode
2046 \fancyheadoffset[L]{\dimexpr(\marginparsep+\marginparwidth)}%
2047 \fi
2048 \if@ACM@timestamp
2049 \fancyfoot[LO,RE]{\ACM@timestamp}
2050 \fi
2051 }
2052 \pagestyle{standardpagestyle}

\@folio@wd Folio blob width, height, offsets and max number
\@folio@ht
\@folio@voffset
\@folio@max
2053 \newdimen\@folio@wd
2054 \@folio@wd=\z@
2055 \newdimen\@folio@ht
2056 \@folio@ht=\z@
2057 \newdimen\@folio@voffset
2058 \@folio@voffset=\z@
2059 \def\@folio@max{1}
2060 \ifcase\ACM@format@nr
2061 \relax % manuscript
2062 \or % acmsmall
2063 \@folio@wd=45.75pt\relax
2064 \@folio@ht=1.25in\relax
2065 \@folio@voffset=.2in\relax
2066 \def\@folio@max{8}
2067 \or % acmlarge
2068 \@folio@wd=43.25pt\relax
2069 \@folio@ht=79pt\relax
2070 \@folio@voffset=.55in\relax
2071 \def\@folio@max{10}
2072 \fi

\@folioblob The macro to typeset the folio blob.
2073 \def\@folioblob{\@tempcnta=\@acmArticleSeq\relax
First, we calculate \@acmArticleSeq modulo \@folio@max
2074 \loop
2075 \ifnum\@tempcnta>\@folio@max\relax

```

```

2076     \advance\@tempcnta by - \@folio@max
2077 \repeat

2078     \advance\@tempcnta by -1\relax
2079     \@tempdima=\@folio@ht\relax
2080     \multiply\@tempdima by \the\@tempcnta\relax
2081     \advance\@tempdima by -\@folio@voffset\relax
2082     \begin{picture}(0,0)
2083     \makebox[\z@]{\raisebox{-\@tempdima}{%
2084         \rlap{%
2085             \raisebox{-0.45\@folio@ht}{\z@}{\z@}{%
2086                 \rule{\@folio@wd}{\@folio@ht}}}%
2087         \parbox{\@folio@wd}{%
2088             \centering
2089             \textcolor{white}{\LARGE\bfseries\sffamily\@acmArticle}}}}
2090 \end{picture}}
2091

```

firstpagestyle The pagestyle for the first page only.

```

2092 \fancypagestyle{firstpagestyle}{%
2093     \fancyhf{}%
2094     \renewcommand{\headrulewidth}{\z@}%
2095     \renewcommand{\footrulewidth}{\z@}%
2096     \ifcase\ACM@format@nr
2097     \relax % manuscript
2098     \fancyhead[L]{\ACM@linecountL}%
2099     \fancyfoot[R0,LE]{\if@ACM@printfolios\small\thepage\fi}%
2100     \fancyfoot[RE,LO]{\footnotesize Manuscript submitted to ACM}%
2101 \or % acmsmall
2102     \fancyfoot[R0,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
2103         \@acmNumber, Article \@acmArticle. Publication date:
2104         \@acmPubDate.}%
2105     \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2106     \fancyhead[LO]{\ACM@linecountL}%
2107     \fancyhead[R0]{\@folioblob}%
2108     \fancyheadoffset[R0,LE]{0.6\@folio@wd}%
2109 \or % acmlarge
2110     \fancyfoot[R0,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
2111         \@acmNumber, Article \@acmArticle. Publication date:
2112         \@acmPubDate.}%
2113     \fancyhead[R0]{\@folioblob}%
2114     \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2115     \fancyhead[LO]{\ACM@linecountL}%
2116     \fancyheadoffset[R0,LE]{1.4\@folio@wd}%
2117 \or % acmtog
2118     \fancyfoot[R0,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
2119         \@acmNumber, Article \@acmArticle. Publication date:
2120         \@acmPubDate.}%
2121     \fancyhead[L]{\ACM@linecountL}%
2122     \fancyhead[R]{\ACM@linecountR}%

```

```

2123 \else % Conference proceedings
2124   \fancyhead[L]{\ACM@linecountL}%
2125   \fancyhead[R]{\ACM@linecountR}%
2126   \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2127   \fi
2128   \if@ACM@timestamp
2129     \ifnum\ACM@format@nr=0\relax % Manuscript
2130     \fancyfoot[LO,RE]{\ACM@timestamp\quad
2131       \footnotesize Manuscript submitted to ACM}
2132     \else
2133     \fancyfoot[LO,RE]{\ACM@timestamp}
2134     \fi
2135   \fi
2136 }

```

3.15 Sectioning

Sectioning is different for different levels

```

2137 \renewcommand\section{\@startsection{section}{1}{\z@}%
2138   {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2139   {.25\baselineskip}%
2140   {\@secfont}}
2141 \renewcommand\subsection{\@startsection{subsection}{2}{\z@}%
2142   {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2143   {.25\baselineskip}%
2144   {\@subsecfont}}
2145 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{10pt}%
2146   {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2147   {-3.5\p@}%
2148   {\@subsubsecfont\@adddotafter}}
2149 \renewcommand\paragraph{\@startsection{paragraph}{4}{\parindent}%
2150   {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2151   {-3.5\p@}%
2152   {\@parfont\@adddotafter}}
2153 \renewcommand\part{\@startsection{part}{9}{\z@}%
2154   {-10\p@ \@plus -4\p@ \@minus -2\p@}%
2155   {4\p@}%
2156   {\@parfont}}

```

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

```

2157 \def\section@raggedright{\@rightskip\@flushglue
2158   \rightskip\@rightskip
2159   \leftskip\z@skip
2160   \parindent\z@}

```

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

```

\@subsecfont 2161 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeUppercase}
\@subsubsecfont 2162 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
\@parfont 2163 \def\@subsubsecfont{\sffamily\itshape}

```

```

2164 \def\@parfont{\itshape}
2165 \setcounter{secnumdepth}{3}
2166 \ifcase\ACM@format@nr
2167 \relax % manuscript
2168 \or % acmsmall
2169 \or % acmlarge
2170 \def\@secfont{\sffamily\large\section@raggedright\MakeUppercase}
2171 \def\@subsecfont{\sffamily\large\section@raggedright}
2172 \or % acmtog
2173 \def\@secfont{\sffamily\large\section@raggedright\MakeUppercase}
2174 \def\@subsecfont{\sffamily\large\section@raggedright}
2175 \or % sigconf
2176 \def\@secfont{\bfseries\Large\section@raggedright\MakeUppercase}
2177 \def\@subsecfont{\bfseries\Large\section@raggedright}
2178 \or % siggraph
2179 \def\@secfont{\bfseries\sffamily\Large\section@raggedright\MakeUppercase}
2180 \def\@subsecfont{\bfseries\sffamily\Large\section@raggedright}
2181 \or % sigplan
2182 \def\@secfont{\bfseries\Large\section@raggedright}
2183 \def\@subsecfont{\bfseries\section@raggedright}
2184 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{\z@}%
2185   {-0.75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2186   {.25\baselineskip}%
2187   {\@subsubsecfont}}
2188 \def\@subsubsecfont{\bfseries\section@raggedright}
2189 \renewcommand\paragraph{\@startsection{paragraph}{4}{\z@}%
2190   {-0.5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2191   {-3.5\p@}%
2192   {\@parfont\@addspaceafter}}
2193 \def\@parfont{\bfseries\itshape}
2194 \renewcommand\subparagraph{\@startsection{subparagraph}{5}{\z@}%
2195   {-0.5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2196   {-3.5\p@}%
2197   {\@subparfont\@addspaceafter}}
2198 \def\@subparfont{\itshape}
2199 \or % sigchi
2200 \setcounter{secnumdepth}{1}
2201 \def\@secfont{\bfseries\sffamily\section@raggedright\MakeUppercase}
2202 \def\@subsecfont{\bfseries\sffamily\section@raggedright}
2203 \or % sigchi-a
2204 \setcounter{secnumdepth}{0}
2205 \def\@secfont{\bfseries\sffamily\section@raggedright\MakeUppercase}
2206 \def\@subsecfont{\bfseries\sffamily\section@raggedright}
2207 \fi

```

\@adddotafter Add punctuation after the command

```
2208 \def\@adddotafter#1{#1\@addpunct{.}}
```

\@addspaceafter Add space after the command

```
2209 \def\@addspaceafter#1{#1\@addpunct{\enspace}}
```

3.16 TOC Lists

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

```
2210 \providecommand*\dotsep{4.5}
```

3.17 Theorems

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

```
2211 \def\acmplainbodyfont{\itshape}
```

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

```
2212 \def\acmplainindent{\parindent}
```

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

```
2213 \def\acmplainheadfont{\scshape}
```

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

```
2214 \def\acmplainnotefont{\@empty}
```

Customization of `acmplain` theorem style:

```
2215 \ifcase\ACM@format@nr
2216 \relax % manuscript
2217 \or % acmsmall
2218 \or % acmlarge
2219 \or % acmtog
2220 \or % sigconf
2221 \or % siggraph
2222 \or % sigplan
2223 \def\acmplainbodyfont{\itshape}
2224 \def\acmplainindent{\z@}
2225 \def\acmplainheadfont{\bfseries}
2226 \def\acmplainnotefont{\normalfont}
2227 \or % sigchi
2228 \or % sigchi-a
2229 \fi
```

`acmplain` The `acmplain` theorem style

```
2230 \newtheoremstyle{acmplain}%
2231 { .5\baselineskip\@plus.2\baselineskip
2232 \@minus.2\baselineskip}% space above
2233 { .5\baselineskip\@plus.2\baselineskip
2234 \@minus.2\baselineskip}% space below
2235 {\acmplainbodyfont}% body font
2236 {\acmplainindent}% indent amount
2237 {\acmplainheadfont}% head font
```



```

2238 {.}% punctuation after head
2239 {.5em}% spacing after head
2240 {\thmname{#1}\thmnumber{ #2}\thmnote{ {\@acmplainnotefont{#3}}}}% head spec

\@acmdefinitionbodyfont The font to typeset the acmdefinition theorem style body.
2241 \def\@acmdefinitionbodyfont{\normalfont}

\@acmdefinitionindent The amount to indent the acmdefinition theorem style.
2242 \def\@acmdefinitionindent{\parindent}

\@acmdefinitionheadfont The font to typeset the acmdefinition theorem style head.
2243 \def\@acmdefinitionheadfont{\itshape}

\@acmdefinitionnotefont The font to typeset the acmdefinition theorem style note.
2244 \def\@acmdefinitionnotefont{\@empty}

Customization of acmdefinition theorem style:
2245 \ifcase\ACM@format@nr
2246 \relax % manuscript
2247 \or % acmsmall
2248 \or % acmlarge
2249 \or % acmtog
2250 \or % sigconf
2251 \or % siggraph
2252 \or % sigplan
2253 \def\@acmdefinitionbodyfont{\normalfont}
2254 \def\@acmdefinitionindent{\z@}
2255 \def\@acmdefinitionheadfont{\bfseries}
2256 \def\@acmdefinitionnotefont{\normalfont}
2257 \or % sigchi
2258 \or % sigchi-a
2259 \fi

acmdefinition The acmdefinition theorem style
2260 \newtheoremstyle{acmdefinition}%
2261 { .5\baselineskip\@plus.2\baselineskip
2262 \@minus.2\baselineskip}% space above
2263 { .5\baselineskip\@plus.2\baselineskip
2264 \@minus.2\baselineskip}% space below
2265 {\@acmdefinitionbodyfont}% body font
2266 {\@acmdefinitionindent}% indent amount
2267 {\@acmdefinitionheadfont}% head font
2268 {.}% punctuation after head
2269 {.5em}% spacing after head
2270 {\thmname{#1}\thmnumber{ #2}\thmnote{ {\@acmdefinitionnotefont{#3}}}}% head spec

The definitions for theorems:
2271 \theoremstyle{acmplain}
2272 \newtheorem{theorem}{Theorem}[section]

```

```

2273 \newtheorem{conjecture}[theorem]{Conjecture}
2274 \newtheorem{proposition}[theorem]{Proposition}
2275 \newtheorem{lemma}[theorem]{Lemma}
2276 \newtheorem{corollary}[theorem]{Corollary}
2277 \theoremstyle{acmdefinition}
2278 \newtheorem{example}[theorem]{Example}
2279 \newtheorem{definition}[theorem]{Definition}
2280 \theoremstyle{acmplain}

\@proofnamefont The font to typeset the proof name.
2281 \def\@proofnamefont{\scshape}

```

```

\@proofindent Whether or not to indent proofs.
2282 \def\@proofindent{\indent}

```

Customization of proof environment.

```

2283 \ifcase\ACM@format@nr
2284 \relax % manuscript
2285 \or % acmsmall
2286 \or % acmlarge
2287 \or % acmtog
2288 \or % sigconf
2289 \or % siggraph
2290 \or % sigplan
2291 \def\@proofnamefont{\itshape}
2292 \def\@proofindent{\noindent}
2293 \or % sigchi
2294 \or % sigchi-a
2295 \fi

proof We want some customization of proof environment.
2296 \renewenvironment{proof}[1][\proofname]{\par
2297 \pushQED{\qed}%
2298 \normalfont \topsep6\p@\@plus6\p@\relax
2299 \trivlist
2300 \item[\@proofindent\hspace\labelsep
2301 \quad\@proofnamefont #1\@addpunct{.}]\ignorespaces
2302 }{%
2303 \popQED\endtrivlist\endpfalse
2304 }

```

3.18 Acknowledgments

```

\acks This is a comment-like structure
2305 \specialcomment{acks}{%
2306 \begin{group}
2307 \section*{Acknowledgments}
2308 \phantomsection\addcontentsline{toc}{section}{Acknowledgments}
2309 }{%

```

```

2310 \endgroup
2311 }

\grantsponsor We just typeset the name of the sponsor
2312 \def\grantsponsor#1#2#3{#2}

\grantnum
2313 \newcommand\grantnum[3][{}]{#3%
2314 \def\@tempa{#1}\ifx\@tempa\@empty\else\space(\url{#1})\fi}

```

3.19 Conditional typesetting

We use the comment package for conditional typesetting:

```

2315 \if@ACM@screen
2316 \includecomment{screenonly}
2317 \excludecomment{printonly}
2318 \else
2319 \excludecomment{screenonly}
2320 \includecomment{printonly}
2321 \fi
2322 \if@ACM@anonymous
2323 \excludecomment{anonsuppress}
2324 \excludecomment{acks}
2325 \else
2326 \includecomment{anonsuppress}
2327 \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/>).

```

2328 \newcommand\showeprint[2][arxiv]{%
2329 \def\@tempa{#1}%
2330 \ifx\@tempa\@empty\def\@tempa{arxiv}\fi
2331 \def\@tempb{arxiv}%
2332 \ifx\@tempa\@tempb
2333 arXiv:\href{http://arxiv.org/abs/#2}{#2}\else arXiv:#2%
2334 \fi}

```

3.21 End of Class

```

2335 \normalsize\normalfont\frenchspacing
2336 </class>

```

References

Change History

v1.00	General: First released version	26	v1.05	General: Added processing doi numbers for acmsiggraph and doi numbers for sigproc.bib	26
v1.01	General: Changed hyperref colors in screen mode (closes https://github.com/borisveytsman/acmart/issues/1)	26		Patched \setcitestyle command; closes https://github.com/borisveytsman/acmart/issues/19	26
	Defined ACM colors	26	v1.06	\@ACM@badge@skip: Added macro . .	52
	Explicitly put draft option (closes https://github.com/borisveytsman/acmart/issues/4)	29		\@ACM@badge@width: Added macro .	52
	Set headheight to 1pc for all formats (closes https://github.com/borisveytsman/acmart/issues/5)	26		\@ACM@title@width: Added macro .	52
v1.02	General: Added TOPS and TSC (closes https://github.com/borisveytsman/acmart/issues/12)	26		\@mktitle@i: Added processing badges	65
	Documentation changes (closes https://github.com/borisveytsman/acmart/issues/13)	26		Made generic	65
v1.03	\@formatdoi: Added macro	57		\@mktitle@ii: Now this macro is obsolete	65
	General: Added anonsuppress environment	26		\@mktitle@iii: Added processing badges	65
	Added authorversion option (closes https://github.com/borisveytsman/acmart/issues/9)	26		Made more generic	65
	\if@ACM@authorversion: Added macro	27		\@mktitle@iv: Made more generic .	66
	\maketitle: Added special case of authorversion	60		\@printtopmatter: Added processing badges	62
v1.04	General: Updated bibliography for siggraph	26		\@subtitlefont: Added macro	64
	\acmArticleSeq: Name change by Matthew Fluet	51		\@titlefont: Added macro	64
	\acmDOI: Name change by Matthew Fluet	52		\acmBadgeL: Added macro	52
	\acmISBN: Name change by Matthew Fluet	52		\acmBadgeR: Added macro	52
				\if@ACM@badge: Added macro	52
			v1.07	\maketitle: Corrected a bug with abstract footnotes	60
				Corrected a bug with permission and footnotes order	60
			v1.08	General: SIGPLAN reformatting by Matthew Fluet	26
				Typos corrected (Tobias Pape) . . .	26
			v1.09	General: Revert SIGPLAN caption rules	26
			v1.10	General: Changes of 'licensedothergov' wording	55
				\maketitle: Corrected a bug with doi in manuscript and author version, https://github.com/	

borisveytsman/acmart/issues/36	60	v1.14	General: \citestyle updates (Matthew Fluet)	26
standardpagestyle: Reversed folios location	75		Patched \citestyle	30
v1.11			\bibstyle@acmauthoryear: Moved def of \bibstyle@acmauthoryear before use	32
General: Customization of ACM theorem styles and proof environment by Matthew Fluet	26		\bibstyle@acmnumeric: Moved def of \bibstyle@numeric before use ..	32
v1.12		v1.15		
\@marginfigure: Now centering by default	41	\@ACM@addtoaddress: Added macro	66	
\@marginable: Now centering by default	41	\@mkauthors@iii: New authors system	70	
\@parfont: Moved to \section@raggedright	78	\@shortauthors: Introduced macro ..	74	
General: Added graceful behavior when libertine fonts are absent ..	40	\@typeset@author@bx: Moved to separate macro	69	
Documentation updates	26	\acks: Added macro	82	
\copyrightpermissionfootnoterule: Added macro	38	\affiliation: Added code for author groups	49	
\descriptionlabel: Redefined	43	\author: Added code for author groups	49	
\footnoterule: Made shorter	39	\city: Added macro	66	
\if@ACM@natbib@override: Added macro	27	\country: Added macro	66	
\if@ACM@newfonts: Added macro ..	40	\department: Added macro	66	
\maketitle: Moved thankses to copyrightpermission box	60	\grantnum: Added macro	83	
\section@raggedright: Introduced macro	78	\grantsponsor: Added macro	83	
v1.13		\if@insideauthorgroup: Introduced macro	49	
\@mpfootnotetext: Made minipage footnotes centered	39	\institution: Added macro	66	
General: Font adjustments for acmsmall	68	\num@authorgroups: Renamed	48	
Increased font size for ACM Large	30	\orcid: Introduced macro	50	
Print bibliographic information by default for the proceedings	54	\position: Added macro	66	
\bibliographystyle: Redefined macro	36	\postcode: Added macro	66	
\bibstyle@acmauthoryear: Added macro	32	\state: Added macro	66	
\bibstyle@acmnumeric: Added macro	32	\streetaddress: Added macro	66	
\if@ACM@printfolios: Added macro	53	standardpagestyle: Better handling of anonymous mode	75	
standardpagestyle: Added headers for sigs	75	v1.16		
Expanded headers for sigchi-a ...	75	\@headfootfont: Added macro	74	
Suppressed folios if sig	75	General: Formatting header/footer (Matthew Fluet)	26	
		standardpagestyle: Customize header/footer text font	75	
		v1.17		
		\@makefnmark: Redefined	40	
		\@mkauthors: TOG now uses the same authors block as other journals ..	67	
		\@mkauthors@ii: Deleted	69	
		\@mkbibcitation: Added \nobreak	72	
		Changed format for sigs	72	

General: Slightly decreased margins for sigs	37	v1.26	General: Corrected \shortcite bug	26
\acmArticle: The default is now nu- merical	51		Documentation typos fixed (thanks to Stephen Spencer)	26
\acmMonth: The default must be nu- merical. Closes #50.	51	v1.27	\if@ACM@printccs: Typo corrected	53
\acmNumber: The default is now nu- merical	51	v1.28	General: Corrected option natbib be- havior	32
\acmVolume: The default is now nu- merical	51		Got rid of warnings in pdf keywords	35
\acmYear: The default is now numeri- cal	51		\ccsdesc@parse: Change from \to to \textrightarrow (Matteo Riondato)	55
\description: Decreased indent	43	v1.29	\@mkabstract: Removed spurious in- dentation (John Wickerson)	72
\grantnum: Added url	83		General: Increased head to 13pt	37
\grantsponsor: Renamed	83		\ccsdesc@parse: Add spacing af- ter bullet and around rightrightarrow; semicolon separators no longer in bold/italic (John Wickerson)	55
\if@ACM@printacmref: Renamed from \if@ACM@printbib	53		standardpagestyle: Corrected print- folios (Matthew Fluet)	75
standardpagestyle: Added paper title to sigs	75	v1.30	General: Added \frenchspacing	83
v1.18			Bibtex style now recognizes https:// in doi	26
\@mkauthors@i: Now we andify affli- ations	68		Switched to T1: looks like libertine has problems with \l in OT1	40
\@typeset@author@line: Added macro	68		Updated IMWUT and PACMPL	43
General: Natbib is now the default for all formats	26		\department: Added optional parame- ter	66
v1.19		v1.31	\@additionalaffiliation: Added macro	50
\@mkabstract: Include 'Abstract' in PDF bookmarks (Matthew Fluet)	72		\@mkbibcitation: Disabled linebreak	72
General: Include 'Abstract', 'Acknowl- edgements', and 'References' in PDF bookmarks (Matthew Fluet)	26		\@startsection: Added \tochangmeasure	32
Include 'References' in PDF book- marks (Matthew Fluet)	30		Redefined macro	34
\acks: Include 'Acknowledgements' in PDF bookmarks (Matthew Fluet)	82		\@textbottom: Redefined	40
v1.20			General: Documentation changes	26
\@mkabstract: Deleted spurious space	72		\acmMonth: The default now is the cur- rent month (Matteo Riondato)	51
General: Bug fixes for bst	26		\acmYear: The default now is the cur- rent year (Matteo Riondato)	51
v1.21			\additionalaffiliation: Added macro	50
\showeprint: Added macro	83		\l@section: Redefined macro	35
v1.22			\l@subsubsection: Redefined macro	35
General: More bibliography changes for Aptara	26			
v1.23				
General: Add PACMPL journal option	26			
v1.24				
General: Add IMWUT journal option	43			
v1.25				
General: Updated PACMPL	43			

v1.32		\if@ACM@timestamp: Added macro (Michael D. Adams)	28
	\@formatdoi: New doi format		57
	General: Added POMACS journal op- tion	\institution: Added obeypunctua- tion code	26
	Format siggraph is now obsolete	firstpagestyle: Added right linecount for two column formats	26
v1.33		Added timestamp (Michael D. Adams)	77
	\@ACM@addtoaddress: Added obey- punctuation code	\maketitle: Fixed the bug with figures on top and bottom of the title page, thanks to David Epstein	66
	\@mkauthors@i: Added obeypunctua- tion code	\position: Added obeypunctuation code	68
	\@mkauthors@iii: Added obeypunc- tuation code	\postcode: Added obeypunctuation code	70
	\@mkauthors@iv: Added obeypunctua- tion code	\state: Added obeypunctuation code	71
	\@subtitlefont: Added \normalsize	\streetaddress: Added obeypunctua- tion code	64
	General: Added acmart-preload-hook	standardpagestyle: Added right linecount for two column formats	26
	Added cmap and glyptounicode	Added timestamp (Michael D. Adams)	40
	BibTeX comma before articleno bug corrected		75
	BibTeX crossref bug corrected		26
	BibTeX numpages bug corrected		26
	Documentation updates		26
	Moved \citename definition for non-natbib bibliography, so a pack- age may redefine it	v1.34	35
	Switched to Type 1 fonts for liber- tine even if OTF-capable engine is used (Kai Mindermann)	\@mkbibcitation: Deleted DOI from doi numbers	40
	\ACM@linecountL: Renamed macro	\ACM@linecount@bx: Rulers now are continuous	72
	\ACM@linecountR: Added macro	\ACM@linecountL: Rulers now are continuous	74
	\ACM@timestamp: Added current page number	\ACM@linecountR: Rulers now are continuous	74
	Added macro (Michael D. Adams)	\maketitle: Added date to the bibstrip in conf proceedings	74
	Added submission id	Deleted 'DOI' from doi numbers	60
	\acmSubmissionID: Added macro	Rearranged bibstrip	60
	\city: Added obeypunctuation code	The \terms command is now obso- lete	60
	\country: Added obeypunctuation code	\terms: The \terms command now just produces a warning	66
	\department: Added obeypunctuation code		53
	\if@ACM@affiliation@obeypunctuation: Added macro	v1.35	66
	\if@ACM@authordraft: Added macro	General: BibTeX bug fixed: et al.	50
	\if@ACM@natbib@override: Deleted macro	If the copyright is set to usgov or rigtsretained, the price is sup- pressed	27
		\bibstyle@acmauthoryear: Square brackets for author-year style	32

Index

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

Symbols		
\\$	1427, 1432	\@acmArticle . . . 1054, 1057, 1426, 1901,
\@	1317, 1324, 1337	2013, 2014, 2018,
\@par	304, 361	2021, 2024, 2026,
\@ACM@addtoaddress .		2029, 2033, 2035,
1661, 1684, 1685, 1687		2089, 2103, 2111, 2119
\@ACM@badge@skip . . .		\@acmArticleSeq 1056, 2073
.	1079, 1524,	\@acmBadgeL@image . .
1601, 1605, 1611,		. . . . . 1088, 1090,
1620, 1630, 1636, 1645		1521, 1523, 1599,
\@ACM@badge@width . .		1608, 1610, 1632, 1634
.	1076, 1523,	\@acmBadgeL@url . 1087,
1528, 1600, 1604,		1089, 1522, 1609, 1633
1610, 1622, 1629,		\@acmBadgeR@image . .
1631, 1634, 1646, 1649		. . . . . 1083, 1085,
\@ACM@badgefalse . . .	1075	1526, 1528, 1603,
\@ACM@badgetrue 1081, 1086		1619, 1622, 1647, 1649
\@ACM@commabox		\@acmBadgeR@url . 1082,
.	1661, 1665, 1666	1084, 1527, 1621, 1648
\@ACM@journalfalse .		\@acmDOI . . 1072, 1419,
139, 141, 143, 145, 147		1422, 1428, 1433, 1910
\@ACM@journaltrue . .		\@acmISBN 1070, 1431
.	131, 133, 135, 137	\@acmMonth 1060, 1062, 1426
\@ACM@manuscriptfalse 126		\@acmNumber 1052,
\@ACM@manuscripttrue 124		1901, 2018, 2026,
\@ACM@newfontfalse		2035, 2103, 2111, 2119
.	592, 594, 597	\@acmPrice 1066, 1427, 1432
\@ACM@newfonttrue . .	589	\@acmPubDate . . . 1062,
\@ACM@reviewtrue . . .	100	1901, 2018, 2026,
\@ACM@sigchiamodefalse		2035, 2104, 2112, 2120
.	128	\@acmSubmissionID . .
\@ACM@sigchiamodetrue 148		. . . . . 1068, 1974, 1975
\@ACM@timestamptrue . .	99	\@acmVolume 1050,
\@ACM@title@width . .		1901, 2017, 2025,
.	1078,	2034, 2102, 2110, 2118
1598, 1600, 1601,		\@acmYear 1058,
1604, 1605, 1613,		1065, 1345, 1426, 1898
1627, 1629, 1630, 1638		\@acmdefinitionbodyfont
\@DeclareACMFormat .		. . . . . 2241, 2253, 2265
.	37, 38, 39, 40,	\@acmdefinitionheadfont
41, 42, 43, 44, 45, 46		. . . . . 2243, 2255, 2267
\@M	304, 343, 361, 370	\@acmdefinitionindent
\@abstract 1098, 1882, 1889		. . . . . 2242, 2254, 2266
		\@acmdefinitionnotefont
		. . . . . 2244, 2256, 2270
		\@acmownedfalse . 1179,
		1182, 1185, 1191,
		1195, 1198, 1201, 1207
		\@acmownedtrue
		. . . . . 1168, 1175, 1204
		\@acmplainbodyfont .
		. . . . . 2211, 2223, 2235
		\@acmplainheadfont .
		. . . . . 2213, 2225, 2237
		\@acmplainindent . . .
		. . . . . 2212, 2224, 2236
		\@acmplainnotefont .
		. . . . . 2214, 2226, 2240
		\@adddotafter
		. . . . . 2148, 2152, 2208
		\@additionalaffiliation
		. . . . . 1008, 1009
		\@addpunct
		1933, 2208, 2209, 2301
		\@addspaceafter
		. . . . . 2192, 2197, 2209
		\@affiliationfont . .
		1714, 1719, 1723,
		1726, 1729, 1732,
		1735, 1738, 1766, 1784
		\@afterheading . 335, 1466
		\@afterindentfalse .
		. . . . . 281, 1465
		\@afterindenttrue . . 279
		\@author 969, 972,
		977, 1752, 1807, 1846
		\@authorfont
		1713, 1718, 1722,
		1725, 1728, 1731,
		1734, 1737, 1754, 1784
		\@authornotemark . . .
		. . . . . 1046, 1872
		\@authornotes
		. . . . . 1043, 1047, 1378
		\@auxout 438
		\@begindocumenthook 434

\@botnum	1368	1490, 1521, 1526,	\@input	372
\@citestyle	213	1599, 1603, 1608,	\@insideauthorgroupfalse	
\@classname	25, 27, 34,	1616, 1619, 1632,	.....	1002
	50, 52, 53, 58, 60,	1640, 1647, 1657,	\@insideauthorgrouptrue	
	61, 66, 68, 69, 74,	1743, 1753, 1761,	.....	965
	76, 77, 82, 84, 85,	1762, 1807, 1813,	\@journalCode	691, 938
	90, 92, 93, 98, 102,	1818, 1846, 1852,	\@journalCode@nr	...
	103, 114, 119, 172,	1857, 1874, 1974,	.....	691, 743, 943
	590, 593, 595, 938,	2214, 2244, 2314, 2330	\@journalName	745,
	940, 1007, 1093,	\@endfloatbox	749, 753, 758, 762,	
	1103, 1105, 1106,	.....	766, 770, 774, 778,	
	1109, 1111, 1112,	\@endpefalse	779, 781, 782, 785,	
	1115, 1117, 1118, 1894	.....	786, 789, 793, 797,	
\@clubpenalty	349	\@endwidefloatbox	799, 803, 807, 809,	
\@concepts	1151,	\@finalstrut	811, 813, 817, 821,	
	1158, 1442, 1444, 1463	... 564, 577	825, 829, 833, 837,	
\@copyrightowner	...	\@float	841, 845, 849, 853,	
	1211, 1403	.....	857, 861, 865, 869,	
\@copyrightpermission		2053, 2079, 2085, 2086	870, 873, 877, 878,	
	1240, 1395	\@folio@max	881, 886, 890, 894,	
\@copyrightyear	...	2053, 2075, 2076	898, 902, 906, 910,	
	1344, 1403, 1405	\@folio@voffset	914, 918, 922, 926,	
\@currbox	664, 665, 666	2053, 2081	930, 934, 944, 945,	
\@currentaffiliation		\@folio@wd	1415, 2017, 2025,	
	1785, 1788, 1806,	2086, 2087, 2108, 2116	2034, 2102, 2110, 2118	
	1813, 1814, 1816,	\@folioblob	\@journalNameShort	...
	1818, 1819, 1823,	.... 2073,	... 746, 750, 755,	
	1845, 1852, 1853,	\@footnotemark	759, 763, 767, 771,	
	1855, 1857, 1858, 1862	... 382, 1363	775, 790, 794, 800,	
\@currentaffiliations		\@footnotemark@nolink	804, 814, 818, 822,	
	1743,	.....	826, 830, 834, 838,	
	1744, 1745, 1747,	\@footnotetext	842, 846, 850, 854,	
	1750, 1762, 1763, 1768	....	858, 862, 866, 874,	
\@currentauthors	1741,	..... 383, 555, 1364	879, 882, 887, 891,	
	1742, 1749, 1753,	\@footnotetext@nolink	895, 899, 903, 907,	
	1754, 1756, 1784,	..... 383, 1364	911, 915, 919, 923,	
	1787, 1805, 1807,	\@for	927, 931, 935, 945, 1900	
	1808, 1810, 1844,	..... 189	\@keywords	1095, 1447, 1453
	1846, 1847, 1849, 1872	\@formatdoi	\@latex@error	257
\@currentlabel	559, 573	.... 1239,	\@empty	1100, 1882
\@dblarg	290	1422, 1428, 1433, 1910	\@m	292
\@dblfloating	648	\@fps	\@makefnmark	554,
\@department	1012, 1013	..... 651	579, 1370, 1375, 1379	
\@dotsep	2210	\@fpsaddddefault	\@makefntext	...
\@empty	150, 294, 953,	..... 651	... 554, 563, 576, 1380	
	967, 982, 987, 988,	\@gobble	\@marginfigure	640, 641
	994, 1132, 1133,	..... 211,	\@marginable	643, 644
	1139, 1146, 1151,	255, 1670, 1673,	\@minipagefalse	550, 660
	1381, 1419, 1427,	1674, 1675, 1676, 1677	\@minus	2138, 2142,
	1432, 1442, 1447,	\@hangfrom	2146, 2150, 2154,	
		.... 303, 360		
		\@headfootfont		
			
		1980, 2013, 2014,		
		2015, 2016, 2020,		
		2023, 2028, 2032,		
		2038, 2039, 2040, 2042		
		\@ifnextchar		
		..... 1012		
		\@ifnotempty		
		..... 1350		
		\@ifnum		
		..... 227, 229		
		\@ifstar		
		..... 288		
		\@iiiparbox		
		..... 553		

2185, 2190, 2195,	2150, 2154, 2185,	\@subtitle 958,
2232, 2234, 2262, 2264	2190, 2195, 2231,	1035, 1616, 1617,
\@mkabstract . . 1440, 1881	2233, 2261, 2263, 2298	1640, 1641, 1657, 1658
\@mkauthors 1371, 1373, 1689	\@printcopyrightfalse	\@subtitlefont
\@mkauthors@i . . 1693,	. . . . . 1178, 1190	1576, 1617, 1641, 1658
1695, 1697, 1699, 1748	\@printcopyrighttrue	\@subtitlenotes
\@mkauthors@ii 1778	. . . . . 1164, 1174	1033, 1037, 1040, 1377
\@mkauthors@iii . 1701,	\@printendtopmatter	\@svsec . 294, 297, 303, 318
1703, 1705, 1707, 1789	. . . . . 1464, 1912	\@svsechd . . . 316, 344, 364
\@mkauthors@iv 1709, 1834	\@printpermissionfalse	\@teaser 1348, 1875
\@mkbibcitation 1460, 1891	. . . . . 1177	\@teaserfigures
\@mkteasers . . . 1371, 1873	\@printpermissiontrue	1346, 1348, 1874, 1878
\@mktitle 1371, 1533	. . . 1166, 1173, 1189	\@tempa
\@mktitle@i 1536,	\@printtopmatter . . .	189, 190, 192, 194,
1538, 1540, 1542, 1597	. . . . . 1372, 1489	196, 198, 200, 202,
\@mktitle@ii 1625	\@proofindent	204, 206, 208, 210,
\@mktitle@iii . . 1544,	. . . 2282, 2292, 2300	212, 214, 216, 218,
1546, 1548, 1550, 1625	\@proofnamefont	220, 222, 224, 226,
\@mktitle@iv . . 1552, 1653	. . . 2281, 2291, 2301	228, 230, 232, 234,
\@mpargs 553	\@received . 1130, 1133,	237, 239, 241, 243,
\@mparswitchfalse . . 518	1134, 1136, 1139,	245, 247, 986, 987,
\@mpfootins	1140, 1142, 1146, 1147	1131, 1132, 1761,
545, 546, 548, 568, 569	\@rightskip . . . 2157, 2158	2314, 2329, 2330, 2332
\@mpfootnotetext . . . 567	\@saveabstract 1097, 1098	\@tempb 190, 192,
\@ne 215, 219, 223,	\@saveteaser . . 1347, 1348	194, 196, 198, 200,
225, 424, 1939, 1944	\@secntformat . 297, 354	202, 204, 206, 208,
\@nil 234	\@secfont 2140, 2161	210, 212, 214, 216,
\@nobreakfalse . 337, 377	\@secpenalty 286	218, 220, 222, 224,
\@noskipsecfalse . . . 341	\@sect 290, 291	226, 228, 230, 232,
\@noskipsectrue 338	\@setaddresses 1880	237, 239, 241, 243,
\@par 1383	\@setthanks . . . 1383, 1933	245, 247, 2331, 2332
\@parboxrestore 572	\@shortauthors	\@tempboxa 553
\@parfont . 2152, 2156, 2161	. . . . . 1979, 2009,	\@tempc . 235, 236, 238,
\@permissionCodeOne	2015, 2021, 2029, 2039	240, 242, 244, 246, 248
. 747,	\@sidebar 637, 638	\@tempcnta 2073,
751, 756, 760, 764,	\@specialsection . . .	2075, 2076, 2078, 2080
768, 772, 776, 783,	1443, 1449, 1451, 1468	\@tempdima
787, 791, 795, 801,	\@ssect 289, 355	2079, 2080, 2081, 2083
805, 815, 819, 823,	\@startPage 1091,	\@tempskipa
827, 831, 835, 839,	1490, 1491, 1493, 1973	278, 280, 281, 286,
843, 847, 851, 855,	\@startsection	299, 300, 331, 332,
859, 863, 867, 871,	. . . 275, 367, 2137,	334, 346, 347, 356, 357
875, 883, 888, 892,	2141, 2145, 2149,	\@textbottom 580
896, 900, 904, 908,	2153, 2184, 2189, 2194	\@textsuperscript . .
912, 916, 920, 924,	\@starttoc 367	. . . . . 579, 1370, 1375
928, 932, 936, 946, 1426	\@subparfont . . 2197, 2198	\@texttop 581
\@permissionCodeTwo	\@subsecfont . . 2144, 2161	\@thefnmark . 560, 574,
. 884, 947	\@subsubsecfont 2148, 2161	579, 1370, 1375, 1379
\@plus . . . 370, 378, 580,		\@title . . . 1026, 1463,
2138, 2142, 2146,		1615, 1639, 1656, 1898

\@titlefont	1555 , 1607 , 1614 , 1626 , 1638 , 1654	2060 , 2096 , 2129 , 2166 , 2215 , 2245 , 2283	\acmYear	13 , 1058	
\@titlenotes	..... 1024 , 1028 , 1031 , 1376	\ACM@linecount	.... 1938 , 1939 , 1943 , 1944	\addcontentsline	185 , 310 , 323 , 1883 , 2308
\@tochangmeasure	308 , 321	\ACM@linecount@bx	.. ... 1935 , 1952 , 1959	\additionalaffiliation	..... 10 , 1008
\@toclevel	..... 292	\ACM@linecount@bxht	..... 1937 , 1942 , 1945 , 1946	\addpenalty	..... 286
\@tocline	..... 380 , 381	\ACM@linecountL	.... ... 1948 , 2007 , 2010 , 2013 , 2016 , 2020 , 2022 , 2028 , 2030 , 2038 , 2040 , 2098 , 2105 , 2106 , 2114 , 2115 , 2121 , 2124	\addresses	967 , 969 , 972 , 977 , 1004 , 1022 , 1046 , 1775 , 1833 , 1871
\@topnum	..... 1366	\ACM@mk@linecount	.. ... 1940 , 1950 , 1957	\addtolength	..... 1945
\@typeset@author@bx	..... 1782 , 1827 , 1833 , 1866 , 1871	\ACM@timestamp	.... 1962 , 2049 , 2130 , 2133	\addvspace	..... 286 , 378
\@typeset@author@line	1740 , 1751 , 1773 , 1775	\acmArticle	.... 13 , 1054	\advance	.. 964 , 1600 , 1601 , 1604 , 1605 , 1629 , 1630 , 1791 , 1804 , 1836 , 1843 , 1944 , 2076 , 2078 , 2081
\@undefined	..... 434	\acmArticleSeq	. 14 , 1056	\affiliation	..... 9 , 1001 , 1760 , 1818 , 1857
\@width	..... 536 , 541	\acmBadgeL	..... 14 , 1086	\and	.... 977 , 978 , 991 , 997 , 1751 , 1756 , 1758 , 1768 , 1773 , 1782 , 1812 , 1827 , 1833 , 1851 , 1866 , 1871
\@xp	..... 374 , 375	\acmBadgeR	..... 14 , 1081	\andify	..... 1455 , 1456 , 1741 , 1744
\@xsect	.... 329 , 330 , 366	\acmConference	... 9 , 948	anonsuppress (environ- ment)	..... 20
\@z	..... 221	\acmConference@date	..... 951 , 1399 , 1417 , 1905 , 2041 , 2043	\AtBeginDocument	427 , 435
\\	454 , 1403 , 1408 , 1423 , 1427 , 1432 , 1893 , 1943	\acmConference@name	..... 950 , 1417 , 1904 , 1906	\AtEndDocument	.... 1145
\{	..... 197	\acmConference@shortname	..... 949 , 953 , 954 , 1399 , 1906 , 1907 , 2040 , 2042	\author	..... 9 , 962 , 1359 , 1360 , 1895
\}	..... 197	\acmConference@venue	..... 952 , 1399 , 1904 , 2041 , 2043	\author@bx	1778 , 1783 , 1786
_	... 1157 , 1403 , 1405 , 1427 , 1901 , 1907 , 1973	\acmdefinition	.... 2260	\author@bx@sep	.... ... 1780 , 1786 , 1791 , 1804 , 1836 , 1843
A				\author@bx@wd	..... 1779 , 1782 , 1790 , 1791 , 1796 , 1798 , 1800 , 1802 , 1804 , 1835 , 1836 , 1841 , 1843
\abstract	..... 1097	\acmDOI	..... 14 , 1072	\authornote	..... .. 13 , 1008 , 1044 , 1896
abstract (environment)	16	\acmISBN	..... 14 , 1070	\authors	970 , 973 , 978 , 1455 , 1457 , 1462 , 1898
\acks	..... 2305	\acmJournal	..... 7 , 942	B	
acks (environment)	.... 20	\acmMonth	..... 13 , 1060	\baselineskip	..... 1393 , 1609 , 1621 , 1633 , 1648 , 1942 , 1945 , 2138 , 2139
\acm@copyrightinput	1170	\acmNumber	..... 13 , 1052		
\acm@copyrightmode	.. ... 1170 , 1176 , 1181 , 1184 , 1188 , 1194 , 1197 , 1200 , 1203 , 1206 , 1212 , 1241	\acmplain	..... 2230		
\ACM@fontsize	..... 106 , 150 , 153 , 155 , 157 , 159 , 161 , 163 , 165 , 167 , 169 , 172 , 173	\acmPrice	..... .. 14 , 1066 , 1186 , 1192		
\ACM@format	..... 31 , 114	\acmSubmissionID	14 , 1068		
\ACM@format@nr	.. 31 , 114 , 118 , 123 , 129 , 151 , 392 , 458 , 523 , 616 , 668 , 1469 , 1497 , 1534 , 1556 , 1577 , 1691 , 1715 , 1913 , 1981 , 2005,	\acmVolume	..... 13 , 1050		

2142, 2143, 2146, 2150, 2185, 2186, 2190, 2195, 2231, 2232, 2233, 2234, 2261, 2262, 2263, 2264	\ccsdesc 1153, 1154 CCSXML (environment) . . 15 \centering 371, 453, 575, 642, 645, 1626, 1638, 1783, 1832, 2088	374, 375, 560, 574, 1156, 1157, 1158, 1159 \CurrentOption . 107, 108, 109, 110, 111, 112
\begin . 20, 1951, 1958, 2082 \begingroup 301, 344, 358, 367, 423, 1362, 1689, 2306 \bfseries . . 683, 1388, 1558, 1560, 1562, 1566, 1568, 1570, 1572, 1574, 1734, 1737, 1897, 2089, 2161, 2162, 2176, 2177, 2179, 2180, 2182, 2183, 2188, 2193, 2201, 2202, 2205, 2206, 2225, 2255 \bgroup 638, 641, 644, 649, 1009, 1442, 1447, 1782, 1868, 1875, 1881, 1891 \bibfont 187 \bibliofont 187 \bibliographystyle . 433 \bibsection 183 \bibstyle 211, 213, 255, 438 \bibstyle@acmauthoryear 261 \bibstyle@acmnumeric 267 \bigskip 1147, 1518, 1624, 1652, 1660, 1833, 1871, 1875, 1921, 1923, 1925, 1927, 1929 \box 665, 1499, 1502, 1505, 1508, 1510, 1512, 1514, 1516, 1518, 1774, 1786, 1831, 1877	\cite . . . 415, 416, 428, 432 \citeA 422 \citealt 421 \citeANP 417 \citeauthor 417 \citeN 415 \citename 429 \citeNN 418 \citeNP 421 \citet 416 \citestyle . . . 21, 253, 273 \citeyear . . . 419, 420, 432 \citeyearNP 419 \citeyearpar . . . 418, 420 \city 11, 1015, 1669 \ClassError 34, 940, 1007, 1106, 1112, 1118, 1894 \ClassInfo . . 114, 172, 938, 1103, 1105, 1109, 1111, 1115, 1117 \ClassWarning . . . 27, 119, 590, 593, 595, 1093 \cleaders 1666 \clubpenalty . . . 343, 349 \CodelineIndex 17 \Collect@Body . . 637, 640, 643, 1097, 1347 \color 1391, 1943 \color@begingroup 562, 575 \color@endbox 663 \color@endgroup 551, 565, 578 \columnwidth . . . 536, 571, 649, 1835, 1868 \contentsnamefont . . 371 \copy 1666 \copyright 1403 \copyrightpermissionfootnoterule 535 \copyrightyear . . 16, 1344 \country . . . 11, 1018, 1669 \csname 255, 306, 308, 312, 319, 321, 325, 354,	D \day 1971 \DeclareNewFootnote 539 \DeclareOptionX 37, 107, 108, 109, 110, 111, 112 \DeclareRobustCommand 422 \def . . . 25, 37, 106, 153, 155, 157, 159, 161, 163, 165, 167, 169, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 226, 228, 230, 232, 233, 237, 239, 241, 243, 245, 247, 275, 291, 316, 330, 354, 355, 364, 367, 380, 381, 386, 387, 388, 389, 433, 535, 540, 542, 554, 556, 567, 579, 580, 638, 641, 644, 649, 651, 655, 658, 676, 677, 678, 679, 745, 746, 747, 749, 750, 751, 753, 755, 756, 758, 759, 760, 762, 763, 764, 766, 767, 768, 770, 771, 772, 774, 775, 776, 778, 779, 781, 782, 783, 785, 786, 787, 789, 790, 791, 793, 794, 795, 797, 799, 800, 801, 803, 804, 805, 807, 809, 811, 813, 814, 815, 817, 818, 819, 821, 822, 823, 825, 826, 827, 829, 830, 831, 833, 834, 835, 837, 838, 839, 841, 842, 843,
C \c@footnote 1365 \c@secnumdepth 293, 307, 311, 320, 324 \captionsetup 608, 610, 612, 614, 623, 625, 628, 631, 638, 641, 644, 1876 \ccsdesc 15, 1152		

845, 846, 847, 849,	1761, 1782, 1789,	1444, 1453, 1785,
850, 851, 853, 854,	1807, 1813, 1818,	1871, 1876, 1890, 1911
855, 857, 858, 859,	1834, 1846, 1852,	\else . 51, 59, 67, 75, 83,
861, 862, 863, 865,	1857, 1872, 1873,	91, 101, 125, 235,
866, 867, 869, 870,	1875, 1880, 1881,	256, 285, 292, 295,
871, 873, 874, 875,	1891, 1892, 1893,	307, 311, 315, 320,
877, 878, 879, 881,	1894, 1912, 1933,	324, 336, 348, 363,
882, 883, 884, 886,	1940, 1948, 1955,	411, 426, 432, 434,
887, 888, 890, 891,	1979, 1980, 2059,	545, 613, 963, 971,
892, 894, 895, 896,	2066, 2071, 2073,	975, 976, 985, 990,
898, 899, 900, 902,	2157, 2161, 2162,	993, 996, 1003,
903, 904, 906, 907,	2163, 2164, 2170,	1021, 1030, 1039,
908, 910, 911, 912,	2171, 2173, 2174,	1045, 1104, 1110,
914, 915, 916, 918,	2176, 2177, 2179,	1116, 1123, 1126,
919, 920, 922, 923,	2180, 2182, 2183,	1135, 1138, 1141,
924, 926, 927, 928,	2188, 2193, 2198,	1146, 1160, 1161,
930, 931, 932, 934,	2201, 2202, 2205,	1353, 1371, 1381,
935, 936, 942, 943,	2206, 2208, 2209,	1394, 1397, 1398,
944, 945, 946, 947,	2211, 2212, 2213,	1404, 1409, 1416,
958, 986, 1008,	2214, 2223, 2224,	1421, 1424, 1427,
1009, 1010, 1011,	2225, 2226, 2241,	1429, 1432, 1442,
1012, 1013, 1024,	2242, 2243, 2244,	1447, 1450, 1492,
1025, 1033, 1034,	2253, 2254, 2255,	1521, 1526, 1599,
1043, 1044, 1050,	2256, 2281, 2282,	1603, 1608, 1616,
1052, 1054, 1056,	2291, 2292, 2312,	1619, 1632, 1640,
1058, 1060, 1062,	2314, 2329, 2330, 2331	1647, 1657, 1663,
1066, 1068, 1070,	\define@boolkey 48, 56,	1664, 1678, 1679,
1072, 1082, 1083,	64, 72, 80, 88, 96,	1680, 1682, 1683,
1084, 1085, 1087,	1006, 1101, 1107, 1113	1686, 1743, 1755,
1088, 1089, 1090,	\define@choicekey ..	1761, 1767, 1783,
1091, 1093, 1095,	..... 31, 691, 1169	1801, 1809, 1815,
1098, 1100, 1119,	\definecolor	1822, 1840, 1848,
1130, 1131, 1155,	... 441, 442, 443,	1854, 1861, 1874,
1209, 1211, 1239,	444, 445, 446, 447, 448	1882, 1886, 1903,
1240, 1344, 1346,	\department . 11, 1012, 1669	1906, 1974, 1979,
1348, 1357, 1370,	\description 684	2036, 2123, 2132,
1375, 1383, 1468,	\descriptionlabel 683, 686	2314, 2318, 2325, 2333
1489, 1533, 1555,	\dimexpr .. 647, 665, 2046	\email 9,
1576, 1597, 1625,	\divide 1796,	1020, 1759, 1813, 1852
1653, 1662, 1671,	1798, 1800, 1802, 1841	\emph 1415, 1417
1679, 1680, 1683,	\do 189	\EnableCrossrefs 19
1686, 1689, 1713,	\DocInput 21	\end ... 22, 1953, 1960, 2090
1714, 1718, 1719,	\documentclass 9	\end@dblfloat 654
1722, 1723, 1725,	\dots 1432	\end@float 656
1726, 1728, 1729,		\endcsname 254,
1731, 1732, 1734,	E	255, 306, 308, 312,
1735, 1737, 1738,	\edef 107, 108, 109, 110, 292	319, 321, 325, 354,
1740, 1742, 1747,	\egroup 552,	374, 375, 560, 574,
1748, 1749, 1750,	639, 642, 645,	1156, 1157, 1158, 1159
1752, 1759, 1760,	656, 662, 1019,	\enddescription 690

<code>\endgroup</code>	305, 344, 362, 377, 1438, 1711, 2310		
<code>\endlist</code>	688, 690		
<code>\endminipage</code>	542		
<code>\endtrivlist</code>	2303		
<code>\enspace</code>	2209		
environments:			
<code>abstract</code>	16		
<code>acks</code>	20		
<code>anonsuppress</code>	20		
<code>CCSXML</code>	15		
<code>marginfigure</code>	19		
<code>marginable</code>	19		
<code>printonly</code>	19		
<code>screenonly</code>	19		
<code>sidebar</code>	19		
<code>teaserfigure</code>	17		
<code>\everypar</code>	284, 339, 350		
<code>\excludecomment</code>	1150, 2317, 2319, 2323, 2324		
<code>\ExecuteOptionsX</code>	...		
.....	47, 55, 63, 71, 79, 87, 95, 105		
<code>\expandafter</code>		
...	234, 236, 435, 553, 1156, 1157, 1159		
F			
<code>\familydefault</code>	.... 605		
<code>\fancyfoot</code>	..... 2011, 2017, 2025, 2034, 2037, 2049, 2099, 2100, 2102, 2110, 2118, 2126, 2130, 2133		
<code>\fancyhead</code>	. 2007, 2008, 2009, 2010, 2013, 2014, 2015, 2016, 2020, 2022, 2023, 2028, 2030, 2031, 2032, 2038, 2039, 2040, 2042, 2098, 2105, 2106, 2107, 2113, 2114, 2115, 2121, 2122, 2124, 2125		
<code>\fancyheadoffset</code>	...		
...	2046, 2108, 2116		
<code>\fancyhf</code>	..... 2002, 2093		
<code>\fancypagestyle</code>	2001, 2092		
<code>\fi</code>	..... 53, 61, 69, 77, 85, 93, 103, 122,		
	127, 149, 170, 171, 180, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 238, 240, 242, 244, 246, 248, 249, 258, 260, 274, 276, 282, 287, 292, 298, 309, 313, 322, 326, 328, 351, 352, 365, 376, 404, 413, 430, 432, 436, 439, 456, 520, 534, 549, 566, 586, 603, 606, 633, 634, 653, 657, 682, 937, 955, 966, 974, 979, 980, 984, 992, 998, 999, 1000, 1005, 1023, 1032, 1042, 1049, 1065, 1106, 1112, 1118, 1128, 1129, 1137, 1143, 1144, 1148, 1158, 1162, 1180, 1183, 1187, 1193, 1196, 1199, 1202, 1205, 1208, 1238, 1343, 1355, 1360, 1361, 1371, 1373, 1384, 1392, 1395, 1396, 1400, 1401, 1406, 1418, 1423, 1427, 1432, 1434, 1435, 1436, 1437, 1445, 1446, 1452, 1454, 1461, 1488, 1494, 1525, 1529, 1530, 1531, 1553, 1575, 1596, 1602, 1606, 1612, 1618, 1623, 1635, 1637, 1642, 1650, 1651, 1659, 1667, 1679, 1680, 1682, 1683, 1686, 1688, 1710, 1739, 1746, 1757, 1771, 1772, 1783, 1803, 1811,		
	1817, 1826, 1842, 1850, 1856, 1865, 1879, 1888, 1890, 1907, 1909, 1931, 1947, 1954, 1961, 1976, 1978, 1979, 2000, 2007, 2008, 2013, 2014, 2021, 2024, 2029, 2033, 2037, 2044, 2047, 2050, 2072, 2099, 2126, 2127, 2134, 2135, 2207, 2229, 2259, 2295, 2314, 2321, 2327, 2330, 2334		
<code>\firstpagestyle</code>	.... 2092		
<code>\floatname</code>	..... 636		
<code>\footnote</code>	..... 1894		
<code>\footnotemark</code>	.. 389, 1026, 1035, 1872, 1892		
<code>\footnoterule</code>	..... 540		
<code>\footnotesep</code>	... 564, 577		
<code>\footnotesize</code>	..... . 570, 1970, 2011, 2017, 2025, 2034, 2037, 2100, 2102, 2110, 2118, 2126, 2131		
<code>\footnotetext</code>	.. 1029, 1031, 1038, 1041, 1048		
<code>\footnotetextcopyrightpermission</code>	..... 1382, 1386		
<code>\footrulewidth</code>	2004, 2095		
<code>\format</code>	..... 31		
<code>\frenchspacing</code>	.... 2335		
<code>\fulltextwidth</code>	..... 646, 649, 665		
G			
<code>\g@addto@macro</code>	.... ..... 977, 978, 991, 997, 1004, 1022, 1026, 1028, 1031, 1035, 1037, 1040, 1046, 1047, 1136, 1142, 1158, 1159, 1348, 1352, 1354, 1756, 1768, 1810, 1816, 1823, 1849, 1855, 1862, 1872		

<code>\gdef</code> 949, 950, 951, 952, 954, 969, 970, 972, 973, 983, 989, 995, 1098, 1134, 1140, 1157, 1491, 1754, 1758, 1763, 1787, 1788, 1805, 1806, 1808, 1812, 1814, 1819, 1844, 1845, 1847, 1851, 1853, 1858	<code>\if@ACM@affiliation@obey</code> <u>1006</u> , 1664, 1679, 1680, 1681, 1683, 1686	<code>\if@printcopyright</code> <u>1163</u> , 1402
<code>\geometry</code> 460, 463, 470, 477, 484, 491, 498, 505, 512	<code>\if@ACM@authorversion</code> <u>64</u> , 1394, 1410	<code>\if@printpermission</code> <u>1165</u> , 1395
<code>\global</code> 338, 341, 377, 568, 664, 964, 965, 1002, 1366, 1368, 1457, 1458, 1751, 1773, 1774, 1783, 1827, 1830, 1866, 1877, 1944	<code>\if@ACM@authordraft</code> <u>96</u> , 449, 1387	<code>\ifcase</code> . 129, 151, 392, 458, 523, 616, 668, 743, 1062, 1212, 1241, 1469, 1497, 1534, 1556, 1577, 1691, 1715, 1792, 1837, 1913, 1981, 2005, 2060, 2096, 2166, 2215, 2245, 2283
<code>\grantnum</code> 20, <u>2313</u>	<code>\if@ACM@authorversion</code> <u>64</u> , 1394, 1410	<code>\ifcsname</code> 254
<code>\grantsponsor</code> .. 20, <u>2312</u>	<code>\if@ACM@badge</code> <u>1074</u> , 1519, 1628, 1644	<code>\ifdim</code> 280, 300, 332, 357, 1946
H	<code>\if@ACM@journal</code> <u>116</u> , 609, 1124, 1398, 1414, 1425, 1448, 1669, 1884, 1899	<code>\iffalse</code> 1385
<code>\hbox</code> . 579, 1370, 1375, 1665	<code>\if@ACM@manuscript</code> <u>115</u> , 177, 1121, 1397, 1407	<code>\IfFileExists</code> 590, 593, 595
<code>\headrulewidth</code> 2003, 2094	<code>\if@ACM@natbib</code> <u>72</u> , 181, 272, 414	<code>\ifNAT@numbers</code> 432
<code>\hfill</code> 1655	<code>\if@ACM@natbib@override</code> <u>72</u> 1206, 1360, 2075, 2129	<code>\ifnum</code> 118, 123, 292, 293, 307, 311, 320, 324, 1160, 1161, 1176, 1181, 1184, 1188, 1194, 1197, 1200, 1203,
<code>\href</code> . 1522, 1527, 1609, 1621, 1633, 1648, 2333	<code>\if@ACM@newfonts</code> <u>588</u> , <u>598</u>	<code>\ifPDFTeX</code> 583
<code>\hrule</code> 536, 541, 1655	<code>\if@ACM@printacmref</code> <u>1107</u> , 1459	<code>\ifvmode</code> 1663
<code>\hrulefill</code> . 1500, 1503, 1506, 1915, 1917, 1919	<code>\if@ACM@printccs</code> <u>1101</u> , 1441	<code>\ifvoid</code> 545
<code>\hsize</code> 571, 1369, 1597, 1598, 1625, 1627, 1653, 1690, 1782, 1829, 1868	<code>\if@ACM@printfolios</code> <u>1113</u> , 2007, 2008, 2013, 2014, 2021, 2024, 2029, 2033, 2037, 2099, 2126	<code>\ifx</code> . 150, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 237, 239, 241, 243, 245, 247, 434, 953, 967, 982, 987, 988, 994, 1132, 1133, 1139, 1146, 1156, 1381, 1419, 1427, 1432, 1442, 1447, 1490, 1521, 1526, 1599, 1603, 1608, 1616, 1619, 1632, 1640, 1647, 1657, 1743, 1753, 1761, 1762, 1807, 1813, 1818, 1846, 1852, 1857, 1874, 1882, 1906, 1974, 2314, 2330, 2332
<code>\hskip</code> 303, 317, 347, 360, 364, 1524, 1611, 1620, 1636, 1645, 1666, 2300	<code>\if@ACM@review</code> <u>56</u> , 1935, 1949, 1956	
<code>\hspace</code> ... 683, 1251, 1262, 1271, 1288, 1302, 1314, 1786, 1832	<code>\if@ACM@screen</code> <u>48</u> , 405, 2315	
<code>\Huge</code> 1564, 1566, 1568, 1570, 1572, 1574	<code>\if@ACM@sigchiamode</code> <u>117</u> , 555, 604, 648, 654, 1371, 1373, 1783, 2045	
<code>\hypersetup</code> 406, 412, 1462	<code>\if@ACM@timestamp</code> <u>88</u> , 1962, 2048, 2128	
I	<code>\if@acmowned</code> <u>1167</u>	
<code>\if</code> 235	<code>\if@filesw</code> 373, 437	
	<code>\if@insideauthorgroup</code> <u>962</u> , 963	
	<code>\if@nobreak</code> 283	
	<code>\if@noskipsec</code> .. 276, 340	

\ignorespaces	\leaders 1655	\medskip 1471, 1473, 1475,
. . . 353, 564, 577,	\leavevmode 276, 1655, 1831	1477, 1774, 1776,
1010, 1011, 1013,	\leftskip . 1654, 1869, 2159	1831, 1878, 1897,
1671, 1889, 1893, 2301	\let 211, 213,	1912, 1915, 1917, 1919
\immediate 375, 438	225, 227, 229, 255,	
\includecomment	294, 382, 383, 415,	\mktitle@bx 1356,
. . . 2316, 2320, 2326	416, 417, 418, 419,	1499, 1502, 1505,
\includegraphics	420, 421, 424, 428,	1508, 1510, 1512,
. . . . 1523, 1528,	581, 650, 686, 690,	1514, 1516, 1518,
1610, 1622, 1634, 1649	1014, 1015, 1016,	1607, 1626, 1654,
\indent 2282	1017, 1018, 1151,	1774, 1830, 1831, 1877
\input 584	1363, 1364, 1379,	
\InputIfFileExists .. 26	1380, 1383, 1457,	\month 1061, 1971
\institution <u>11</u> , 1011, <u>1669</u>	1458, 1670, 1673,	\moveleft 664
\interfootnotelinepenalty	1674, 1675, 1676,	\multiply 2080
. 558	1677, 1684, 1685,	
\interlinepenalty ..	1687, 1751, 1773,	N
. 304, 361, 558	1827, 1833, 1866, 1871	\NAT@@setcites 251
\item 2300	\lineskip 1832, 1870	\NAT@aysep 242
\itemindent 685	\linespacing . . . 370, 371	\NAT@citetp 424
\itshape .. 1399, 2163,	\list 684	\NAT@close
2164, 2193, 2198,	\LoadClass 173	191, 193, 195, 197, 240
2211, 2223, 2243, 2291	\long 556,	\NAT@cmprs .. 219, 221, 223
	567, 638, 641, 644,	\NAT@cmt 246
J	1098, 1100, 1348, 1933	\NAT@ctype 424
\jobname 372, 375	\loop 1943, 2074	\NAT@find@eq 234
K	M	\NAT@fullfalse 424
\kern 535, 536, 540, 541, 1655	\makebox 1388, 2083	\NAT@longnametrue . 231
\keywords <u>15</u> , <u>1095</u>	\makebox 1388, 2083	\NAT@merge .. 225, 227, 229
L	\makelabel 686	\NAT@nmfmt 233
\l@section <u>380</u>	\maketitle <u>17</u> , <u>1357</u>	\NAT@numbersfalse .. 205
\l@subsection <u>381</u>	\MakeUppercase	\NAT@numberstrue 207, 209
\labelenumi 676	. . . . 1754, 1756,	\NAT@open 191,
\labelenumii 677	2161, 2170, 2173,	193, 195, 197, 238, 424
\labelenumiii 678	2176, 2179, 2201, 2205	\NAT@partrue 424
\labelenumiv 679	\marginfigure <u>640</u>	\NAT@rem@eq 236
\labelsep 683, 2300	marginfigure (environ-	\NAT@sep 199, 201, 203, 248
\labelwidth 686	ment) 19	\NAT@sort 215, 217, 223
\LARGE 1558,	\marginpar 556,	\NAT@superfalse 207
1560, 1562, 1585,	639, 642, 645, 1520	\NAT@supertrue 209
1587, 1589, 1591,	\marginparsep .. 647, 2046	\NAT@swafalse 423
1593, 1722, 1725, 2089	\marginparwidth . 647, 2046	\NAT@up 233
\Large 1713, 1731, 2176,	\margintable <u>643</u>	\NAT@yrsep 244
2177, 2179, 2180, 2182	margintable (environ-	\NeedsTeXFormat 1
\large 1388,	ment) 19	\newblock 425
1718, 1723, 1726,	\mbox 233	\newbox .. 1356, 1661, 1778
2170, 2171, 2173, 2174	\mdseries	\newcommand
\lastbox 342	1579, 1581, 1583,	261, 267, 431, 948,
	1587, 1589, 1591,	1001, 1081, 1086,
	1593, 1595, 1735, 1738	1131, 1152, 1672,
		1681, 1969, 2313, 2328

1473, 1475, 1477, 1499, 1500, 1502, 1503, 1505, 1506, 1518, 1617, 1624, 1641, 1652, 1655, 1658, 1660, 1679, 1680, 1682, 1683, 1741, 1745, 1774, 1776, 1782, 1784, 1808, 1810, 1816, 1823, 1831, 1833, 1847, 1849, 1855, 1862, 1869, 1871, 1875, 1876, 1877, 1878, 1889, 1897, 1909, 1911, 1912, 1915, 1917, 1919, 1921, 1923, 1925, 1927, 1929, 1933, 2296	\pushQED 2297 \put 1952, 1959	203, 253, 605, 683, 962, 1020, 1349, 1365, 2003, 2004, 2094, 2095, 2137, 2141, 2145, 2149, 2153, 2184, 2189, 2194
\paragraph 1483, 2149, 2189 \parbox 453, 1613, 1631, 1638, 1646, 1941, 2087 \parindent 521, 1383, 1393, 2149, 2160, 2212, 2242 \parskip 521, 1393 \part 2153 \PassOptionsToClass 111, 112 \pdfgentounicode . . . 585 \pdfstringdefDisableCommands 385 \phantomsection 185, 1883, 2308 \popQED 2303 \position 11, 1010, 1014, 1015, 1016, 1017, 1018, 1669 \postcode . . . 11, 1017, 1669 printonly (environment) 19 \ProcessOptionsX . . . 113 \proof 2296 \proofname 2296 \protect 312, 325 \protected@edef 297, 559, 573 \providecommand 425, 429, 2210 \ProvidesClass 5 \ProvidesFile 3	Q \qed 2297 \quad 354, 2021, 2024, 2029, 2033, 2130 R \raggedright 1613, 1654, 1869 \raisebox 1388, 1609, 1621, 1633, 1648, 2083, 2085 \received 17, 1131 \RecordChanges 18 \ref 1902, 1908 \refname 184, 185 \refstepcounter 296 \relax . . 118, 123, 130, 152, 234, 235, 278, 297, 299, 303, 317, 331, 346, 356, 364, 375, 393, 459, 524, 581, 617, 669, 744, 961, 964, 1156, 1176, 1181, 1184, 1188, 1194, 1197, 1200, 1203, 1206, 1212, 1241, 1379, 1470, 1498, 1535, 1557, 1578, 1692, 1716, 1781, 1790, 1791, 1793, 1796, 1798, 1800, 1802, 1804, 1832, 1835, 1836, 1838, 1841, 1843, 1914, 1939, 1966, 1968, 1974, 1982, 2006, 2061, 2063, 2064, 2065, 2068, 2069, 2070, 2073, 2075, 2078, 2079, 2080, 2081, 2097, 2129, 2167, 2216, 2246, 2284, 2298 \removelastskip 369 \renewcommand . . 183, 187, 188, 191, 193, 195, 197, 199, 201,	\renewenvironment . . . 637, 684, 1097, 2296 \repeat 1946, 2077 \RequirePackage . . 30, 174, 175, 176, 178, 182, 384, 440, 450, 457, 537, 582, 587, 599, 600, 601, 602, 607, 1149, 1154, 1934 \reset@font 557, 570 \reversemarginpar . . 519 \rightskip 2158 \rlap 2084 \rule 564, 577, 2086 S \savebox 1941 screenonly (environ- ment) 19 \scriptsize 1943 \scshape 2213, 2281 \section 184, 1479, 1481, 1485, 1487, 1887, 2137, 2307 \section@raggedright 2157, 2161, 2162, 2170, 2171, 2173, 2174, 2176, 2177, 2179, 2180, 2182, 2183, 2188, 2201, 2202, 2205, 2206 \SelectFootnoteRule 538 \setbox 342, 568, 664, 1607, 1626, 1654, 1665, 1774, 1783, 1830, 1877 \setcitestyle 21, 188, 262, 268 \setcopyright . . 16, 1209 \setcounter 1374, 1439, 1493, 1966, 1968, 2165, 2200, 2204 \setkeys 37, 121, 942, 1119,

1209, 1764, 1765,	\strutbox 564, 577	\trivlist 2299
1769, 1770, 1820,	\subparagraph 2194	\tw@ 227
1821, 1824, 1825,	\subsection 2141	\two@digits . . . 1971, 1972
1859, 1860, 1863, 1864	\subsubsection 2145, 2184	\twocolumn 1508,
\setlength . . 521, 522,	\subtitle 9, <u>958</u>	1510, 1512, 1514, 1516
528, 1077, 1080, 1942	\subtitlenote . . <u>13</u>, <u>1034</u>	
\settopmatter 17, <u>1119</u>,		U
1120, 1122, 1125, 1127	T	\unskip 345, 386,
\setTrue 368	\teaserfigure <u>1347</u>	544, 1013, 1019,
\SetWatermarkColor . 452	teaserfigure (environ-	1666, 1686, 1745, 1893
\SetWatermarkFontSize 451	ment) 17	\unvbox 548, 553, 569
\SetWatermarkText . . 453	\terms 15, <u>1093</u>	\upshape 683
\sfdefault 605	\textbf 1157, 1160	\url 1239, 2314
\sffamily . . 1558, 1560,	\textbullet 387, 1157,	\urlstyle . . . 391, 400, 403
1562, 1564, 1566,	2021, 2024, 2029, 2033	\usebox 1952, 1959
1568, 1572, 1713,	\textcolor 2089	\usepackage
1718, 1722, 1983,	\textheight 1946	. 10, 11, 12, 13, 14, 15
1985, 1987, 1989,	\textit . . 1161, 1900, 1904	
1991, 1993, 1995,	\textrightarrow . 388, 1157	V
1997, 1999, 2089,	\textwidth 647, 665, 666,	\vbox 568,
2161, 2162, 2163,	1369, 1597, 1625,	664, 1607, 1626,
2170, 2171, 2173,	1653, 1690, 1790, 1829	1654, 1774, 1830, 1877
2174, 2179, 2180,	\thanks <u>13</u>, <u>1349</u>, 1933	\vskip 334, 369, 546, 580, 659
2201, 2202, 2205, 2206	\thankses	\vtop 1783
\shortauthors	1352, 1354, 1381, 1933	
17, 982, 983, 988,	\the 1059,	W
989, 991, 994, 995,	1061, 1943, 1971, 2080	\wd 666, 1666
997, 1456, 1458, 1979	\theACM@time@hours .	\write 438
\shortcite 428, 431	. . . . . 1968, 1972	
\shorttitle 2010,	\theACM@time@minutes 1972	X
2016, 2024, 2033, 2038	\theenumi 676	\xdef 238,
\showeprint <u>2328</u>	\theenumii 677	240, 242, 244, 246, 248
\sidebar <u>635</u>	\theenumiii 678	
sidebar (environment) . 19	\theenumiv 679	Y
\skip 546	\thefootnote 1365	\year 1059, 1971
\small . . 557, 639, 642,	\theoremstyle	Z
645, 1147, 1471,	. . . 2271, 2277, 2280	\z@ 217, 280, 300,
1473, 1475, 1477,	\thepage . . 1973, 2007,	332, 342, 357, 370,
1719, 1885, 1897, 2099	2008, 2013, 2014,	522, 564, 577, 580,
\space 321, 1686, 2314	2021, 2024, 2029,	611, 615, 626, 686,
\specialcomment 2305	2033, 2037, 2099, 2126	1366, 1368, 1383,
\standardpagestyle . <u>2001</u>	\thispagestyle 1495	1388, 1393, 1609,
\startPage 15, <u>1091</u>	\thmname 2240, 2270	1621, 1633, 1648,
\state 11, 1016, <u>1669</u>	\thmnote 2240, 2270	1869, 2003, 2004,
\stepcounter . . . 1029,	\thmnumber 2240, 2270	2054, 2056, 2058,
1031, 1038, 1041, 1048	\thr@ 229	2083, 2085, 2094,
\streetaddress	\time 1963, 1966, 1968	2095, 2137, 2141,
. 11, 1014, <u>1669</u>	\title 9, 1895	2153, 2160, 2184,
\string 438, 1093, 1895, 1896	\titlenote . . 13, <u>1025</u>, 1896	2189, 2194, 2224, 2254
\strut 1631, 1646	\topsep 2298	\z@skip . . . 369, 659, 2159

T

V

W

X

Y

$$\mathbf{Z}$$