

Boris Veytsman † 2020/02/08, v1.69

Abstract

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

Contents

1	Intr	oduction	3
2	Useı	r's guide	3
	2.1	Installation	3
	2.2	Invocation and options	6
	2.3	Top matter	7
	2.4	Algorithms	20
	2.5	Figures and tables	20
	2.6	Descriptions of images	22
	2.7	Theorems	22
	2.8	Online-only and offline-only material	22
	2.9	Note about anonymous mode	23
	2.10	Acknowledgments	23
	2.11	Bibliography	24
	2.12	Colors	27
	2.13	Other notable packages and typographic remarks	28
	2.14	Disabled or forbidden commands	28
	2.15	A note for wizards: acmart-preload-hook.tex	29
	2.16	Currently supported publications	29

^{*©2016–2019,} Association for Computing Machinery

[†]borisv@lk.net,boris@varphi.com

3	Imp	plementation 32		
	3.1	Identification	32	
	3.2	Preload hook	32	
	3.3	Options	32	
	3.4	Setting switches	36	
	3.5	Loading the base class and package	37	
	3.6	Citations	38	
	3.7	Paper size and paragraphing	45	
	3.8	Fonts	48	
	3.9	Image descriptions	49	
	3.10	Floats	50	
	3.11	Lists	52	
	3.12	Top-matter data	54	
	3.13	Concepts system	68	
	3.14	Copyright system	69	
	3.15	Typesetting top matter	74	
	3.16	Headers and Footers	89	
	3.17	Sectioning	96	
	3.18	TOC lists	98	
	3.19	Theorems	98	
	3.20	Balancing columns	102	
	3.21	Acknowledgments	102	
	3.22	Conditional typesetting	103	
	3.23	Additional bibliography commands	103	
	3.24	End of Class	103	

1 Introduction

The Association for Computing Machinery¹ is the world's largest educational and scientific computing society, which delivers resources that advance computing as a science and a profession. It was one of the early adopters of TeX for its typesetting.

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

This package provides the uniform interface for all ACM publications. It is intended to replace all the different classes and packages and provide an up-to-date LATEX package.

This package uses only free TEX packages and fonts included in TEXLive, MikTEX and other popular TEX distributions. It is intended to be published in these distributions itself, which minimizes users' efforts in the installation and support of this package.

I am grateful to Michael D. Adams, Leif Andersen, Lawrence Christopher Angrave, Dirk Beyer, Joachim Breitner, Benjamin Byholm, Nils Anders Danielsson, Michael Ekstrand, Matthew Fluet, Paolo G. Giarrusso, Ben Greenman, Enrico Gregorio, Jamie Davis, Peter Kemp, Luis Leiva, Ben Liblit, Rholais Lii, LianTze Lim, Kai Mindermann, Frank Mittelbach, Serguei Mokhov, Ross Moore, John Owens, Joel Nider, Tobias Pape, Philip Quinn, Mathias Rav, Andreas Reichinger, Matteo Riondato, Craig Rodkin, Bernard Rous, Feras Saad, Kerry A. Seitz, Jr., David Shamma, Gabriel Scherer, Kartik Singhal, Stephen Spencer, Shin Hwei Tan, Daniel Thomas, Zack Weinberg, John Wickerson and many others for their invaluable help.

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

2 User's guide

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

2.1 Installation

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

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

¹http://www.acm.org/

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

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

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

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

This class uses a number of other packages. They are included in all major TEX distributions (TEXLive, MacTEX, MikTEX) of 2015 and later, so you probably have them installed. Just in case here is the list of these packages:

```
    amscls, http://www.ctan.org/pkg/amscls
```

- amsfonts, http://www.ctan.org/pkg/amsfonts
- amsmath, http://www.ctan.org/pkg/amsmath
- binhex, http://www.ctan.org/pkg/binhex
- balance, http://www.ctan.org/pkg/balance
- booktabs, http://www.ctan.org/pkg/booktabs
- caption, http://www.ctan.org/pkg/caption
- comment, http://www.ctan.org/pkg/comment
- cm-super, http://www.ctan.org/pkg/cm-super
- cmap, http://www.ctan.org/pkg/cmap
- draftwatermark, http://www.ctan.org/pkg/draftwatermark
- environ, http://www.ctan.org/pkg/environ
- etoolbox, http://www.ctan.org/pkg/etoolbox
- fancyhdr, http://www.ctan.org/pkg/fancyhdr
- float, http://www.ctan.org/pkg/float

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

2.2 Invocation and options

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

```
\documentclass[\langle options \rangle] \{ acmart \}
```

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

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

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

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

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

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

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

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

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

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

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

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

The option natbib is used when the corresponding $BibT_{E}X$ style is based on natbib. In most cases you do not need to set it. See Section 2.11.

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

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

Table 1: The possible values for the format option

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

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

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

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

2.3 Top matter

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

Table 2: Boolean options

Option	Default	Meaning
review	false	A review version: lines are numbered and hyperlinks are colored
screen	see text	A screen version: hyperlinks are colored
natbib	true	Whether to use the natbib package (see Section 2.11)
anonymous	false	Whether to make author(s) anonymous
authorversion	false	Whether to generate a special version for the authors' personal use or posting (see Section 2.3)
nonacm	false	Use the class typesetting options for a non-ACM document, which will not include the conference/journal header and footers or permission statements
timestamp	false	Whether to put a time stamp in the footer of each page
authordraft	false	Whether author's-draft mode is enabled
acmthm	true	Whether to define theorem-like environments, see Section 2.7
balance	true	Whether to balance the last page in two column mode
urlbreakonhyphens	true	Whether to break urls on hyphens

used before \maketitle.

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

\acmJournal

The macro $\armontomal{\langle shortName \rangle}$ sets the name of the journal or transaction for journals and transactions. The argument is the short name of the publication *in uppercase*, for example,

```
\acmJournal{TOMS}
```

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

\acmConference

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

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

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

venue: the place of the conference.

Examples:

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

\acmBooktitle

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

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

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

\editor

In most cases, conference proceedings are edited. You can use the command $\ensuremath{\mbox{\mbox{\sc heitor}}}\$ to set the editor of the volume. This command can be repeated, for example,

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

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

```
\title[\langle ShortTitle \rangle] \{\langle FullTitle \rangle \}
```

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

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

\subtitle

Besides title, ACM classes allow a subtitle, set with the $\boldsymbol{\langle subtitle \rangle}$ macro.

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

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

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

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

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

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

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

Similarly you can repeat the \email command.

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

```
\author{...}
\orcid{...}
```

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

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

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

However, this format is not generally recommended.

\additionalaffiliation

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

```
\author{G. Tobin}
\author{Ben Trovato}
\additionalaffiliation{%
  \institution{The Th{\o}rv{\"a}ld Group}
  \streetaddress{1 Th{\o}rv{\"a}ld Circle}
  \city{Hekla}
  \country{Iceland}}
\affiliation{%
  \institution{Institute for Clarity in Documentation}
  \streetaddress{P.O. Box 1212}
  \city{Dublin}
  \state{Ohio}
  \postcode{43017-6221}}
```

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

\position
\institution
\department
\streetaddress
\city
\state

\postcode \country

The \affiliation and \additionalaffiliation commands are further structured to interact with the metadata extraction tools. Inside these commands you should use the \position, \institution, \department, \city, \streetaddress, \state, \postcode

and \country 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 *are* necessary since they are used by the XML metadata extraction programs. Do *not* put commas or \\ between the elements of \affiliation. They will be provided automatically.

An example of the author block:

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

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

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

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

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

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

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

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

```
Fluginstitut
Sonenallee 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, \afffiliation 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
Sonenallee 17
123456 Helm, Germany
```

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

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

\thanks

Like amsart (and unlike standard LateX), we allow \thanks only *outside* of the commands \title and \author. This command is obsolete and should *not* be used in most cases. Do not list your acknowledgments or grant sponsors here. Put this information in the acks environment (see Section 2.10).

\authorsaddresses

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

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

You can *suppress* printing authors' addresses by setting them to an empty string: \authorsaddresses{}. Please note that authors' addresses are mandatory for journal articles.

\titlenote \subtitlenote \authornote While the command \thanks generates a note without a footnote mark, sometimes the authors might need notes more tightly connected to the title, subtitle or author. The 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}
```

\authornotemark

Please never use a \footnote inside an \author or \title command since this confuses the metadata extraction software. (Actually these commands now produce errors.) Sometimes one may need to have the same footnote connected to several authors.

Sometimes one may need to have the same roothote connected to several authors. The command $\arrowvert authornotemark[\langle number \rangle]$ adds just the footnote mark, for example,

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

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

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

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

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

\acmArticleSeq

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

Setting this number to zero suppresses the blob.

\acmSubmissionID

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

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

\acmPrice

The macro $\acmPrice{\langle price \rangle}$ sets the price for the article, for example,

```
\acmPrice{25.00}
```

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

\acmISBN

Book-like volumes have ISBN numbers attached to them. The macro $\acmISBN(\langle ISBN \rangle)$ sets it. Normally it is set by the typesetter, for example,

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

\acmD0I

Setting it to the empty string, as $\acmISBN{}$, suppresses printing the ISBN. The macro $\acmDOI{\langle DOI \rangle}$ sets the DOI of the article, for example,

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

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

\acmBadgeR \acmBadgeL Some conference articles get special distinctions, for example, the artifact evaluation for PPoPP 2016 (see http://ctuning.org/ae/ppopp2016.html). These articles display special badges supplied by the conference organizers. This class provides commands to add these badges: \acmBadgeR[$\langle url \rangle$]{ $\langle graphics \rangle$ } and \acmBadgeL[$\langle url \rangle$]{ $\langle graphics \rangle$ }. The first command puts the badge to the right of the title, and the second one—to the left. The exception is the sigchi-a mode for SIGCHI extended abstracts, which puts the badges on the left margin. The arguments have the following meaning: [$\langle url \rangle$], if provided, sets the link to the badge authority in the screen version, while { $\langle graphics \rangle$ } 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 $\startPage{\langle page \rangle}$ sets the first page of the article in a journal or book. It is used by the typesetter.

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

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

CCSXML \ccsdesc

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

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

```
\begin{CCSXML}
<ccs2012>
 <concept>
  <concept_id>10010520.10010553.10010562</concept_id>
  <concept_desc>Computer systems organization~Embedded systems</concept_desc>
  <concept_significance>500</concept_significance>
 </concept>
 <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>
  <concept_id>10003033.10003083.10003095</concept_id>
  <concept_id>10003033.10003083.10003095</concept_id>
  <concept_desc>Networks Network reliability</concept_desc>
  <concept_significance>100</concept_significance>
  </concept>
</cos2012>
  \end{CCSXML}

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

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

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

\setcopyright

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

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

\copyrightyear

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

```
\acmYear{2016}
\copyrightyear{2015}
```

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

abstract

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

teaserfigure

A special kind of figure is used for many two-column conference proceedings.

Table 3: Parameters for the \backslash setcopyright command

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

Table 4: Settings for the \settopmatter command

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

This figure is placed just after the authors but before the main text. The environment teaserfigure is used for these figures. This environment must be used *before* \maketitle, for example,

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

\settopmatter

Some information in the top matter is printed for certain journals or proceedings and suppressed for others. You can override these defaults using the command $\operatorname{settopmatter}{\langle settings \rangle}$. The settings and their meanings are listed in Table 4. For example,

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

The parameter authorsperrow requires some explanation. In conference proceedings authors' information is typeset in boxes, several boxes per row (see sample-sigconf.pdf, sample-sigplan.pdf, etc.). The number of boxes per row is determined automatically. If you want to override this, you can do it using this parameter, for example,

\settopmatter{authorsperrow=4}

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

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

\received

The command $\ensuremath{\mbox{\sc command}} \ensuremath{\mbox{\sc command}} \ensuremath{\mbo$

```
\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. That is it must follow the commands defined in this section.

\shortauthors

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

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

2.4 Algorithms

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

2.5 Figures and tables

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

- 1. The captions for figures must be entered *after* the figure bodies and for tables *before* the table bodies.
- 2. The ACM uses the standard types for figures and tables and adds several new ones. In total there are the following types:
 - **figure, table:** a standard figure or table taking a full text width in one-column formats and one column width in two-column formats.
 - figure*, table* in two-column formats, a special figure or table taking a full text width.

teaserfigure: a special figure before \maketitle.

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

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

1. Never, ever use vertical rules.

2. Never use double rules.

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

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

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

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

sidebar: textual information in the margin

marginfigure: a figure in the margin margintable: a table in the margin

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

2.6 Descriptions of images

\Description

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

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

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

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

2.7 Theorems

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

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

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

2.8 Online-only and offline-only material

printonly
screenonly

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

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

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

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

2.9 Note about anonymous mode

anonsuppress

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

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

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

2.10 Acknowledgments

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

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

acks

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

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

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

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 the $\{\langle sponsorID\rangle\}$ of a \grantsponsor command. Some awards have their own web pages, which you can include using the optional argument of the \grantnum command.

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

Example:

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

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

2.11 Bibliography

The ACM uses the natbib package for formatting references and the BibTeX style file ACM-Reference-Format.bst for BibTeX processing. You can disable loading of natbib using the option natbib=false in \documentclass. However, it is not recommended, as well as the use of BibTeX styles other than ACM-Reference-Format.bst, and may delay the processing of the manuscript.

\citestyle

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

```
\citestyle{acmauthoryear}
```

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

\setcitestyle

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

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

One of the more common versions is

```
\setcitestyle{nosort}
```

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

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

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

There are several customized $BibT_EX$ entry types and fields in the ACM style file ACM-Reference-Format. bst that you may want to be aware of.

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

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

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

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

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

There are several special entry types. Types online and game are used for Web pages and games, for example,

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

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

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

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

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

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

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

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

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

```
@periodical{JCohen96,
 kev =
 editor =
                "Jacques Cohen",
                "Special issue: Digital Libraries",
 title =
                "Communications of the \{ACM\}",
 journal =
                "39",
 volume =
                "11",
 number =
 month =
                nov,
 year =
                "1996".
}
```

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

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

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

```
@PREAMBLE{"\providecommand{\noopsort}[1]{}"}
and then encode the author as
author = {Ludwig {\noopsort{Beethoven}}van Beethoven},
```

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

2.12 Colors

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

The ACM provides the following recommendation on color use.

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

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

- 3. Most printing is in black and white.
- 4. Situational impairments (e.g., bright sunlight shining on a mobile screen) tend to reduce the entire color gamut, reducing color discriminability.

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

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

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

2.13 Other notable packages and typographic remarks

Several other packages are recommended for specialized tasks.

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

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

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

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

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

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

2.14 Disabled or forbidden commands

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

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

You cannot change \baselinestretch in your document: this produces an error. You should not abuse the command \vspace: this command may disturb the type-setting of ACM papers.

2.15 A note for wizards: acmart-preload-hook.tex

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

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

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

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

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

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

\PassOptionsToPackage{dvipsnames}{xcolor}

you will pass dvipsnames to xcolor.

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

2.16 Currently supported publications

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

Abbreviation	Publication
CIE	ACM Computers in Entertainment
CSUR	ACM Computing Surveys
DGOV	Digital Government: Research and Practice
DTRAP	Digital Threats: Research and Practice
HEALTH	ACM Transactions on Computing for Healthcare
IMWUT	PACM on Interactive, Mobile, Wearable and Ubiquitous Technologies
JACM	Journal of the ACM
JDIQ	ACM Journal of Data and Information Quality
JEA	ACM Journal of Experimental Algorithmics
JERIC	ACM Journal of Educational Resources in Computing

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

Abbreviation	Publication
JETC	ACM Journal on Emerging Technologies in Computing Systems
JOCCH	ACM Journal on Computing and Cultural Heritage
PACMCGIT	Proceedings of the ACM on Computer Graphics and Interactive Tech-
	niques
PACMHCI	PACM on Human-Computer Interaction
PACMPL	PACM on Programming Languages
POMACS	PACM on Measurement and Analysis of Computing Systems
TAAS	ACM Transactions on Autonomous and Adaptive Systems
TACCESS	ACM Transactions on Accessible Computing
TACO	ACM Transactions on Architecture and Code Optimization
TALG	ACM Transactions on Algorithms
TALLIP	ACM Transactions on Asian and Low-Resource Language Information
	Processing
TAP	ACM Transactions on Applied Perception
TCPS	ACM Transactions on Cyber-Physical Systems
TDS	ACM Transactions on Data Science
TEAC	ACM Transactions on Economics and Computation
TECS	ACM Transactions on Embedded Computing Systems
TELO	ACM Transactions on Evolutionary Learning
THRI	ACM Transactions on Human-Robot Interaction
TIIS	ACM Transactions on Interactive Intelligent Systems
TIOT	ACM Transactions on Internet of Things
TISSEC	ACM Transactions on Information and System Security
TIST	ACM Transactions on Intelligent Systems and Technology
TKDD	ACM Transactions on Knowledge Discovery from Data
TMIS	ACM Transactions on Management Information Systems
TOCE	ACM Transactions on Computing Education
TOCHI	ACM Transactions on Computer-Human Interaction
TOCL	ACM Transactions on Computational Logic
TOCS	ACM Transactions on Computer Systems
TOCT	ACM Transactions on Computation Theory
TODAES	ACM Transactions on Design Automation of Electronic Systems
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 Com-
	puting Systems
TOMS	ACM Transactions on Mathematical Software

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

Abbreviation	Publication
TOPC	ACM Transactions on Parallel Computing
TOPLAS	ACM Transactions on Programming Languages and Systems
TOPS	ACM Transactions on Privacy and Security
TOS	ACM Transactions on Storage
TOSEM	ACM Transactions on Software Engineering and Methodology
TOSN	ACM Transactions on Sensor Networks
TQC	ACM Transactions on Quantum Computing
TRETS	ACM Transactions on Reconfigurable Technology and Systems
TSAS	ACM Transactions on Spatial Algorithms and Systems
TSC	ACM Transactions on Social Computing
TSLP	ACM Transactions on Speech and Language Processing
TWEB	ACM Transactions on the Web

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

3 Implementation

3.1 Identification

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

```
1 (class)\NeedsTeXFormat{LaTeX2e}
2 (*gobble)
3 \ProvidesFile{acmart.dtx}
4 (/gobble)
5 (class)\ProvidesClass{acmart}
6 [2020/02/08 v1.69 Typesetting articles for the Association for Computing Machinery]
  And the driver code:
7 (*gobble)
8 \documentclass{ltxdoc}
9 \usepackage{array,booktabs,amsmath,graphicx,fancyvrb,tabularx, longtable}
10 \usepackage[tt=false, type1=true]{libertine}
11 \usepackage[varqu]{zi4}
12 \usepackage[libertine]{newtxmath}
13 \usepackage[tableposition=top]{caption}
14 \usepackage{hypdoc}
15 \PageIndex
16 \CodelineIndex
17 \RecordChanges
18 \EnableCrossrefs
19 \begin{document}
20 \DocInput{acmart.dtx}
21 \end{document}
22 (/gobble)
23 (*class)
24 \ensuremath{\mbox{def}\ensuremath{\mbox{@classname}\{acmart\}}}
```

3.2 Preload hook

We preload acmart-preload-hook:

3.3 Options

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

```
29 \RequirePackage{xkeyval}
We use xstring to check whether user input is valid
30 \RequirePackage{xstring}
```

```
format The possible formats
                           31 \define@choicekey*+{acmart.cls}{format}[\ACM@format@nr]{%
                           manuscript, acmsmall, acmlarge, acmtog, sigconf, siggraph,
                               sigplan, sigchi, sigchi-a}[manuscript]{}{%
                               \ClassError{\@classname}{The option format must be manuscript,
                                 acmsmall, acmlarge, acmtog, sigconf, siggraph,
                                 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
                                 \PackageInfo{\@classname}{Not using screen mode}%
                           53 \fi}{\PackageError{\@classname}{The option screen can be either true or
                                 false}}
                           55 \ExecuteOptionsX{screen=false}
\if@ACM@urlbreakonhyphens
                           \if@ACM@urlbreakonhyphens
                                 \PackageInfo{\@classname}{Using breaking urls on hyphens}%
                           58
                           59
                                 \PackageInfo{\@classname}{Not breaking urls on hyphens}%
                              \fi}{\PackageError{\@classname}{The option urlbreakonhyphens can be either true or
                                 false}}
                           63 \ExecuteOptionsX{urlbreakonhyphens=true}
          \if@ACM@acmthm Whether we define theorem-like environments.
                           64 \define@boolkey+{acmart.cls}[@ACM@]{acmthm}[true]{%
                           65 \if@ACM@acmthm
                                 \PackageInfo{\@classname}{Requiring acmthm}%
                                 \PackageInfo{\@classname}{Suppressing acmthm}%
                           68
                           69 \fi}{\PackageError{\@classname}{The option acmthm can be either true or
                                 false}}
                           71 \ExecuteOptionsX{acmthm=true}
```

```
\if@ACM@review Whether we use review mode
                          72 \define@boolkey+{acmart.cls}[@ACM@]{review}[true]{%
                          73 \if@ACM@review
                                \PackageInfo{\@classname}{Using review mode}%
                          75
                                \AtBeginDocument{\@ACM@printfoliostrue}%
                                \PackageInfo{\@classname}{Not using review mode}%
                          78 \fi}{\PackageError{\@classname}{The option review can be either true or
                                false}}
                          80 \ExecuteOptionsX{review=false}
  \if@ACM@authorversion Whether we use author's-version mode
                          81 \define@boolkey+{acmart.cls}[@ACM@]{authorversion}[true]{%
                          82 \if@ACM@authorversion
                                \PackageInfo{\@classname}{Using authorversion mode}%
                              \else
                          84
                                \PackageInfo{\@classname}{Not using authorversion mode}%
                          %6 \fi}{\PackageError{\@classname}{The option authorversion can be either true or
                          88 \ExecuteOptionsX{authorversion=false}
         \if@ACM@nonacm Special option for non-ACM publications using the ACM typesetting options.
                          89 \define@boolkey+{acmart.cls}[@ACM@]{nonacm}[true]{%
                          90 \if@ACM@nonacm
                                \PackageInfo{\@classname}{Using nonacm mode}%
                                \AtBeginDocument{\@ACM@printacmreffalse}%
                                % in 'nonacm' mode we disable the "ACM Reference Format"
                                % printing by default, but this can be re-enabled by the
                                % user using \settopmatter{printacmref=true}
                                \PackageInfo{\@classname}{Not using nonacm mode}%
                              \fi}{\PackageError{\@classname}{The option nonacm can be either true or
                                false}}
                          100 \ExecuteOptionsX{nonacm=false}
        \if@ACM@balance
                         Whether to balance the last page
                          101 \define@boolkey+{acmart.cls}[@ACM@]{balance}[true]{}{%
                          102 \PackageError{\@classname}{The option balance can be either true or
                                false}}
                          104 \ExecuteOptionsX{balance}
\if@ACM@natbib@override This macro is no longer used.
                         Whether we use natbib mode
         \if@ACM@natbib
                          105 \define@boolkey+{acmart.cls}[@ACM@]{natbib}[true]{%
                          106 \if@ACM@natbib
                                \PackageInfo{\@classname}{Explicitly selecting natbib mode}%
                          107
                          108 \else
                                \PackageInfo{\@classname}{Explicitly deselecting natbib mode}%
```

```
\fi}{\PackageError{\@classname}{The option natbib can be either true or
                      111
                      112 \ExecuteOptionsX{natbib=true}
 \if@ACM@anonymous
                     Whether we use anonymous mode
                     113 \define@boolkey+{acmart.cls}[@ACM@]{anonymous}[true]{%
                      114 \if@ACM@anonymous
                            \PackageInfo{\@classname}{Using anonymous mode}%
                      116
                            \PackageInfo{\@classname}{Not using anonymous mode}%
                      117
                      118 \fi}{\PackageError{\@classname}{The option anonymous can be either true or
                            false}}
                      120 \ExecuteOptionsX{anonymous=false}
 \if@ACM@timestamp
                     Whether we use timestamp mode
                      121 \define@boolkey+{acmart.cls}[@ACM@]{timestamp}[true]{%
                      122 \if@ACM@timestamp
                      123
                            \PackageInfo{\@classname}{Using timestamp mode}%
                      124
                            \PackageInfo{\@classname}{Not using timestamp mode}%
                      125
                      126
                          \fi}{\PackageError{\@classname}{The option timestamp can be either true or
                            false}}
                      128 \ExecuteOptionsX{timestamp=false}
                     Whether we use author-draft mode
\if@ACM@authordraft
                      129 \define@boolkey+{acmart.cls}[@ACM@]{authordraft}[true]{%
                          \if@ACM@authordraft
                            \PackageInfo{\@classname}{Using authordraft mode}%
                      131
                      132
                            \@ACM@timestamptrue
                      133
                            \@ACM@reviewtrue
                             \PackageInfo{\@classname}{Not using authordraft mode}%
                      fi}{\PackageError{\Qclassname}} The option authordraft can be either true or
                      138 \ExecuteOptionsX{authordraft=false}
      \ACM@fontsize The font size to pass to the base class
                      139 \def\ACM@fontsize{}
                      140 \DeclareOptionX{9pt}{\edef\ACM@fontsize{\CurrentOption}}
                      141 \DeclareOptionX{10pt}{\edef\ACM@fontsize{\CurrentOption}}
                      142 \DeclareOptionX{11pt}{\edef\ACM@fontsize{\CurrentOption}}
                      143 \DeclareOptionX{12pt}{\edef\ACM@fontsize{\CurrentOption}}
                      144 \DeclareOptionX{draft}{\PassOptionsToClass{\CurrentOption}{amsart}}
                      145 \DeclareOptionX{*}{\PassOptionsToClass{\CurrentOption}{amsart}}
                      146 \ProcessOptionsX
                      147 \ClassInfo{\@classname}{Using format \ACM@format, number \ACM@format@nr}
```

3.4 Setting switches

```
\if@ACM@manuscript Whether we use manuscript mode
                            148 \newif\if@ACM@manuscript
         \if@ACM@journal
                           There are two kinds of publications: journals and books
                            149 \newif\if@ACM@journal
                           Sometimes ACM wants a journal-like publication to have conference information in the
\if@ACM@journal@bibstrip
                           bibstrip and vice versa, so we have an additional switch.
                           150 \newif\if@ACM@journal@bibstrip
                           The formatting of SIGCHI extended abstracts is quite unusual. We have a special switch
     \if@ACM@sigchiamode
                           for them.
                            151 \newif\if@ACM@sigchiamode
                              Setting up switches
                            152 \ifnum\ACM@format@nr=5\relax % siggraph
                            153 \ClassWarning{\@classname}{The format siggraph is now obsolete.
                                  I am switching to sigconf.}
                            \setkeys{acmart.cls}{format=sigconf}
                            156 \fi
                            157 \ifnum\ACM@format@nr=0\relax
                            158 \@ACM@manuscripttrue
                           159 \else
                           160 \@ACM@manuscriptfalse
                           161 \fi
                            162 \@ACM@sigchiamodefalse
                            163 \ifcase\ACM@format@nr
                            164 \relax % manuscript
                           165 \@ACM@journaltrue
                            166 \or % acmsmall
                            167 \@ACM@journaltrue
                            168 \or % acmlarge
                            169 \@ACM@journaltrue
                            170 \or % acmtog
                           171 \@ACM@journaltrue
                           172 \or % sigconf
                           173 \@ACM@journalfalse
                           174 \or % siggraph
                            175 \@ACM@journalfalse
                           176 \or % sigplan
                           177 \@ACM@journalfalse
                           178 \or % sigchi
                           179 \@ACM@journalfalse
                           180∖or % sigchi-a
                            181 \@ACM@journalfalse
```

182 \@ACM@sigchiamodetrue

183 \fi

```
184\if@ACM@journal
185\@ACM@journal@bibstriptrue
186\else
187\@ACM@journal@bibstripfalse
188\fi
```

3.5 Loading the base class and package

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

```
189 \ifx\ACM@fontsize\@empty
190 \ifcase\ACM@format@nr
191
     \relax % manuscript
       \def\ACM@fontsize{9pt}%
     \or % acmsmall
193
       \def\ACM@fontsize{10pt}%
194
     \or % acmlarge
195
       \def\ACM@fontsize{10pt}%
196
197 \or % acmtog
       \def\ACM@fontsize{9pt}%
198
    \or % sigconf
199
       \def\ACM@fontsize{9pt}%
200
201 \or % siggraph
       \def\ACM@fontsize{9pt}%
202
203
      \or % sigplan
       \def\ACM@fontsize{10pt}%
      \or % sigchi
       \def\ACM@fontsize{10pt}%
206
     \or % sigchi-a
207
       \def\ACM@fontsize{10pt}%
208
209 \fi
210 \fi
211 \ClassInfo{\@classname}{Using fontsize \ACM@fontsize}
212 \LoadClass[\ACM@fontsize, reqno]{amsart}
213 \RequirePackage{microtype}
   We need etoolbox for delayed code
214 \RequirePackage{etoolbox}
   Booktabs is now the default
215 \RequirePackage{booktabs}
   We need totpages to calculate the number of pages and refcount to use that num-
216 \RequirePackage{refcount}
217 \RequirePackage{totpages}
   The \collect@body macro in amsmath is defined using \def. We load environ to
access the \long version of this command
218 \RequirePackage{environ}
```

```
We use setspace for double spacing
219 \if@ACM@manuscript
220 \RequirePackage{setspace}
221 \onehalfspacing
222 \fi
We need textcase for better upcasing
223 \RequirePackage{textcase}
```

3.6 Citations

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

```
224 \if@ACM@natbib
    \RequirePackage{natbib}
225
    \renewcommand{\bibsection}{%
226
       \section*{\refname}%
227
       \phantomsection\addcontentsline{toc}{section}{\refname}%
228
229
    \renewcommand{\bibfont}{\bibliofont}
230
    \renewcommand\setcitestyle[1]{
231
    \@for\@tempa:=#1\do
232
    233
       \renewcommand\NAT@open{(}\renewcommand\NAT@close{)}\fi
234
235
     \def\@tempb{square}\ifx\@tempa\@tempb
       \renewcommand\NAT@open{[}\renewcommand\NAT@close{]}\fi
     \def\@tempb{angle}\ifx\@tempa\@tempb
237
       \renewcommand\NAT@open{$<$}\renewcommand\NAT@close{$>$}\fi
238
     \def\@tempb{curly}\ifx\@tempa\@tempb
239
       240
     \def\@tempb{semicolon}\ifx\@tempa\@tempb
241
       \renewcommand\NAT@sep{;}\fi
242
     \def\@tempb{colon}\ifx\@tempa\@tempb
243
       \renewcommand\NAT@sep{;}\fi
244
     \def\@tempb{comma}\ifx\@tempb\
245
       \renewcommand\NAT@sep{,}\fi
246
     \def\@tempb{authoryear}\ifx\@tempa\@tempb
247
       \NAT@numbersfalse\fi
248
249
     \def\@tempb{numbers}\ifx\@tempa\@tempb
250
       \NAT@numberstrue\NAT@superfalse\fi
     \def\@tempb{super}\ifx\@tempa\@tempb
251
       \NAT@numberstrue\NAT@supertrue\fi
252
     \def\@tempb{nobibstyle}\ifx\@tempa\@tempb
253
       \let\bibstyle=\@gobble\fi
254
255
     \def\@tempb{bibstyle}\ifx\@tempb
256
       \let\bibstyle=\@citestyle\fi
257
     \def\@tempb{sort}\ifx\@tempa\@tempb
258
       \def\NAT@sort{\@ne}\fi
     \def\@tempb{nosort}\ifx\@tempa\@tempb
259
```

```
\def\@tempb{compress}\ifx\@tempa\@tempb
                                                                                             261
                                                                                                                        \def\NAT@cmprs{\@ne}\fi
                                                                                             262
                                                                                                                263
                                                                                                                        \def\NAT@cmprs{\z@}\fi
                                                                                             264
                                                                                                                265
                                                                                                                        \def\NAT@sort{\ene}\def\NAT@cmprs{\ene}\fi
                                                                                             266
                                                                                                                \def\@tempb{mcite}\ifx\@tempa\@tempb
                                                                                             267
                                                                                                                        \let\NAT@merge\@ne\fi
                                                                                             268
                                                                                                                \def\@tempb{merge}\ifx\@tempa\@tempb
                                                                                             269
                                                                                                                       \ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ens
                                                                                             270
                                                                                             271
                                                                                                                \def\@tempb{elide}\ifx\@tempa\@tempb
                                                                                             272
                                                                                                                       \ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ens
                                                                                                                \def\@tempb{longnamesfirst}\ifx\@tempa\@tempb
                                                                                             273
                                                                                                                        \NAT@longnamestrue\fi
                                                                                             274
                                                                                                                \def\@tempb{nonamebreak}\ifx\@tempa\@tempb
                                                                                             275
                                                                                                                       276
                                                                                                                \expandafter\NAT@find@eq\@tempa=\relax\@nil
                                                                                             277
                                                                                                                \if\@tempc\relax\else
                                                                                             278
                                                                                             279
                                                                                                                       \expandafter\NAT@rem@eq\@tempc
                                                                                                                       \def\@tempb{open}\ifx\@tempa\@tempb
                                                                                             280
                                                                                                                           \xdef\NAT@open{\@tempc}\fi
                                                                                             281
                                                                                                                       \def\@tempb{close}\ifx\@tempb
                                                                                             282
                                                                                                                           \xdef\NAT@close{\@tempc}\fi
                                                                                             283
                                                                                                                        \def\@tempb{aysep}\ifx\@tempa\@tempb
                                                                                                                           \xdef\NAT@aysep{\@tempc}\fi
                                                                                                                        \def\@tempb{yysep}\ifx\@tempa\@tempb
                                                                                             286
                                                                                                                           \xdef\NAT@yrsep{\@tempc}\fi
                                                                                             287
                                                                                                                        \def\@tempb{notesep}\ifx\@tempa\@tempb
                                                                                             288
                                                                                                                           \xdef\NAT@cmt{\empc}\fi
                                                                                             289
                                                                                                                       \def\@tempb{citesep}\ifx\@tempa\@tempb
                                                                                             290
                                                                                             291
                                                                                                                           \xdef\NAT@sep{\@tempc}\fi
                                                                                             292
                                                                                                                \fi
                                                                                             293
                                                                                                             }%
                                                                                                             \NAT@@setcites
                                                                                             294
                                                                                             295
                                                                                                             \renewcommand\citestyle[1]{%
                                                                                             296
                                                                                                                   \ifcsname bibstyle@#1\endcsname%
                                                                                             297
                                                                                                                    \csname bibstyle@#1\endcsname\let\bibstyle\@gobble%
                                                                                             299
                                                                                             300
                                                                                                                   \@latex@error{Undefined '#1' citestyle}%
                                                                                             301
                                                                                                                   \fi
                                                                                             302
                                                                                                         }%
                                                                                            303 \fi
                                                                                          The default author-year format:
\bibstyle@acmauthoryear
                                                                                            304 \newcommand{\bibstyle@acmauthoryear}{%
                                                                                                          \setcitestyle{%
                                                                                             305
                                                                                             306
                                                                                                                   authoryear,%
                                                                                             307
                                                                                                                   open={[},close={]},citesep={;},%
```

\def\NAT@sort{\z@}\fi

260

```
aysep={},yysep={,},%
                        308
                               notesep={, }}}
                        309
\bibstyle@acmnumeric The default numeric format:
                       310 \newcommand{\bibstyle@acmnumeric}{%
                            \setcitestyle{%
                        311
                               numbers, sort&compress, %
                       312
                               open={[},close={]},citesep={,},%
                               notesep={, }}}
                          The default is numeric:
                        315 \if@ACM@natbib
                        316 \citestyle{acmnumeric}
                       317 \fi
```

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

```
318 \def\@startsection#1#2#3#4#5#6{%
               \if@noskipsec \leavevmode \fi
320
                 \par
                 \@tempskipa #4\relax
321
                \@afterindenttrue
322
                \ifdim \@tempskipa <\z@
                         \@tempskipa -\@tempskipa \@afterindentfalse
324
 325 \fi
                \if@nobreak
326
                         \everypar{}%
327
328
                         \addpenalty\@secpenalty\addvspace\@tempskipa
329
                \fi
 330
 331
                  \@ifstar
                         {\@ssect{#3}{#4}{#5}{#6}}%
                         {\@dblarg{\@sect{#1}{#2}{#3}{#4}{#5}{#6}}}}
 333
 334 \def\@sect#1#2#3#4#5#6[#7]#8{%
                 \edge{\colevel{\colevel{\colevel{\colevel}}} % $$ \edge{\colevel{\colevel{\colevel}} } $$ \edge{\colevel{\colevel}} $$ \edge{\colevel{\colevel}} $$ \edge{\colevel{\colevel}} $$ \edge{\colevel{\colevel}} $$ \edge{\colevel} $$ \edge{\colevel
335
                  \ifnum #2>\c@secnumdepth
 336
                         \let\@svsec\@empty
337
 338
                  \else
                         \refstepcounter{#1}%
339
                         \protected@edef\@svsec{\@seccntformat{#1}\relax}%
340
                 \fi
 341
                  \@tempskipa #5\relax
342
                  \left( \cdot \right) = \left( \cdot \right)
 343
                         \begingroup
 344
                                #6{%
                                        \@hangfrom{\hskip #3\relax\@svsec}%
 346
                                               \interlinepenalty \@M #8\@@par}%
 347
                         \endgroup
 348
```

```
\csname #1mark\endcsname{#7}%
349
                   \ifnum #2>\c@secnumdepth \else
350
                               \@tochangmeasure{\csname the#1\endcsname}%
351
                   \fi
352
                   \addcontentsline{toc}{#1}{%}
353
354
                         \ifnum #2>\c@secnumdepth \else
355
                               \protect\numberline{\csname the#1\endcsname}%
                         \fi
356
                         #7}%
357
             \else
358
                   \def\@svsechd{\%}
359
360
                         #6{\hskip #3\relax
                         \@svsec #8}%
361
                         \csname #1mark\endcsname{#7}%
362
                         \ifnum #2>\c@secnumdepth \else
363
                               \@tochangmeasure{\csname the#1\endcsname\space}%
364
365
                         \addcontentsline{toc}{#1}{%}
366
                               \ifnum #2>\c@secnumdepth \else
368
                                     \protect\numberline{\csname the#1\endcsname}%
369
                               #7}}%
370
             \fi
371
             \@xsect{#5}}
372
373 \def\@xsect#1{%
             \@tempskipa #1\relax
             \ifdim \@tempskipa>\z@
375
                   \par \nobreak
376
                   \vskip \@tempskipa
377
                   \@afterheading
378
379
             \else
380
                   \@nobreakfalse
381
                   \global\@noskipsectrue
                   \everypar{%
382
                         \if@noskipsec
383
                               \global\@noskipsecfalse
384
                            {\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc}^{\sc}_{\sc
385
386
                               \clubpenalty\@M
387
                               \begingroup \@svsechd \endgroup
                               \unskip
388
389
                               \@tempskipa #1\relax
                               \hskip -\@tempskipa
390
                         \else
391
                               \clubpenalty \@clubpenalty
392
393
                               \everypar{}%
394
                         \fi}%
395
            \fi
             \ignorespaces}
397 \def\@seccntformat#1{\csname the#1\endcsname\quad}
398 \def\@ssect#1#2#3#4#5{%
```

```
\@tempskipa #3\relax
                   399
                        \ifdim \@tempskipa>\z@
                    400
                          \begingroup
                    401
                            #4{%
                    402
                               \@hangfrom{\hskip #1}%
                    403
                                 \label{lem:linepenalty $$\emptyset #5\@par}%
                    404
                    405
                          \endgroup
                    406
                        \else
                          \def\@svsechd{#4{\hskip #1\relax #5}}%
                    407
                        \fi
                    408
                        \@xsect{#3}}
                    409
  \@startsection
                  The amsart package redefines \startsection. Here we redefine it again to make the
                   table of contents work.
                   410 \def\@starttoc#1#2{\begingroup\makeatletter
                        \setTrue{#1}%
                   411
                        \par\removelastskip\vskip\z@skip
                   412
                        \@startsection{section}\@M\z@{\linespacing\@plus\linespacing}%
                          {.5\linespacing}{\centering\contentsnamefont}{#2}%
                        \@input{\jobname.#1}%
                    415
                        \if@filesw
                   416
                          \@xp\newwrite\csname tf@#1\endcsname
                    417
                          \immediate\@xp\openout\csname tf@#1\endcsname \jobname.#1\relax
                   418
                    419
                        \global\@nobreakfalse \endgroup
                        \addvspace{32\p@\@plus14\p@}%
                   422 }
   \l@subsection
                  Section spacing is more generous than for amsart
                   423 \ensuremath{\mbox{def}\ensuremath{\mbox{0pt}}{1}}\
   \l@subsection The spacing in amsart is too large
                   424 \end{area} \{ 1pc} \{ 3pc} \} 
\l@subsubsection The spacing in amsart is too large
                    425 \def\l@subsubsection{\@tocline{2}{0pt}{1pc}{5pc}{}}
                      We need to define foonote-related stuff before the call to hyperref (Ross Moore)
    \@makefntext We do not use indentation for footnotes
                    426 \def\@makefntext{\noindent\@makefnmark}
  \@footnotetext In sigchi-a mode our footnotes are in the margin!
                   427 \if@ACM@sigchiamode
                   428 \long\def\@footnotetext#1{\marginpar{%
                          \reset@font\small
                    429
                          \interlinepenalty\interfootnotelinepenalty
                    430
                          \protected@edef\@currentlabel{%
                              \csname p@footnote\endcsname\@thefnmark
                    432
```

```
433
                          }%
                          \color@begingroup
                   434
                            \@makefntext{%
                   435
                              \rule\z@\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
                   436
                          \color@endgroup}}%
                   437
                   438 \fi
\@mpfootnotetext
                  We want the footnotes in minipages centered:
                   439 \long\def\@mpfootnotetext#1{%
                       \global\setbox\@mpfootins\vbox{%
                          \unvbox\@mpfootins
                          \reset@font\footnotesize
                   442
                          \hsize\columnwidth
                   443
                          \@parboxrestore
                          \protected@edef\@currentlabel
                               {\csname p@mpfootnote\endcsname\@thefnmark}%
                   446
                   447
                          \color@begingroup\centering
                            \@makefntext{%
                   448
                              \rule\z@\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
                   449
                          \color@endgroup}}
                   450
    \@makefnmark AMS classes use a buggy definition of \makefnmark. We revert to the standard one.
                   451 \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}
                      And now, hyperref
                   452 \let\@footnotemark@nolink\@footnotemark
                   453 \let\@footnotetext@nolink\@footnotetext
                   454 \RequirePackage[bookmarksnumbered,unicode]{hyperref}
                   455 \pdfstringdefDisableCommands{%
                   456 \def\addtocounter#1#2{}%
                   457 \def\unskip{}%
                   458 \def\textbullet{-}%
                       \def\textrightarrow{ -> }%
                        \def\footnotemark{}%
                   460
                   461 }
                   462 \urlstyle{rm}
                   463 \ifcase\ACM@format@nr
                   464 \relax % manuscript
                   465 \or % acmsmall
                   466 \or % acmlarge
                   467 \or % acmtog
                   468 \or % sigconf
                   469 \or % siggraph
                   470 \or % sigplan
                   471 \urlstyle{sf}
                   472 \or % sigchi
                   473 \or % sigchi-a
                   474 \urlstyle{sf}
                   475 \fi
```

```
\if@ACM@urlbreakonhyphens
                     477
                            478
                          \fi
                     479
                          \if@ACM@screen
                     480
                     481
                            \hypersetup{colorlinks,
                     482
                              linkcolor=ACMPurple,
                              citecolor=ACMPurple,
                     483
                              urlcolor=ACMDarkBlue,
                     484
                              filecolor=ACMDarkBlue}
                     485
                            \else
                     486
                            \hypersetup{hidelinks}
                     487
                     488
                          \hypersetup{pdflang={en},
                     489
                            pdfdisplaydoctitle}}
                     490
                        Bibliography mangling.
                     491 \if@ACM@natbib
                         \let\citeN\cite
                          \let\cite\citep
                          \let\citeANP\citeauthor
                          \let\citeNN\citeyearpar
                          \let\citeyearNP\citeyear
                          \let\citeNP\citealt
                     497
                          \DeclareRobustCommand\citeA
                     498
                             {\begingroup\NAT@swafalse
                     499
                               500
                         \providecommand\newblock{}%
                     501
                     502 \else
                          \AtBeginDocument{%
                     504
                            \let\shortcite\cite%
                     505
                            \providecommand\citename[1]{#1}}
                     506 \fi
                     507 \newcommand\shortcite[2][]{%
                         \ifNAT@numbers\cite[#1]{#2}\else\citeyearpar[#1]{#2}\fi}
\bibliographystyle
                    The amsart package redefines \bibliographystyle since it prefers the AMS bibliographystyle since it prefers the AMS bibliographystyle
                    phy style. We turn it back to the LaTeX definition:
                     509 \def\bibliographystyle#1{%
                         \ifx\@begindocumenthook\@undefined\else
                     510
                            \expandafter\AtBeginDocument
                     511
                     512
                     513
                               \immediate\write\@auxout{\string\bibstyle{#1}}%
                     514
                             \fi}}
                     515
                        Graphics and color.
                     516 \RequirePackage{graphicx}
                     517 \RequirePackage[prologue]{xcolor}
```

476 \AtEndPreamble{%

```
We define ACM colors according to [7]:
518 \definecolor[named]{ACMBlue}{cmyk}{1,0.1,0,0.1}
519 \definecolor[named]{ACMYellow}{cmyk}{0,0.16,1,0}
520 \definecolor[named]{ACMOrange}{cmyk}{0,0.42,1,0.01}
521 \definecolor[named]{ACMRed}{cmyk}{0,0.90,0.86,0}
522 \definecolor[named]{ACMLightBlue}{cmyk}{0.49,0.01,0,0}
523 \definecolor[named]{ACMGreen}{cmyk}{0.20,0,1,0.19}
524 \definecolor[named]{ACMPurple}{cmyk}{0.55,1,0,0.15}
525 \definecolor[named]{ACMDarkBlue}{cmyk}{1,0.58,0,0.21}
  Author-draft mode
526 \if@ACM@authordraft
    \RequirePackage{draftwatermark}
    \SetWatermarkFontSize{0.5in}
    \SetWatermarkColor[gray]{.9}
530
    \SetWatermarkText{\parbox{12em}{\centering}
531
        Unpublished working draft.\\
532
        Not for distribution. }}
533 \fi
```

3.7 Paper size and paragraphing

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

```
534 \RequirePackage{geometry}
535 \ifcase\ACM@format@nr
536 \relax % manuscript
     \geometry{letterpaper,head=13pt,
     marginparwidth=6pc, heightrounded}%
539 \or % acmsmall
     \geometry{twoside=true,
540
       includeheadfoot, head=13pt, foot=2pc,
541
       paperwidth=6.75in, paperheight=10in,
542
       top=58pt, bottom=44pt, inner=46pt, outer=46pt,
543
       marginparwidth=2pc,heightrounded
     }%
545
546 \or % acmlarge
     \geometry{twoside=true, head=13pt, foot=2pc,
547
       paperwidth=8.5in, paperheight=11in,
548
       includeheadfoot,
549
550
       top=78pt, bottom=114pt, inner=81pt, outer=81pt,
551
       marginparwidth=4pc, heightrounded
552
       }%
553 \or % acmtog
     \geometry{twoside=true, head=13pt, foot=2pc,
554
       paperwidth=8.5in, paperheight=11in,
555
       includeheadfoot, columnsep=24pt,
556
        top=52pt, bottom=75pt, inner=52pt, outer=52pt,
557
```

```
}%
             559
             560 \or % sigconf
                   \geometry{twoside=true, head=13pt,
             561
                     paperwidth=8.5in, paperheight=11in,
             562
             563
                     includeheadfoot, columnsep=2pc,
             564
                     top=57pt, bottom=73pt, inner=54pt, outer=54pt,
                     marginparwidth=2pc,heightrounded
             565
                     }%
             566
             567\or % siggraph
                   \geometry{twoside=true, head=13pt,
             568
                     paperwidth=8.5in, paperheight=11in,
             570
                     includeheadfoot, columnsep=2pc,
                     top=57pt, bottom=73pt, inner=54pt, outer=54pt,
             571
                     marginparwidth=2pc, heightrounded
             572
                     }%
             573
             574\or % sigplan
                   \geometry{twoside=true, head=13pt,
             575
                     paperwidth=8.5in, paperheight=11in,
             577
                     includeheadfoot=false, columnsep=2pc,
                     top=1in, bottom=1in, inner=0.75in, outer=0.75in,
             578
             579
                     marginparwidth=2pc,heightrounded
                     }%
             580
             581 \or % sigchi
                   \geometry{twoside=true, head=13pt,
             582
             583
                     paperwidth=8.5in, paperheight=11in,
                     includeheadfoot, columnsep=2pc,
             584
                     top=66pt, bottom=73pt, inner=54pt, outer=54pt,
             585
                     marginparwidth=2pc,heightrounded
             586
                     }%
             587
             588 \or % sigchi-a
                   \geometry{twoside=false, head=13pt,
             590
                     paperwidth=11in, paperheight=8.5in,
                     includeheadfoot, marginparsep=72pt,
             591
                     marginparwidth=170pt, columnsep=20pt,
             592
             593
                     top=72pt, bottom=72pt, left=314pt, right=72pt
             594
                     \@mparswitchfalse
             595
             596
                     \reversemarginpar
             597 \fi
\parindent
            Paragraphing
  \parskip
             598 \setlength\parindent{10\p@}
             599 \setlength\parskip{\z@}
             600 \ifcase\ACM@format@nr
             601 \relax % manuscript
             602 \or % acmsmall
             603 \or % acmlarge
             604 \or % acmtog
             605 \setlength\parindent{9\p@}%
```

marginparwidth=2pc, heightrounded

558

```
606 \or % sigconf
607 \or % siggraph
608 \or % sigplan
609 \or % sigchi
610 \or % sigchi-a
611 \fi
```

\normalparindent

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

612 \setlength\normalparindent{\parindent}

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

We use manyfoot for layered footnotes instead.

\copyrightpermissionfootnoterule

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

```
613 \def\copyrightpermissionfootnoterule{\kern-3\p@ 614 \hrule \@width \columnwidth \kern 2.6\p@}
615 \RequirePackage{manyfoot}
616 \SelectFootnoteRule[2]{copyrightpermission}
617 \DeclareNewFootnote{authorsaddresses}
618 \SelectFootnoteRule[2]{copyrightpermission}
619 \DeclareNewFootnote{copyrightpermission}
```

\footnoterule Tschichold's rules:

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

\endminipage

We do not use footnote rules in minipages

```
622 \def\endminipage{%
       \par
       \unskip
624
       \ifvoid\@mpfootins\else
625
         \vskip\skip\@mpfootins
626
         \normalcolor
627
628
         \unvbox\@mpfootins
629
       \fi
       \@minipagefalse
630
     \color@endgroup
631
632
    \expandafter\@iiiparbox\@mpargs{\unvbox\@tempboxa}}
```

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

```
634 \def\@textbottom{\vskip \z@ \@plus 1pt} 635 \let\@texttop\relax
```

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

```
636 \ifcase\ACM@format@nr
637 \relax % manuscript
638 \or % acmsmall
639 \or % acmlarge
_{640}\,\text{\o or}\, % acmtog
641 \flushbottom
642 \or % sigconf
643 \flushbottom
644 \or % siggraph
645 \flushbottom
646 \or % sigplan
647 \flushbottom
648 \or % sigchi
649 \flushbottom
650 \or % sigchi-a
651\fi
```

3.8 Fonts

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

The code below is by Ross Moore.

```
652 \RequirePackage{iftex}
                   653 \ifPDFTeX
                   654 \input{glyphtounicode}
                   655 \pdfglyphtounicode{f_f}{FB00}
                   656 \pdfglyphtounicode{f_i}{FB03}
                   657 \pdfglyphtounicode{f_f_l}{FB04}
                   658 \pdfglyphtounicode{f_i}{FB01}
                   659 \pdfglyphtounicode{t_t}{0074 0074}
                   660 \pdfglyphtounicode{f_t}{0066 0074}
                   661 \pdfglyphtounicode{T_h}{0054 0068}
                   662 \pdfgentounicode=1
                   663\fi
                   664 \RequirePackage{cmap}
\if@ACM@newfonts Whether we load the new fonts
                    665 \newif\if@ACM@newfonts
                   666 \@ACM@newfontstrue
                   667 \IfFileExists{libertine.sty}{}{\ClassWarning{\@classname}{You do not
```

have the libertine package installed. Please upgrade your

```
 670 \ | Section{100}{$100$} \ | Section{100}{$100$}
                                                                            have the zi4 package installed. Please upgrade your
                                                                            TeX}\@ACM@newfontsfalse}
                                                             {\it 673 \ \tt IfFileExists\{newtxmath.sty\}\{} {\tt \ ClassWarning\{\ \ do \ not \ \ do \ \ not \ \ \ do \ \ not \ \ \ do \ \ \ } } }
                                                                            have the newtxmath package installed. Please upgrade your
                                                             675
                                                                            TeX}\@ACM@newfontsfalse}
                                                                   We use Libertine throughout.
                                                             676 \if@ACM@newfonts
                                                             677 \RequirePackage[T1]{fontenc}
                                                             678 \ifxetex
                                                             679 \RequirePackage[tt=false]{libertine}
                                                             680 \setmonofont{inconsolata}
                                                             682 \RequirePackage[tt=false, type1=true]{libertine}
                                                            683 \fi
                                                             684 \RequirePackage[varqu]{zi4}
                                                             685 \RequirePackage[libertine]{newtxmath}
                                                            686\fi
                            \liningnums Libertine defines \liningnums, which makes fontspec unhappy. While we do not use
                                                           fontspec, some users do.
                                                            687 \let\liningnums\@undefined
                                                            688 \AtEndPreamble{%
                                                             689 \DeclareTextFontCommand{\liningnums}{\libertineLF}}
                                                                   The SIGCHI extended abstracts are sans serif:
                                                             690 \if@ACM@sigchiamode
                                                             691 \renewcommand{\familydefault}{\sfdefault}
                                                             692\fi
                                                           3.9
                                                                      Image descriptions
\if@Description@present A local switch: whether there is a description in the given figure
                                                             693 \newif\if@Description@present
                                                             694 \@Description@presenttrue
  \if@undescribed@images
                                                           A global switch whether some images were not described
                                                             695 \newif\if@undescribed@images
                                                            696 \@undescribed@imagesfalse
                          \Description The Description macro right now just sets switches
                                                            697 \newcommand\Description[2][]{\global\@Description@presenttrue\ignorespaces}
                                                                   The global warning
                                                             698 \AtEndDocument{\if@undescribed@images
                                                             699 \ClassWarningNoLine{\@classname}{Some images may lack descriptions}\fi}
```

TeX}\@ACM@newfontsfalse}

669

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

```
700 \AtBeginEnvironment{figure}{\@Description@presentfalse
701 \let\@vspace\@vspace@orig
702 \let\@vspacer\@vspacer@orig}
703 \AtBeginEnvironment{figure*}{\@Description@presentfalse
704 \let\@vspace\@vspace@orig
705 \let\@vspacer\@vspacer@orig}
706 \AtEndEnvironment{figure}{\if@Description@present\else
707 \global\@undescribed@imagestrue
708 \ClassWarning{\@classname}{A possible image without description}\fi}
709 \AtEndEnvironment{figure*}{\if@Description@present\else
710 \global\@undescribed@imagestrue
711 \ClassWarning{\@classname}{A possible image without description}\fi}
712 \AtBeginEnvironment{table}{\let\@vspace\@vspace@orig
713 \let\@vspacer\@vspacer@orig}
714 \AtBeginEnvironment{table*}{\let\@vspace\@vspace@orig}
715 \let\@vspacer\@vspacer@orig}
716 \AtBeginEnvironment{algorithm}{\let\@vspace\@vspace@orig
717 \let\@vspacer\@vspacer@orig}
718 \AtBeginEnvironment{algorithm*}{\let\@vspace\@vspace@orig
719 \let\@vspacer\@vspacer@orig}
720 \AtBeginEnvironment{lstlisting}{\let\@vspace\@vspace@orig
721 \let\@vspacer\@vspacer@orig}
722 \AtBeginEnvironment{lstlisting*}{\let\@vspace\@vspace@orig
723 \let\@vspacer\@vspacer@orig}
724
```

3.10 Floats

We use the caption package

```
725 \RequirePackage{caption, float}
726 \captionsetup[table]{position=top}
727 \if@ACM@journal
728 \captionsetup{labelfont={sf, small},
      textfont={sf, small}, margin=\z@}
730 \captionsetup[figure]{name={Fig.}}
731 \else
732 \captionsetup{labelfont={bf},
      textfont={bf}, labelsep=colon, margin=\z@}
733
734 \ifcase\ACM@format@nr
735 \relax % manuscript
    \or % acmsmall
736
    \or % acmlarge
737
738 \or % acmtog
739 \or % sigconf
740 \or % siggraph
      \captionsetup{textfont={it}}
742 \or % sigplan
```

```
\captionsetup{labelfont={bf},
                                      743
                                                          textfont={normalfont}, labelsep=period, margin=\z@}
                                      744
                                                \or % sigchi
                                      745
                                                     \captionsetup[figure]{labelfont={bf, small},
                                      746
                                                          textfont={bf, small}}
                                      747
                                                     \captionsetup[table]{labelfont={bf, small},
                                      748
                                      749
                                                          textfont={bf, small}}
                                      750
                                                \or % sigchi-a
                                                     \captionsetup[figure]{labelfont={bf, small},
                                      751
                                                          textfont={bf, small}}
                                      752
                                                     \captionsetup[table]{labelfont={bf, small},
                                      753
                                      754
                                                          textfont={bf, small}}
                                      755
                                              \fi
                                      756\fi
                                    The sidebar environment:
               sidebar
                                      757 \newfloat{sidebar}{}{sbar}
                                      758 \floatname{sidebar}{Sidebar}
                                      759 \renewenvironment{sidebar}{\Collect@Body\@sidebar}{}
           \@sidebar
                                    The processing of the saved text
                                      760 \log \ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensure
                                     761 \let\@vspacer\@vspacer@orig\captionsetup{type=sidebar}%
                                     762 \marginpar{\small#1}\egroup}
    marginfigure The marginfigure environment:
                                     763 \newenvironment{marginfigure}{\Collect@Body\@marginfigure}{}
\@marginfigure
                                    The processing of the saved text
                                     764 \long\def\@marginfigure#1{\bgroup
                                      765 \let\@vspace\@vspace@orig
                                               \let\@vspacer\@vspacer@orig
                                      766
                                                \captionsetup{type=figure}%
                                     767
                                                \marginpar{\@Description@presentfalse\centering
                                      768
                                                     \small#1\if@Description@present\else
                                                          \global\@undescribed@imagestrue
                                      770
                                      771
                                                          \ClassWarning{\@classname}{A possible image without description}
                                                         \fi}%
                                      772
                                     773 \egroup}
                                   The margintable environment:
      margintable
                                     774 \newenvironment{margintable}{\Collect@Body\@margintable}{}
 \@margintable The processing of the saved text
                                     775 \long\def\@margintable#1{\bgroup\let\@vspace\@vspace@orig
                                     776 \let\@vspacer\@vspacer@orig\captionsetup{type=table}%
                                      777 \marginpar{\centering\small#1}\egroup}
```

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

```
\fulltextwidth We define the width of the boxes as
                    778 \newdimen\fulltextwidth
                    779 \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)
                    780 \if@ACM@sigchiamode
                    781 \def\@dblfloat{\bgroup\let\@vspace\@vspace@orig
                    782 \let\@vspacer\@vspacer@orig\columnwidth=\fulltextwidth
                    783 \let\@endfloatbox\@endwidefloatbox
                         \def\@fpsadddefault{\def\@fps{tp}}%
                    785 \@float}
                    786 \fi
    \end@dblfloat And the end. Just adding a \bgroup.
                    787 \if@ACM@sigchiamode
                    788 \def\end@dblfloat{%
                           \end@float\egroup}
                    789
                    790 \fi
\@endwidefloatbox This is the end of a wide box—we basically move everything to the left
                    791 \def\@endwidefloatbox{%
                    792 \par\vskip\z@skip
                    793 \@minipagefalse
                    794 \outer@nobreak
                    795
                        \egroup
                    796
                         \color@endbox
                         \global\setbox\@currbox=\vbox{\moveleft
                           \dimexpr(\fulltextwidth-\textwidth)\box\@currbox}%
                        \wd\@currbox=\textwidth
                    800 }
                   3.11 Lists
                    801 \ifcase\ACM@format@nr
                    802 \relax % manuscript
                    803 \or % acmsmall
                    804 \or % acmlarge
                    805 \or % acmtog
                    806 \or % sigconf
                    807 \or % siggraph
                    808 \or % sigplan
                    809 \def\labelenumi{\theenumi.}
                    810 \def\labelenumii{\theenumii.}
                    811 \def\labelenumiii{\theenumiii.}
                    812 \def\labelenumiv{\theenumiv.}
                    813 \or % sigchi
                    814 \or % sigchi-a
```

815 \fi

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

```
816 \newdimen\@ACM@labelwidth
817 \AtBeginDocument{%
    \setlength\labelsep{4pt}
    \setlength{\@ACM@labelwidth}{6.5pt}
819
820
821
    %% First-level list: when beginning after the first line of an
822
    %% indented paragraph or ending before an indented paragraph, labels
    %% should not hang to the left of the preceding/following text.
823
     \setlength\leftmargini{\z@}
824
     \addtolength\leftmargini{\parindent}
825
     \addtolength\leftmargini{2\labelsep}
826
     \addtolength\leftmargini{\@ACM@labelwidth}
827
828
    %% Second-level and higher lists.
829
    \setlength\leftmarginii{\z@}
830
     \addtolength\leftmarginii{0.5\labelsep}
831
    \addtolength\leftmarginii{\@ACM@labelwidth}
832
     \setlength\leftmarginiii{\leftmarginii}
833
    \setlength\leftmarginiv{\leftmarginiii}
    \setlength\leftmarginv{\leftmarginiv}
    \setlength\leftmarginvi{\leftmarginv}
    \@listi}
838 \newskip\listisep
839 \listisep\smallskipamount
840 \end{figure} \label{leftmargin} leftmargini
841 \labelwidth\leftmargini \advance\labelwidth-\labelsep
842 \listparindent\z@
843 \topsep\listisep}
844 \let\@listi\@listI
845 \def\@listii{\leftmargin\leftmarginii
    \labelwidth\leftmarginii \advance\labelwidth-\labelsep
    \topsep\z@skip}
848 \def\@listiii{\leftmargin\leftmarginiii
849 \labelwidth\leftmarginiii \advance\labelwidth-\labelsep}
850 \def\@listiv{\leftmargin\leftmarginiv
851 \labelwidth\leftmarginiv \advance\labelwidth-\labelsep}
852 \def\@listv{\leftmargin\leftmarginv
853 \labelwidth\leftmarginv \advance\labelwidth-\labelsep}
854 \def\@listvi{\leftmargin\leftmarginvi
   \labelwidth\leftmarginvi \advance\labelwidth-\labelsep}
```

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

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

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

```
857 \renewenvironment{description}{\list{}{%
      \labelwidth\@ACM@labelwidth
859
      \let\makelabel\descriptionlabel}%
860 }{
861 \endlist
862 }
863 \let\enddescription=\endlist % for efficiency
```

Top-matter data

895

TIIS,% 896 TIOT,%

\if@ACM@maketitle@typeset

The switch to check whether \maketitle is already typeset. It is initally false, and setting top matter when it is true is wrong.

```
864 \newif\if@ACM@maketitle@typeset
865 \@ACM@maketitle@typesetfalse
```

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

```
866 \end{cess} $$ 866 \end{cess} $$ 
                         CIE,%
 867
 868
                          CSUR,%
 869
                          DGOV,%
                          DTRAP,%
                          HEALTH,%
871
872 IMWUT,%
                         JACM,%
873
 874 JDIQ,%
875 JEA,%
876 JERIC,%
                         JETC,%
877
                         JOCCH,%
878
                         PACMCGIT,%
879
                         PACMHCI,%
 880
                          PACMPL,%
 881
                           POMACS,%
                           TAAS,%
                          TACCESS,%
 884
                          TACO,%
 885
 886 TALG,%
 887 TALLIP,%
 888 TAP,%
  889 TCPS,%
 890 TDS,%
891 TEAC,%
 892 TECS,%
893 TELO,%
 894 THRI,%
```

```
TISSEC,%
897
    TIST,%
898
    TKDD,%
899
    TMIS,%
900
    TOCE,%
901
902
    TOCHI,%
903
    TOCL,%
    TOCS,%
904
    TOCT,%
905
    TODAES,%
906
    TODS,%
907
    TOG,%
908
909
    TOIS,%
    TOIT,%
910
    TOMACS,%
911
912 TOMM, %
913 TOMPECS,%
914 TOMS,%
915 TOPC,%
916
    TOPS,%
917 TOPLAS,%
    TOS,%
918
    TOSEM,%
919
    TOSN,%
920
    TQC,%
921
922
    TRETS,%
    TSAS,%
923
    TSC,%
924
925 TSLP,%
    TWEB,%
926
   FACMP%
927
928 }{%
929 \ifcase\@journalCode@nr
930 \relax % CIE
    \def\@journalName{ACM Computers in Entertainment}%
    \def\@journalNameShort{ACM Comput. Entertain.}%
932
    \def\@permissionCodeOne{1544-3574}%
933
934 \or % CSUR
    \def\@journalName{ACM Computing Surveys}%
    \def\@journalNameShort{ACM Comput. Surv.}%
    \def\@permissionCodeOne{0360-0300}%
938 \or % DGOV
    \def\@journalName{Digital Government: Research and Practice}%
    \def\@journalNameShort{Digit. Gov. Res. Pract.}%
   \def\@permissionCodeOne{2639-0175}%
942 \or % DTRAP
943 \def\@journalName{Digital Threats: Research and Practice}%
    \def\@journalNameShort{Digit. Threat. Res. Pract.}%
    \def\@permissionCodeOne{2576-5337}%
```

946 \or % HEALTH

```
\def\@journalName{ACM Transactions on Computing for Healthcare}%
    \def\@journalNameShort{ACM Trans. Comput. Healthcare}%
948
^{949} \ \ensuremath{\mbox{def}\permissionCodeOne\{2637-8051\}\%}
950 \or % IMWUT
951 \def\@journalName{Proceedings of the ACM on Interactive, Mobile,
      Wearable and Ubiquitous Technologies}%
953 \def\@journalNameShort{Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.}%
954 \def\@permissionCodeOne{2474-9567}%
955 \@ACM@screentrue
956 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
957 \or % JACM
958 \def\@journalName{Journal of the ACM}%
    \def\@journalNameShort{J. ACM}%
    \def\@permissionCodeOne{0004-5411}%
961 \or % JDIQ
962 \def\@journalName{ACM Journal of Data and Information Quality}%
963 \def\@journalNameShort{ACM J. Data Inform. Quality}%
964 \def\@permissionCodeOne{1936-1955}%
965 \or % JEA
966 \def\@journalName{ACM Journal of Experimental Algorithmics}%
967 \def\@journalNameShort{ACM J. Exp. Algor.}%
968 \def\@permissionCodeOne{1084-6654}%
969 \or % JERIC
970 \def\@journalName{ACM Journal of Educational Resources in Computing}%
    \def\@journalNameShort{ACM J. Edu. Resources in Comput.}%
972 \def\@permissionCodeOne{1073-0516}%
973 \or % JETC
974 \def\@journalName{ACM Journal on Emerging Technologies in Computing Systems}%
975 \def\@journalNameShort{ACM J. Emerg. Technol. Comput. Syst.}%
977 \or % JOCCH
978 \def\@journalName{ACM Journal on Computing and Cultural Heritage}%
979 \def\@journalNameShort{ACM J. Comput. Cult. Herit.}%
980 \or % PACMCGIT
981 \def\@journalName{Proceedings of the ACM on Computer Graphics and Interactive Techniques}%
    \def\@journalNameShort{Proc. ACM Comput. Graph. Interact. Tech.}%
    \def\@permissionCodeOne{2577-6193}%
    \@ACM@screentrue
    \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
986 \or % PACMHCI
    \def\@journalName{Proceedings of the ACM on Human-Computer Interaction}%
    \def\@journalNameShort{Proc. ACM Hum.-Comput. Interact.}%
    \def\@permissionCodeOne{2573-0142}%
989
990 \@ACM@screentrue
991 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
992 \or % PACMPL
993 \def\@journalName{Proceedings of the ACM on Programming Languages}%
994 \def\@journalNameShort{Proc. ACM Program. Lang.}%
995 \def\@permissionCodeOne{2475-1421}%
```

996 \@ACM@screentrue

```
997 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
998 \or % POMACS
999 \def\@journalName{Proceedings of the ACM on Measurement and Analysis of Computing Systems}%
     \def\@journalNameShort{Proc. ACM Meas. Anal. Comput. Syst.}%
     \def\@permissionCodeOne{2476-1249}%
1001
     \@ACM@screentrue
    \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1004 \or % TAAS
     \def\@journalName{ACM Transactions on Autonomous and Adaptive Systems}%
1005
     \def\@journalNameShort{ACM Trans. Autonom. Adapt. Syst.}%
1006
     \def\@permissionCodeOne{1556-4665}%
1008 \or % TACCESS
     \def\@journalName{ACM Transactions on Accessible Computing}%
     \def\@journalNameShort{ACM Trans. Access. Comput.}%
     \def\@permissionCodeOne{1936-7228}%
1012 \or % TACO
1013 \def\@journalName{ACM Transactions on Architecture and Code Optimization}%
1014 \def\@journalNameShort{ACM Trans. Arch. Code Optim.}%
    \def\@journalName{ACM Transactions on Algorithms}%
    \def\@journalNameShort{ACM Trans. Algor.}%
1018 \def\@permissionCodeOne{1549-6325}%
1019 \or % TALLIP
1020 \def\@journalName{ACM Transactions on Asian and Low-Resource Language Information Processing}%
     \def\@journalNameShort{ACM Trans. Asian Low-Resour. Lang. Inf. Process.}%
     \def\@permissionCodeOne{2375-4699}%
1023 \or % TAP
1024 \def\@journalName{ACM Transactions on Applied Perception}%
1025 \or % TCPS
1026 \def\@journalName{ACM Transactions on Cyber-Physical Systems}%
1027 \or % TDS
    \def\@journalName{ACM Transactions on Data Science}%
     \def\@journalNameShort{ACM Trans. Data Sci.}%
    \def\@permissionCodeOne{2577-3224}%
1031 \or % TEAC
1032 \def\@journalName{ACM Transactions on Economics and Computation}%
1033 \or % TECS
     \def\@journalName{ACM Transactions on Embedded Computing Systems}%
     \def\@journalNameShort{ACM Trans. Embedd. Comput. Syst.}%
     \def\@permissionCodeOne{1539-9087}%
1037 \or % TELO
     \def\@journalName{ACM Transactions on Evolutionary Learning}%
1038
     \def\@journalNameShort{ACM Trans. Evol. Learn.}%
    \def\@permissionCodeOne{2688-3007}%
1040
1041 \or % THRI
1042 \def\@journalName{ACM Transactions on Human-Robot Interaction}%
    \def\@journalNameShort{ACM Trans. Hum.-Robot Interact.}%
1044 \def\@permissionCodeOne{2573-9522}%
1045 \or % TIIS
```

1046 \def\@journalName{ACM Transactions on Interactive Intelligent Systems}%

```
\def\@journalNameShort{ACM Trans. Interact. Intell. Syst.}%
     \def\@permissionCodeOne{2160-6455}%
1048
1049 \or % TIOT
    \def\@journalName{ACM Transactions on Internet of Things}%
1050
     \def\@journalNameShort{ACM Trans. Internet Things}%
     \def\@permissionCodeOne{2577-6207}%
1053 \or % TISSEC
     \def\@journalName{ACM Transactions on Information and System Security}%
1054
     \def\@journalNameShort{ACM Trans. Info. Syst. Sec.}%
     \def\@permissionCodeOne{1094-9224}%
1056
1057 \or % TIST
     \def\@journalName{ACM Transactions on Intelligent Systems and Technology}%
     \def\@journalNameShort{ACM Trans. Intell. Syst. Technol.}%
     \def\@permissionCodeOne{2157-6904}%
1061 \or % TKDD
     \def\@journalName{ACM Transactions on Knowledge Discovery from Data}%
    \def\@journalNameShort{ACM Trans. Knowl. Discov. Data.}%
    \def\@permissionCodeOne{1556-4681}%
1065 \or % TMIS
     \def\@journalName{ACM Transactions on Management Information Systems}%
     \def\@journalNameShort{ACM Trans. Manag. Inform. Syst.}%
    \def\@permissionCodeOne{2158-656X}%
1068
1069 \or % TOCE
     \def\@journalName{ACM Transactions on Computing Education}%
     \def\@journalNameShort{ACM Trans. Comput. Educ.}%
     \def\@permissionCodeOne{1946-6226}%
1073 \or % TOCHI
     \def\@journalName{ACM Transactions on Computer-Human Interaction}%
     \def\@journalNameShort{ACM Trans. Comput.-Hum. Interact.}%
     \def\@permissionCodeOne{1073-0516}%
1076
1077 \or % TOCL
    \def\@journalName{ACM Transactions on Computational Logic}%
     \def\@journalNameShort{ACM Trans. Comput. Logic}%
     \def\@permissionCodeOne{1529-3785}%
1080
1081 \or % TOCS
     \def\@journalName{ACM Transactions on Computer Systems}%
1082
     1083
     \def\@permissionCodeOne{0734-2071}%
1085 \or % TOCT
     \def\@journalName{ACM Transactions on Computation Theory}%
     \def\@journalNameShort{ACM Trans. Comput. Theory}%
     \def\@permissionCodeOne{1942-3454}%
1088
1089 \or % TODAES
1090 \def\@journalName{ACM Transactions on Design Automation of Electronic Systems}%
     \def\@journalNameShort{ACM Trans. Des. Autom. Electron. Syst.}%
    \def\@permissionCodeOne{1084-4309}%
1093 \or % TODS
1094
     \def\@journalName{ACM Transactions on Database Systems}%
     \def\@journalNameShort{ACM Trans. Datab. Syst.}%
1095
```

\def\@permissionCodeOne{0362-5915}%

```
1097 \or % TOG
     \def\@journalName{ACM Transactions on Graphics}%
     \def\@journalNameShort{ACM Trans. Graph.}%
    \def\@permissionCodeOne{0730-0301}
1101 \or % TOIS
    \def\@journalName{ACM Transactions on Information Systems}%
    \def\@permissionCodeOne{1046-8188}%
1104 \or % TOIT
     \def\@journalName{ACM Transactions on Internet Technology}%
1105
     \def\@journalNameShort{ACM Trans. Internet Technol.}%
     \def\@permissionCodeOne{1533-5399}%
1108 \or % TOMACS
    \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
    \def\@journalNameShort{ACM Trans. Model. Comput. Simul.}%
1111 \or % TOMM
1112 \def\@journalName{ACM Transactions on Multimedia Computing, Communications and Applications}%
1113 \def\@journalNameShort{ACM Trans. Multimedia Comput. Commun. Appl.}%
1114 \def\@permissionCodeOne{1551-6857}%
1115 \def\@permissionCodeTwo{0100}%
1116 \or % TOMPECS
1117 \def\@journalName{ACM Transactions on Modeling and Performance Evaluation of Computing Systems}%
     \def\@journalNameShort{ACM Trans. Model. Perform. Eval. Comput. Syst.}%
1119 \def\@permissionCodeOne{2376-3639}%
1120 \or % TOMS
     \def\@journalName{ACM Transactions on Mathematical Software}%
1121
     \def\@journalNameShort{ACM Trans. Math. Softw.}%
     \def\@permissionCodeOne{0098-3500}%
1124 \or % TOPC
    \def\@journalName{ACM Transactions on Parallel Computing}%
1125
     \def\@journalNameShort{ACM Trans. Parallel Comput.}%
    \def\@permissionCodeOne{1539-9087}%
1128 \or % TOPS
     \def\@journalName{ACM Transactions on Privacy and Security}%
     \def\@journalNameShort{ACM Trans. Priv. Sec.}%
    \def\@permissionCodeOne{2471-2566}%
1131
1132 \or % TOPLAS
     \def\@journalName{ACM Transactions on Programming Languages and Systems}%
     \def\@journalNameShort{ACM Trans. Program. Lang. Syst.}%
     \def\@permissionCodeOne{0164-0925}%
1136 \or % TOS
     \def\@journalName{ACM Transactions on Storage}%
    \def\@journalNameShort{ACM Trans. Storage}%
1139 \def\@permissionCodeOne{1553-3077}%
1140 \or % TOSEM
1141 \def\@journalName{ACM Transactions on Software Engineering and Methodology}%
1142 \def\@journalNameShort{ACM Trans. Softw. Eng. Methodol.}%
1143 \def\@permissionCodeOne{1049-331X}%
1144 \or % TOSN
1145 \def\@journalName{ACM Transactions on Sensor Networks}%
```

\def\@journalNameShort{ACM Trans. Sensor Netw.}%

```
1148 \or % TQC
                1149 \def\@journalName{ACM Transactions on Quantum Computing}%
                1150 \def\@journalNameShort{ACM Trans. Quantum Comput.}%
                1151 \def\@permissionCodeOne{2643-6817}%
                1152 \or % TRETS
                1153 \def\@journalName{ACM Transactions on Reconfigurable Technology and Systems}%
                     \def\@journalNameShort{ACM Trans. Reconfig. Technol. Syst.}%
                    \def\@permissionCodeOne{1936-7406}%
                1155
                1156 \or % TSAS
                     \def\@journalName{ACM Transactions on Spatial Algorithms and Systems}%
                1157
                     \def\@journalNameShort{ACM Trans. Spatial Algorithms Syst.}%
                     \def\@permissionCodeOne{2374-0353}%
                1160 \or % TSC
                     \def\@journalName{ACM Transactions on Social Computing}%
                1161
                1162 \def\@journalNameShort{ACM Trans. Soc. Comput.}%
                1163 \def\@permissionCodeOne{2469-7818}%
                1164 \or % TSLP
                1165 \def\@journalName{ACM Transactions on Speech and Language Processing}%
                    \def\@journalNameShort{ACM Trans. Speech Lang. Process.}%
                1166
                1167 \def\@permissionCodeOne{1550-4875}%
                1168 \or % TWEB
                1169 \def\@journalName{ACM Transactions on the Web}%
                     \def\@journalNameShort{ACM Trans. Web}%
                1170
                     \def\@permissionCodeOne{1559-1131}%
                1172 \else % FACMP, a dummy journal
                1173 \def\@journalName{Forthcoming ACM Publication}%
                1174
                     \def\@journalNameShort{ACM Forthcoming}%
                1175 \def\@permissionCodeOne{XXXX-XXXX}%
                1176 \fi
                1177 \ClassInfo{\@classname}{Using journal code \@journalCode}%
                1179 \ClassError{\@classname}{Incorrect journal #1}%
                1180 }%
  \acmJournal And the syntactic sugar around it
                1181 \def\acmJournal#1{\setkeys{ACM}{acmJournal=#1}%
                1182 \global\@ACM@journal@bibstriptrue}
                   The defaults:
                1183 \def\@journalCode@nr{0}
                1184 \def\@journalName{}%
                1185 \def\@journalNameShort{\@journalName}%
                1186 \def\@permissionCodeOne{XXXX-XXXX}%
                1187 \def\@permissionCodeTwo{}%
\acmConference This is the conference command
                1188 \newcommand\acmConference[4][]{%
                1189 \gdef\acmConference@shortname{#1}%
```

1147 \def\@permissionCodeOne{1550-4859}%

```
\gdef\acmConference@name{#2}%
                        1190
                              \gdef\acmConference@date{#3}%
                        1191
                              \gdef\acmConference@venue{#4}%
                        1192
                              \ifx\acmConference@shortname\@empty
                        1193
                                \gdef\acmConference@shortname{#2}%
                        1194
                        1195
                        1196
                              \global\@ACM@journal@bibstripfalse
                        1197 }
                        1198 \if@ACM@journal\else
                        1199 \acmConference[Conference'17]{ACM Conference}{July 2017}{Washington,
                        1200 DC, USA}%
                        1201\fi
        \acmBooktitle
                        The book title of the conference:
       \@acmBooktitle
                        1202 \def\acmBooktitle#1{\gdef\@acmBooktitle{#1}}
                        1203 \acmBooktitle{Proceedings of \acmConference@name
                                   \ifx\acmConference@name\acmConference@shortname\else
                        1204
                                     \ (\acmConference@shortname)\fi}
                        1205
      \@editorsAbbrev How to abbreviate editors
                        1206 \def\@editorsAbbrev{(Ed.)}
         \@acmEditors The list of editors
                        1207 \def\@acmEditors{}
              \editor Add a new editor to the list
                        1208 \def\editor#1{\ifx\@acmEditors\@empty
                                \gdef\@acmEditors{#1}%
                        1209
                             \else
                        1210
                                \gdef\@editorsAbbrev{(Eds.)}%
                        1211
                                \g@addto@macro\@acmEditors{\and#1}%
                        1212
                        1213 \fi}
            \subtitle The subtitle macro
                        1214 \def\subtitle#1{\def\@subtitle{#1}}
                        1215 \subtitle{}
                        The total number of "groups". Each group is several authors with the same affiliations(s)
    \num@authorgroups
                        1216 \newcount\num@authorgroups
                        1217 \num@authorgroups=0\relax
         \num@authors
                        The total number of authors
                        1218 \newcount\num@authors
                        1219 \num@authors=0\relax
\if@insideauthorgroup Whether we are continuing an author group
                        1220 \newif\if@insideauthorgroup
                        1221 \@insideauthorgroupfalse
```

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

```
1222 \renewcommand\author[2][]{%
              \footnote{Model} \ \footnote{M
1223
                          authors in the same \string\author\space macro!}}{}%
1224
1225
              \global\advance\num@authors by 1\relax
1226
              \if@insideauthorgroup\else
                    \global\advance\num@authorgroups\ by\ 1\relax
1227
                    \global\@insideauthorgrouptrue
1228
1229
              \ifx\addresses\@empty
1230
1231
                    \if@ACM@anonymous
                          \gdef\addresses{\@author{Anonymous Author(s)%
1232
                               \ifx\@acmSubmissionID\@empty\else\\Submission Id:
1233
                                    \@acmSubmissionID\fi}}%
1234
                          \gdef\authors{Anonymous Author(s)}%
1235
1236
                          \gdef\addresses{\@author{#2}}%
1237
1238
                          \gdef\authors{#2}%
1239
                    \fi
1240
              \else
                    \if@ACM@anonvmous\else
1241
                          \g@addto@macro\addresses{\and\@author{#2}}%
1242
                          \g@addto@macro\authors{\and#2}%
1243
                    \fi
1244
              \fi
1245
              \if@ACM@anonymous
1246
                    \ifx\shortauthors\@empty
1247
                          \gdef\shortauthors{Anon.
1248
                               \ifx\@acmSubmissionID\@empty\else Submission Id:
1249
                               \@acmSubmissionID\fi}%
1250
                    \fi
1251
1252
              \else
                    \def\@tempa{#1}%
1253
                    \ifx\@tempa\@empty
1254
                          \ifx\shortauthors\@empty
1255
                               \gdef\shortauthors{#2}%
1256
1257
                               \g@addto@macro\shortauthors{\and#2}%
1258
                          \fi
1259
                    \else
1260
                          \ifx\shortauthors\@empty
1261
                               \gdef\shortauthors{#1}%
1262
                          \else
1263
1264
                               \g@addto@macro\shortauthors{\and#1}%
1265
                          \fi
                    \fi
1266
1267
              \fi}
```

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

```
argument, which we use differently from amsart.
                                   1268 \newcommand{\affiliation}[2][]{%
                                        \global\@insideauthorgroupfalse
                                   1269
                                        \if@ACM@anonymous\else
                                   1270
                                   1271
                                          \g@addto@macro\addresses{\affiliation{#1}{#2}}%
                                   Whether to use the author's punctuation (false by default, which adds American-style
@ACM@affiliation@obeypunctuation
                                   address punctuation)
                                   1273 \define@boolkey+{@ACM@affiliation@}[@ACM@affiliation@]{obeypunctuation}%
                                   1274 [true]{}{\ClassError{\@classname}{The option obeypunctuation can be either true or false}}
          \additional affiliation Additional affiliations go to footnotes
                                   1275 \def\additionalaffiliation#1{\authornote{\@additionalaffiliation{#1}}}
         \@additionalaffiliation Process \additionalaffiliation inside \authornote
                                   1276 \def\@additionalaffiliation#1{\bgroup
                                   1277 \def\position##1{\ignorespaces}%
                                   1278 \def\institution##1{##1\ignorespaces}%
                                   1279 \def\department{\@ifnextchar[{\@department}{\@department[]}}%
                                   1280 \def\@department[##1]##2{\unskip, ##2\ignorespaces}%
                                   1281 \let\streetaddress\position
                                   1282 \let\city\position
                                   1283 \let\state\position
                                   1284 \let\postcode\position
                                   1285
                                        \let\country\position
                                   1286 Also with #1\unskip.\egroup}
                          \email The macro \email mimics \email from amsart. Again, it has an optional argument that
                                   we do not currently need but keep for possible future use.
                                   1287 \renewcommand{\email}[2][]{%
                                        \IfSubStr{#2}{,}{\ClassWarning{\@classname}{Do not put several
                                   1288
                                            addresses in the same \string\email\space macro!}}{}%
                                   1289
                                        \if@ACM@anonymous\else
                                          \g@addto@macro\addresses{\email{#1}{\#2}}\%
                                   1291
                                   1292 \fi}
                          \orcid Right now we do not typeset ORCIDs
                                   1293 \def\orcid#1{\unskip\ignorespaces}
               \authorsaddresses Setting up authors' addresses
                                   1294 \def\authorsaddresses#1{\def\@authorsaddresses{#1}}
                                   1295 \authorsaddresses{\@mkauthorsaddresses}
                    \@titlenotes The title notes
                                   1296 \def\@titlenotes{}
```

```
\titlenote Adding a note to the title
                 1297 \def\titlenote#1{%
                      \g@addto@macro\@title{\footnotemark}%
                 1298
                      \if@ACM@anonymous
                 1299
                 1300
                        \g@addto@macro\@titlenotes{%
                          \stepcounter{footnote}\footnotetext{Title note}}%
                 1301
                 1302
                        \g@addto@macro\@titlenotes{\stepcounter{footnote}\footnotetext{#1}}%
                 1303
                      \fi}
                 1304
\@subtitlenotes The subtitle notes
                 1305 \def\@subtitlenotes{}
  \subtitlenote Adding a note to the subtitle
                 1306 \def\subtitlenote#1{%
                      \g@addto@macro\@subtitle{\footnotemark}%
                 1307
                      \if@ACM@anonymous
                 1308
                        \g@addto@macro\@subtitlenotes{%
                 1309
                          \stepcounter{footnote}\footnotetext{Subtitle note}}%
                 1310
                 1311
                      \else
                 1312
                        \g@addto@macro\@subtitlenotes{%
                          \stepcounter{footnote}\footnotetext{#1}}%
                 1313
                 1314 \fi}
  \@authornotes The author notes
                 1315 \def\@authornotes{}
    \authornote Adding a note to the author
                 1316 \def\authornote#1{%
                      \if@ACM@anonymous\else
                 1317
                        \g@addto@macro\addresses{\@authornotemark}%
                 1318
                        \g@addto@macro\@authornotes{%
                 1319
                          \stepcounter{footnote}\footnotetext{#1}}%
                 1320
                      \fi}
                 1321
                 Adding a footnote mark to the authors
\authornotemark
                 1322 \newcommand\authornotemark[1][\relax]{%
                      \ifx#1\relax\relax\relax
                      \g@add to @macro \addresses {\@authornotemark}\%
                 1324
                 1325
                      \g@addto@macro\addresses{\@@authornotemark{#1}}%
                 1327 \fi}
                The current volume
     \acmVolume
                 1328 \def\acmVolume#1{\def\@acmVolume{#1}}
                 1329 \acmVolume{1}
                 The current number
     \acmNumber
                 1331 \acmNumber{1}
```

\acmArticle The current article 1332 \def\acmArticle#1{\def\@acmArticle{#1}} 1333 \acmArticle{} \acmArticleSeq The sequence number 1334 \def\acmArticleSeq#1{\def\@acmArticleSeq{#1}} 1335 \acmArticleSeq{\@acmArticle} \acmYear The current year 1336 \def\acmYear#1{\def\@acmYear{#1}} 1337 \acmYear{\the\year} \acmMonth The current month 1338 \def\acmMonth#1{\def\@acmMonth{#1}} 1339 \acmMonth{\the\month} \@acmPubDate The publication date ${\tt 1340 \backslash def \backslash @acmPubDate \{ \backslash if case \backslash @acmMonth \backslash or \}}$ 1341 January\or February\or March\or April\or May\or June\or 1342 July\or August\or September\or October\or November\or 1343 December\fi~\@acmYear} \acmPrice The price 1344 \def\acmPrice#1{\def\@acmPrice{#1}} 1345 \acmPrice{15.00} \acmSubmissionID The submission ID 1346 \def\acmSubmissionID#1{\def\@acmSubmissionID{#1}} 1347 \acmSubmissionID{} \acmISBN The book ISBN 1348 \def\acmISBN#1{\def\@acmISBN{#1}} 1349 \acmISBN{978-x-xxxx-xxxx-x/YY/MM} \acmDOI The paper DOI 1350 \def\acmDOI#1{\def\@acmDOI{#1}} 1351 \acmDOI{10.1145/nnnnnnn.nnnnnnn) \if@ACM@badge Whether to print a badge. Note that either a left or right badge triggers it: 1352 \newif\if@ACM@badge 1353 \@ACM@badgefalse The width of the badge \@ACM@badge@width 1354 \newlength\@ACM@badge@width 1355 \setlength\@ACM@badge@width{5pc} \@ACM@title@width The width of the badge

1356 \newlength\@ACM@title@width

```
\@ACM@badge@skip The space between the badge and the title
                 1357 \newlength\@ACM@badge@skip
                 1358 \setlength\@ACM@badge@skip{1pc}
     \acmBadgeR Setting the right badge
                 1360 \def\@acmBadgeR@url{#1}%
                 1361 \def\@acmBadgeR@image{#2}}
                 1362 \def\@acmBadgeR@url{}
                 1363 \def\@acmBadgeR@image{ }
     \acmBadgeL Setting the left badge
                 1364 \newcommand\acmBadgeL[2][]{\@ACM@badgetrue
                 1365 \def\@acmBadgeL@url{#1}%
                 1366 \def\@acmBadgeL@image{#2}}
                 1367 \def\@acmBadgeL@url{}
                 1368 \def\@acmBadgeL@image{}
     \startPage
                The start page of the paper
                 1369 \def\startPage#1{\def\@startPage{#1}}
                 1370 \startPage{}
         \terms Terms are obsolete. We use CCS now.
                 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.
                 1373 \def\keywords#1{\def\@keywords{#1}}
                 1374 \let\@keywords\@empty
                 1375 \AtEndDocument{\if@ACM@nonacm\else\ifx\@keywords\@empty
                 1376 \ifnum\getrefnumber{TotPages}>2\relax
                 1377 \ClassWarningNoLine{\@classname}{ACM keywords are mandatory
                 1378
                        for papers over two pages}%
                 1379 \fi\fi\fi}
       abstract The amsart package puts abstract in a box. Since we do not know whether we will
                 use two-column mode, we prefer to save the text
                 1380 \renewenvironment{abstract}{\Collect@Body\@saveabstract}{}
  \@saveabstract And saving the abstract
                 1381 \long\def\@saveabstract#1{\if@ACM@maketitle@typeset
                 1382 \ClassError{\@classname}{Abstract must be defined before maketitle
                        command. Please move it!}\fi
                 1384 \long\gdef\@abstract{#1}}
                 1385 \@saveabstract{}
```

```
\@lempty The long version of \@empty (to compare with \@abstract)
                                                                 1386 \long\def\@lempty{}
        \if@ACM@printccs Whether to print CCS
                                                                 1387 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printccs}[true]{%
                                                                 1388 \if@ACM@printccs
                                                                                        \ClassInfo{\@classname}{Printing CCS}%
                                                                 1389
                                                                 1390 \else
                                                                                        \ClassInfo{\@classname}{Suppressing CCS}%
                                                                 1391
                                                                 1392 fi}{ClassError{Qclassname}{The option printces can be either true or false}}
                                                               Whether to print the ACM bibstrip
\if@ACM@printacmref
                                                                 1393 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printacmref}[true]{%
                                                                               \if@ACM@printacmref
                                                                                        \ClassInfo{\@classname}{Printing bibformat}%
                                                                 1395
                                                                                 \else
                                                                 1396
                                                                                        \ClassInfo{\@classname}{Suppressing bibformat}%
                                                                 1397
                                                                 1398 fi}{ClassError{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensurem
                                                                 1399 \AtEndDocument{\if@ACM@nonacm\else\if@ACM@printacmref\else
                                                                                \ifnum\getrefnumber{TotPages}>1\relax
                                                                                 \ClassWarningNoLine{\@classname}{ACM reference format is mandatory
                                                                                        for papers over one page}%
                                                                              \fi\fi\fi}
\if@ACM@printfolios Whether to print folios
                                                                 1404 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printfolios}[true]{%
                                                                 1405 \if@ACM@printfolios
                                                                                        \ClassInfo{\@classname}{Printing folios}%
                                                                 1406
                                                                 1407 \else
                                                                                        \ClassInfo{\@classname}{Suppressing folios}%
                                                                 1409 \fi}{\ClassError{\@classname}{The option printfolios can be either true or false}}
\@ACM@authorsperrow
                                                                 The number of authors per row. 0 means use the default algorithm.
                                                                 1410 \define@cmdkey{@ACM@topmatter@}[@ACM@]{authorsperrow}[0]{%
                                                                                 \footnote{Milnight of the continuous of the co
                                                                 1411
                                                                                               #1}}{\ClassWarning{\@classname}{The parameter authorsperrow must be
                                                                 1412
                                                                                               numerical. Ignoring the input #1}\gdef\@ACM@authorsperrow{0}}}
                                                                 1413
                                                                The usual syntactic sugar
                  \settopmatter
                                                                 1414 \def\settopmatter#1{\setkeys{@ACM@topmatter@}{#1}}
                                                                            Now the settings
                                                                 1415 \settopmatter{printccs=true, printacmref=true}
                                                                 1416 \if@ACM@manuscript
                                                                 1417 \settopmatter{printfolios=true}
                                                                 1418 \else
                                                                 1419 \if@ACM@journal
                                                                 1420
                                                                                        \settopmatter{printfolios=true}
```

```
\else
                1421
                        \settopmatter{printfolios=false}
                1422
                1423 \fi
                1424\fi
                1425 \settopmatter{authorsperrow=0}
    \@received The container for the paper history
                1426 \def\@received{}
     \received The \received command
                1427 \newcommand\received[2][]{\def\@tempa{#1}%
                1428
                     \ifx\@tempa\@empty
                        \ifx\@received\@empty
                1429
                          \gdef\@received{Received #2}%
                1430
                        \else
                1431
                          \g@addto@macro{\@received}{; revised #2}%
                1432
                1433
                1434
                     \else
                        \ifx\@received\@empty
                1435
                         \gdef\@received{#1 #2}%
                1436
                1437
                        \else
                1438
                          \g@addto@macro{\@received}{; #1 #2}%
                1439
                        \fi
                1440 \fi}
                1441 \AtEndDocument{%
                1442 \ifx\@received\@empty\else
                        \par\bigskip\noindent\small\normalfont\@received\par
                1443
                1444
                        Concepts system
                We exclude CCSXML stuff generated by the ACM system:
                1445 \RequirePackage{comment}
                1446 \excludecomment{CCSXML}
    \@concepts This is the storage macro and counter for concepts
                1447 \let\@concepts\@empty
                1448 \newcounter{@concepts}
      \ccsdesc The first argument is the significance, the second is the concept(s)
                1449 \newcommand\ccsdesc[2][100]{%
                     \ccsdesc@parse#1~#2~~\ccsdesc@parse@end}
                The parser of the expression Significance General Specific (we need textcomp for
\ccsdesc@parse
                \textrightarrow). Note that Specific can be empty!
                1451 \def\textrightarrow{$\rightarrow$}
                1452 \def\ccsdesc@parse#1~#2~#3~{%
                1453 \stepcounter{@concepts}%
```

```
\expandafter\gdef\csname CCS@General@#2\endcsname{\textbullet\
                      1455
                               \textbf{#2}}%
                      1456
                             \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{; }%
                      1457
                             \expandafter\gdef\csname CCS@Specific@#2\endcsname{}%
                      1458
                           \label{lem:ccsq} $$ \g@addto@macro{\ensuremath{\csname} \ccsgGeneral@#2\endcsname} $$
                      1459
                             \csname CCS@Punctuation@#2\endcsname
                      1460
                             \csname CCS@Specific@#2\endcsname}%
                      1461
                           \fi
                      1462
                           \ifx#3\relax\relax\else
                      1463
                             \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{
                      1464
                               \textrightarrow\ }%
                      1465
                            \expandafter\g@addto@macro\expandafter{\csname CCS@Specific@#2\endcsname}{%
                      1466
                              \addtocounter{@concepts}{-1}%
                      1467
                              1468
                              1469
                              #3\fi\fi\inum\value{@concepts}=0.\else; \fi}%
                      1470
                          \fi
                      1471
                      1472 \ccsdesc@parse@finish}
                      1473 \AtEndDocument{\if@ACM@nonacm\else\ifx\@concepts\@empty\relax
                           \ifnum\getrefnumber{TotPages}>2\relax
                      1475
                           \ClassWarningNoLine{\@classname}{CCS concepts are mandatory
                             for papers over two pages}%
                      1476
                      1477
                           \fi\fi\fi}
                     Gobble everything to \ccsdesc@parse@end
\ccdesc@parse@finish
                      1478 \def\ccsdesc@parse@finish#1\ccsdesc@parse@end{}
                             Copyright system
                      3.14
                      This is from acmcopyright.sty
                     Whether to print a copyright symbol
 \if@printcopyright
                      1479 \newif\if@printcopyright
                      1480 \@printcopyrighttrue
 \if@printpermission
                     Whether to print the permission block
                      1481 \newif\if@printpermission
                      1482 \@printpermissiontrue
        \if@acmowned Whether the ACM owns the rights to the paper
                      1483 \newif\if@acmowned
                      1484 \@acmownedtrue
                         Keys:
                      1485 \define@choicekey*{ACM@}{acmcopyrightmode}[%
                          \acm@copyrightinput\acm@copyrightmode]{none,%
                             acmcopyright,acmlicensed,rightsretained,%
```

\expandafter\ifx\csname CCS@General@#2\endcsname\relax

1454

```
usgov,usgovmixed,cagov,cagovmixed,licensedusgovmixed,%
1488
       {\tt licensed cagov, licensed cagov mixed, other gov, licensed other gov, \%}
1489
       iw3c2w3,iw3c2w3g}{%
1490
     \@printpermissiontrue
1491
     \@printcopyrighttrue
1492
     \@acmownedtrue
1494
     \ifnum\acm@copyrightmode=0\relax % none
      \@printpermissionfalse
1495
      \@printcopyrightfalse
1496
      \@acmownedfalse
1497
1498
     \ifnum\acm@copyrightmode=2\relax % acmlicensed
      \@acmownedfalse
1501
     \ifnum\acm@copyrightmode=3\relax % rightsretained
1502
      \@acmownedfalse
1503
      \AtBeginDocument{\acmPrice{}}%
1504
1505
1506
     \ifnum\acm@copyrightmode=4\relax % usgov
1507
      \@printpermissiontrue
      \@printcopyrightfalse
1508
      \@acmownedfalse
1509
      \AtBeginDocument{\acmPrice{}}%
1510
1511
     \ifnum\acm@copyrightmode=6\relax % cagov
1512
1513
      \@acmownedfalse
1514
     \ifnum\acm@copyrightmode=8\relax % licensedusgovmixed
1515
      \@acmownedfalse
1516
     \fi
1517
     \ifnum\acm@copyrightmode=9\relax % licensedcagov
1518
1519
      \@acmownedfalse
1520
     \ifnum\acm@copyrightmode=10\relax % licensedcagovmixed
1521
      \@acmownedfalse
1522
     \fi
1523
     \ifnum\acm@copyrightmode=11\relax % othergov
1524
      \@acmownedtrue
1525
     \ifnum\acm@copyrightmode=12\relax % licensedothergov
1527
1528
      \@acmownedfalse
1529
     \ifnum\acm@copyrightmode=13\relax % iw3c2w3
1530
      \@acmownedfalse
1531
1532
      \AtBeginDocument{\acmPrice{}}%
1533
1534
     \ifnum\acm@copyrightmode=14\relax % iw3c2w3g
      \@acmownedfalse
1535
```

\AtBeginDocument{\acmPrice{}}%

1536 1537

\fi}

```
\setcopyright This is the syntactic sugar around setting keys.
                      1538 \def\setcopyright#1{\setkeys{ACM@}{acmcopyrightmode=#1}}
                      1539 \setcopyright{acmcopyright}
    \@copyrightowner Here is the owner of the copyright
                      1540 \def\@copyrightowner{%
                      1541 \ifcase\acm@copyrightmode\relax % none
                      1542 \or % acmcopyright
                      1543 Association for Computing Machinery.
                      1544 \or % acmlicensed
                      1545 Copyright held by the owner/author(s). Publication rights licensed to
                      1546 ACM\@.
                           \or % rightsretained
                      1547
                           Copyright held by the owner/author(s).
                      1548
                      1549
                           \or % usgov
                      1550 \or % usgovmixed
                      1551 Association for Computing Machinery.
                      1552 \or % cagov
                      1553 Crown in Right of Canada.
                      1554 \or %cagovmixed
                      1555 Association for Computing Machinery.
                      1556 \or %licensedusgovmixed
                      1557 Copyright held by the owner/author(s). Publication rights licensed to
                      1558 ACM\@.
                      1559
                           \or % licensedcagov
                      1560 Crown in Right of Canada. Publication rights licensed to
                           ACM\@.
                      1562
                           \or %licensedcagovmixed
                      1563 Copyright held by the owner/author(s). Publication rights licensed to
                      1564 ACM\@.
                      1565 \or % othergov
                      1566 Association for Computing Machinery.
                      1567 \or % licensedothergov
                      1568 Copyright held by the owner/author(s). Publication rights licensed to
                      1569 ACM\@.
                      1570 \or % ic2w3www
                      1571 IW3C2 (International World Wide Web Conference Committee), published
                      under Creative Commons CC-BY~4.0 License.
                      1573 \or % ic2w3wwwgoogle
                      1574 IW3C2 (International World Wide Web Conference Committee), published
                           under Creative Commons CC-BY-NC-ND~4.0 License.
                      1576 \fi}
         \@formatdoi Print a clickable DOI
                      \@copyrightpermission The canned permission block.
                      1578 \def\@copyrightpermission{%
```

1579 \ifcase\acm@copyrightmode\relax % none

- 1580 \or % acmcopyright
- 1581 Permission to make digital or hard copies of all or part of this
- work for personal or classroom use is granted without fee provided
- that copies are not made or distributed for profit or commercial
- advantage and that copies bear this notice and the full citation on
- the first page. Copyrights for components of this work owned by
- others than ACM must be honored. Abstracting with credit is
- permitted. To copy otherwise, or republish, to post on servers or to
- redistribute to lists, requires prior specific permission
- and\hspace*{.5pt}/or a fee. Request permissions from
- permissions@acm.org.
- 1591 \or % acmlicensed
- Permission to make digital or hard copies of all or part of this
- work for personal or classroom use is granted without fee provided
- that copies are not made or distributed for profit or commercial
- advantage and that copies bear this notice and the full citation on
- the first page. Copyrights for components of this work owned by
- others than the author(s) must be honored. Abstracting with credit
- is permitted. To copy otherwise, or republish, to post on servers
- or to redistribute to lists, requires prior specific permission
- and\hspace*{.5pt}/or a fee. Request permissions from
- permissions@acm.org.
- 1602 \or % rightsretained
- 1603 Permission to make digital or hard copies of part or all of this work
- 1604 for personal or classroom use is granted without fee provided that
- 1605 copies are not made or distributed for profit or commercial advantage
- $_{\rm 1606}$ $\,$ and that copies bear this notice and the full citation on the first
- page. Copyrights for third-party components of this work must be
- 1608 honored. For all other uses, contact the
- owner\hspace*{.5pt}/author(s).
- 1610 \or % usgov
- This paper is authored by an employee(s) of the United States
- Government and is in the public domain. Non-exclusive copying or
- 1613 redistribution is allowed, provided that the article citation is
- given and the authors and agency are clearly identified as its
- source.
- 1616 \or % usgovmixed
- 1617 ACM acknowledges that this contribution was authored or co-authored
- by an employee, contractor, or affiliate of the United States
- government. As such, the United States government retains a
- nonexclusive, royalty-free right to publish or reproduce this
- article, or to allow others to do so, for government purposes only.
- 1622 \or % cagov
- 1623 This article was authored by employees of the Government of Canada.
- As such, the Canadian government retains all interest in the
- 1625 copyright to this work and grants to ACM a nonexclusive,
- 1626 royalty-free right to publish or reproduce this article, or to allow
- $_{\rm 1627}$ $\,$ others to do so, provided that clear attribution is given both to
- the authors and the Canadian government agency employing them.
- 1629 Permission to make digital or hard copies for personal or classroom

- use is granted. Copies must bear this notice and the full citation 1630 on the first page. Copyrights for components of this work owned by 1631 others than the Canadian Government must be honored. To copy 1632 otherwise, distribute, republish, or post, requires prior specific 1633 permission and\hspace*{.5pt}/or a fee. Request permissions from 1634 permissions@acm.org. 1635 \or % cagovmixed 1636 1637 ACM acknowledges that this contribution was co-authored by an affiliate of the national government of Canada. As such, the Crown 1638 in Right of Canada retains an equal interest in the copyright. 1639
- Reprints must include clear attribution to ACM and the author's 1640 government agency affiliation. Permission to make digital or hard 1641 copies for personal or classroom use is granted. Copies must bear 1642 this notice and the full citation on the first page. Copyrights for 1643 components of this work owned by others than ACM must be honored. 1644 To copy otherwise, distribute, republish, or post, requires prior 1645 specific permission and\hspace*{.5pt}/or a fee. Request permissions 1646 from permissions@acm.org. 1647
- \or % licensedusgovmixed 1648
- Publication rights licensed to ACM\@. ACM acknowledges that this 1649 1650 contribution was authored or co-authored by an employee, contractor
- or affiliate of the United States government. As such, the 1651
- Government retains a nonexclusive, royalty-free right to publish or 1652 reproduce this article, or to allow others to do so, for Government 1653 purposes only. 1654
- \or % licensedcagov 1655
- This article was authored by employees of the Government of Canada. 1656
- As such, the Canadian government retains all interest in the 1657
- copyright to this work and grants to ACM a nonexclusive, 1658
- royalty-free right to publish or reproduce this article, or to allow 1659
- others to do so, provided that clear attribution is given both to 1660
- the authors and the Canadian government agency employing them. 1661
- Permission to make digital or hard copies for personal or classroom 1662
- 1663 use is granted. Copies must bear this notice and the full citation
- on the first page. Copyrights for components of this work owned by 1664
- others than the Canadian Government must be honored. To copy 1665
- otherwise, distribute, republish, or post, requires prior specific 1666
- permission and\hspace*{.5pt}/or a fee. Request permissions from
- permissions@acm.org. 1668
- \or % licensedcagovmixed 1669
- Publication rights licensed to ACM\@. ACM acknowledges that this 1670
- contribution was authored or co-authored by an employee, contractor 1671
- or affiliate of the national government of Canada. As such, the 1672
- 1673 Government retains a nonexclusive, royalty-free right to publish or
- reproduce this article, or to allow others to do so, for Government 1674
- 1675 purposes only.
- 1676 \or % othergov
- 1677 ACM acknowledges that this contribution was authored or co-authored
- by an employee, contractor or affiliate of a national government. As 1678
- such, the Government retains a nonexclusive, royalty-free right to 1679

```
publish or reproduce this article, or to allow others to do so, for
                  1680
                        Government purposes only.
                  1681
                       \or % licensedothergov
                  1682
                        Publication rights licensed to ACM\@. ACM acknowledges that this
                  1683
                        contribution was authored or co-authored by an employee, contractor
                  1684
                        or affiliate of a national government. As such, the Government
                  1686
                        retains a nonexclusive, royalty-free right to publish or reproduce
                        this article, or to allow others to do so, for Government purposes
                  1687
                        only.
                  1688
                  1689 \or % iw3c2w3
                        This paper is published under the Creative Commons Attribution~4.0
                  1690
                        International (CC-BY~4.0) license. Authors reserve their rights to
                        disseminate the work on their personal and corporate Web sites with
                        the appropriate attribution.
                  1693
                  1694 \or % iw3c2w3g
                        This paper is published under the Creative Commons
                  1695
                        Attribution-NonCommercial-NoDerivs~4.0 International
                  1696
                        (CC-BY-NC-ND~4.0) license. Authors reserve their rights to
                  1697
                        disseminate the work on their personal and corporate Web sites with
                        the appropriate attribution.
                 By default, the copyright year is the same as \acmYear, but one can override this:
 \copyrightyear
                  1701 \def\copyrightyear#1{\def\@copyrightyear{#1}}
                  1702 \copyrightyear{\@acmYear}
\@teaserfigures The teaser figures container
                  1703 \def\@teaserfigures{}
   teaserfigure The teaser figure
                  1704 \newenvironment{teaserfigure}{\Collect@Body\@saveteaser}{}
   \@saveteaser Saving the teaser
                  {\tt 1705 \ long\ def\ @saveteaser \#1 \{ \ g@add \ to @macro\ @teaser figures \{ \ @teaser \{ \#1 \} \} \} }
                 We redefine amsart \thanks so the anonymous key works
                  1706 \renewcommand{\thanks}[1]{%
                  1707
                       \@ifnotempty{#1}{%
                         \if@ACM@anonymous
                  1708
                  1709
                            \g@addto@macro\thankses{\thanks{A note}}%
                  1710
                         \g@addto@macro\thankses{\thanks{#1}}%
                  1711
                  1712
                        \fi}}
```

3.15 Typesetting top matter

\mktitle@bx

Some of our formats use a two-column design. Some use a one-column design. In all cases we use a wide title. Thus we typeset the top matter in a special box to be used in the construction θ .

1713 \newbox\mktitle@bx

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

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

```
1714 \def\maketitle{%
1715
     \@ACM@maketitle@typesettrue
1716
     \if@ACM@anonymous
       % Anonymize omission of \author-s
1717
       \ifnum\num@authorgroups=0\author{}\fi
1718
     \fi
1719
     \begingroup
1720
     \let\@vspace\@vspace@orig
1721
     \let\@vspacer\@vspacer@orig
     \let\@footnotemark\@footnotemark@nolink
     \let\@footnotetext\@footnotetext@nolink
     \renewcommand\thefootnote{\@fnsymbol\c@footnote}%
1725
     \hsize=\textwidth
1726
     \def\@makefnmark{\hbox{\@textsuperscript{\@thefnmark}}}%
1727
1728
     \@mktitle\if@ACM@sigchiamode\else\@mkauthors\fi\@mkteasers
1729
     \@printtopmatter
     \if@ACM@sigchiamode\@mkauthors\fi
1730
     \setcounter{footnote}{0}%
1731
     \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}%
1732
     \@titlenotes
1733
     \@subtitlenotes
1734
     \@authornotes
     \let\@makefnmark\relax
     \let\@thefnmark\relax
     \let\@makefntext\noindent
1738
     \ifx\@empty\thankses\else
1739
       \footnotetextauthorsaddresses{%
1740
1741
         \def\par{\let\par\@par}\parindent\z@\@setthanks}%
1742
     \ifx\@empty\@authorsaddresses\else
1743
        \if@ACM@anonymous\else
1744
          \if@ACM@journal@bibstrip
1745
            \footnotetextauthorsaddresses{%
1746
              \def\par{\let\par\@par}\parindent\z@\@setauthorsaddresses}%
1747
          \fi
1748
        \fi
1749
1750
     \if@ACM@nonacm\else\footnotetextcopyrightpermission{%
1751
       \if@ACM@authordraft
1752
           1753
1754
               Unpublished working draft. Not for distribution.}}%
1755
          \color[gray]{0.9}%
       \fi
1756
       \parindent\z@\parskip0.1\baselineskip
1757
```

```
\if@ACM@authorversion\else
1758
        \if@printpermission\@copyrightpermission\par\fi
1759
       \fi
1760
       \if@ACM@manuscript\else
1761
          \if@ACM@journal@bibstrip\else % Print the conference information
1762
1763
         1764
          \fi
1765
       \if@printcopyright
1766
         \copyright\ \@copyrightyear\ \@copyrightowner\\
1767
       \else
1768
1769
         \@copyrightyear.\
1770
       \fi
       \if@ACM@manuscript
1771
        Manuscript submitted to ACM\\
1772
       \else
1773
        \if@ACM@authorversion
1774
            This is the author's version of the work. It is posted here for
1775
1776
            your personal use. Not for redistribution. The definitive Version
1777
            of Record was published in
            \if@ACM@journal@bibstrip
1778
              \emph{\@journalName}%
1779
            \else
1780
              \emph{\@acmBooktitle}%
1781
1782
            \fi
            \ifx\@acmDOI\@empty
1783
1784
            \else
1785
              , \ensuremath{\texttt{QacmDOI}}.
1786
            \fi\\
1787
           \else
1788
1789
            \if@ACM@nonacm\else
1790
              \if@ACM@journal@bibstrip
                \@permissionCodeOne/\@acmYear/\@acmMonth-ART\@acmArticle
1791
                \ifx\@acmPrice\@empty\else\ \$\@acmPrice\fi\\
1792
                \@formatdoi{\@acmDOI}%
1793
              \else % Conference
1794
                1795
                \ifx\@acmPrice\@empty.\else\dots\$\@acmPrice\fi\\\fi
                \int \mathbb{Q}_{\mathbb{Q}}\
1797
1798
              \fi
            \fi
1799
           \fi
1800
        \fi}
1801
1802
       \fi
1803
     \endgroup
1804
     \setcounter{footnote}{0}%
1805
     \@mkabstract
     \if@ACM@printccs
1806
     \ifx\@concepts\@empty\else\bgroup
1807
```

```
\noindent\@concepts\par}\egroup
                   1809
                            \fi
                   1810
                          \fi
                   1811
                          \ifx\@keywords\@empty\else\bgroup
                   1812
                   1813
                             {\if@ACM@journal
                   1814
                                 \@specialsection{Additional Key Words and Phrases}%
                              \else
                   1815
                                 \@specialsection{Keywords}%
                   1816
                              \fi
                   1817
                                 \noindent\@keywords}\par\egroup
                   1818
                   1819
                          \fi
                         \andify\authors
                   1820
                         \andify\shortauthors
                   1821
                         \global\let\authors=\authors
                   1822
                         \global\let\shortauthors=\shortauthors
                   1823
                         \if@ACM@printacmref
                   1824
                            \@mkbibcitation
                   1825
                   1826
                         \fi
                   1827
                         \hypersetup{%
                           pdfauthor={\authors},
                   1828
                           pdftitle={\@title},
                   1829
                           pdfsubject={\@concepts},
                   1830
                           pdfkeywords={\@keywords},
                   1831
                           pdfcreator={LaTeX with acmart
                   1832
                   1833
                             \csname ver@acmart.cls\endcsname\space
                             and hyperref
                   1834
                             \csname ver@hyperref.sty\endcsname}}%
                   1835
                         \global\@topnum\z@ % this prevents floats from falling
                   1836
                                             \% at the top of page 1
                   1837
                         \global\@botnum\z@ % we do not want them to be on the bottom either
                   1838
                   1839
                         \@printendtopmatter
                   1840
                         \@afterindentfalse
                         \@afterheading
                   1841
                   1842 }
                   This macro starts sections for proceedings and uses \small for journals
\@specialsection
                   1843 \def\@specialsection#1{%
                         \ifcase\ACM@format@nr
                   1844
                         \relax % manuscript
                   1845
                           \par\medskip\small\noindent#1: %
                   1846
                         \or % acmsmall
                   1847
                           \par\medskip\small\noindent#1: %
                   1848
                         \or % acmlarge
                   1849
                           \par\medskip\small\noindent#1: %
                   1850
                         \or % acmtog
                   1851
                           \par\medskip\small\noindent#1: %
                   1852
                         \or % sigconf
                   1853
                   1854
                           \section*{#1}%
                         \or % siggraph
```

{\@specialsection{CCS Concepts}%

1808

```
\section*{#1}%
1856
      \or % sigplan
1857
         \noindentparagraph*{#1:~}%
1858
      \or % sigchi
1859
        \section*{#1}%
1860
1861
      \or % sigchi-a
1862
        \section*{#1}%
1863
        \fi
1864 }
```

\@printtopmatter

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

```
1865 \def\@printtopmatter{%
     \ifx\@startPage\@empty
1866
         \gdef\@startPage{1}%
1867
1868
         \setcounter{page}{\@startPage}%
1869
     \fi
1870
     \verb|\thispagestyle{first pagestyle}|%
1871
     \noindent
1872
     \ifcase\ACM@format@nr
1873
1874
     \relax % manuscript
1875
       \box\mktitle@bx\par
     \or % acmsmall
1876
       \box\mktitle@bx\par
1877
     \or % acmlarge
1878
       \box\mktitle@bx\par
1879
1880
     \or % acmtog
       \twocolumn[\box\mktitle@bx]%
1881
     \or % sigconf
1882
       \twocolumn[\box\mktitle@bx]%
1883
     \or % siggraph
1884
       \verb|\twocolumn[\box\mktitle@bx]||%
1885
1886
     \or % sigplan
       \twocolumn[\box\mktitle@bx]%
1887
1888
     \or % sigchi
       \twocolumn[\box\mktitle@bx]%
1889
     \or % sigchi-a
1890
       \par\box\mktitle@bx\par\bigskip
1891
       \if@ACM@badge
1892
           \marginpar{\noindent
1893
             \ifx\@acmBadgeL@image\@empty\else
1894
               \href{\@acmBadgeL@url}{%
1895
                  \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}%
1896
                \hskip\@ACM@badge@skip
1897
              \fi
1898
             \ifx\@acmBadgeR@image\@empty\else
1899
1900
               \href{\@acmBadgeR@url}{%
                  \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}%
1901
```

```
1902
                             \fi}%
                      \fi
              1903
                   \fi
              1904
              1905 }
  \@mktitle The title of the article
              1906 \def\@mktitle{%
                   \ifcase\ACM@format@nr
              1907
                    \relax % manuscript
              1908
              1909
                      \@mktitle@i
              1910
                    \or % acmsmall
              1911
                      \@mktitle@i
                    \or % acmlarge
              1912
                      \@mktitle@i
              1913
                   \or % acmtog
              1914
                      \@mktitle@i
              1915
                   \or % sigconf
              1916
              1917
                      \@mktitle@iii
                    \or % siggraph
              1918
              1919
                      \@mktitle@iii
              1920
                    \or % sigplan
                      \@mktitle@iii
              1921
              1922
                    \or % sigchi
              1923
                      \@mktitle@iii
              1924
                    \or % sigchi-a
              1925
                      \@mktitle@iv
                   \fi
              1926
              1927 }
\@titlefont
              The font to typeset the title
              1928 \def\@titlefont{%
                    \ifcase\ACM@format@nr
              1929
              1930
                    \relax % manuscript
                      \LARGE\sffamily\bfseries
              1931
                    \or % acmsmall
              1932
              1933
                      \LARGE\sffamily\bfseries
              1934
                    \or % acmlarge
                      \LARGE\sffamily\bfseries
              1935
                    \or % acmtog
              1936
                      \Huge\sffamily
              1937
                    \or % sigconf
              1938
                      \Huge\sffamily\bfseries
              1939
              1940
                    \or % siggraph
                      \Huge\sffamily\bfseries
              1941
                    \or % sigplan
              1942
                      \Huge\bfseries
              1943
                    \or % sigchi
              1944
                      \Huge\sffamily\bfseries
              1945
              1946
                    \or % sigchi-a
                       \Huge\bfseries
              1947
```

```
1948 \fi}
\@subtitlefont The font to typeset the subtitle
                1949 \def\@subtitlefont{\normalsize
                     \ifcase\ACM@format@nr
                     \relax % manuscript
                1951
                1952
                       \mdseries
                     \or % acmsmall
                1953
                       \mdseries
                1954
                1955
                     \or % acmlarge
                1956
                       \mdseries
                     \or % acmtog
                1957
                        \LARGE
                1958
                     \or % sigconf
                1959
                        \LARGE\mdseries
                1960
                     \or % siggraph
                1961
                        \LARGE\mdseries
                1962
                     \or % sigplan
                1963
                        \LARGE\mdseries
                1964
                     \or % sigchi
                1965
                         \LARGE\mdseries
                1966
                     \or % sigchi-a
                1967
                1968
                        \mdseries
                     \fi}
                1969
   \@mktitle@i
                The version of \mktitle for most journals
                1970 \def\@mktitle@i{\hsize=\textwidth
                     \@ACM@title@width=\hsize
                     \ifx\@acmBadgeL@image\@empty\else
                1972
                        \advance\@ACM@title@width by -\@ACM@badge@width
                1973
                        \advance\@ACM@title@width by -\@ACM@badge@skip
                1974
                1975
                     \fi
                     \ifx\@acmBadgeR@image\@empty\else
                1976
                       \advance\@ACM@title@width by -\@ACM@badge@width
                1977
                       \advance\@ACM@title@width by -\@ACM@badge@skip
                1978
                1979
                     \setbox\mktitle@bx=\vbox{\noindent\@titlefont
                1980
                       \ifx\@acmBadgeL@image\@empty\else
                1981
                          1982
                              \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
                1983
                          \hskip\@ACM@badge@skip
                1984
                1985
                        \parbox[t]{\@ACM@title@width}{\raggedright
                1986
                          \@titlefont\noindent
                1987
                          \@title
                1988
                     \ifx\@subtitle\@empty\else
                1989
                        \par\noindent{\@subtitlefont\@subtitle}
                1990
                     \fi}%
                1991
                1992
                     \ifx\@acmBadgeR@image\@empty\else
                1993
                       \hskip\@ACM@badge@skip
```

```
1994
                         \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
              1995
                   \fi
              1996
                   \par\bigskip}}%
              1997
\@mktitle@ii
              The version of \mktitle for TOG. Since v1.06, this is subsumed by the \mktitle@i
              macro
\@mktitle@iii
              The version of \@mktitle for SIG proceedings. Note that since the title is centered, we
              leave space for the left badge even if only the right badge is defined.
              1998 \def\@mktitle@iii{\hsize=\textwidth
                     \setbox\mktitle@bx=\vbox{\@titlefont\centering
              1999
                       \@ACM@title@width=\hsize
              2000
              2001
                       \if@ACM@badge
                         \advance\@ACM@title@width by -2\@ACM@badge@width
              2002
                         \advance\@ACM@title@width by -2\@ACM@badge@skip
              2003
                         \parbox[b]{\@ACM@badge@width}{\strut
              2004
                          \ifx\@acmBadgeL@image\@empty\else
              2005
                            2006
                             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
              2007
                          \fi}%
              2008
                         \hskip\@ACM@badge@skip
              2009
              2010
                       \parbox[t]{\@ACM@title@width}{\centering\@titlefont
              2011
              2012
                         \ifx\@subtitle\@empty\else
              2013
              2014
                           \par\noindent{\@subtitlefont\@subtitle}
                        \fi
              2015
                       }%
              2016
                       \if@ACM@badge
              2017
                         \hskip\@ACM@badge@skip
              2018
                         \parbox[b]{\@ACM@badge@width}{\strut
              2019
                          \ifx\@acmBadgeR@image\@empty\else
              2020
                            2021
                             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
              2023
                       \fi
              2024
                       \par\bigskip}}%
\@mktitle@iv
              The version of \@mktitle for sigchi-a
              2026 \def\@mktitle@iv{\hsize=\textwidth
                     \setbox\mktitle@bx=\vbox{\raggedright\leftskip5pc\@titlefont
              2027
                       \noindent\leavevmode\leaders\hrule height 2pt\hfill\kern0pt\par
              2028
              2029
                       \noindent\@title
              2030
                      \ifx\@subtitle\@empty\else
                        \par\noindent\@subtitlefont\@subtitle
              2031
              2032
                      \par\bigskip}}%
```

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

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

```
2034 \newbox\@ACM@commabox
               2035 \def\@ACM@addtoaddress#1{%
               2036
                   \ifvmode\else
                      \if@ACM@affiliation@obeypunctuation\else
               2037
                      \setbox\@ACM@commabox=\hbox{, }%
               2038
                      \unskip\cleaders\copy\@ACM@commabox\hskip\wd\@ACM@commabox
               2039
               2040
                    \fi\fi
                    #1}
 \institution Theoretically we can define the macros for \affiliation inside the \@mkauthors-style
               commands. However, this would lead to a strange error if an author uses them outside
    \position
  \department \affiliation. Of course we can make them produce an error message, but...
\verb|\streetaddress| 2042 \verb|\def\streetaddress| 1{\unskip\ignorespaces}|
        \city 2043 \def\postcode#1{\unskip\ignorespaces}
       \state 2044\if@ACM@journal
    \postcode 2045 \def\position#1{\unskip\ignorespaces}
                    \def\institution#1{\unskip~#1\ignorespaces}
     \country
               2046
                    \def\city#1{\unskip\ignorespaces}
                    \def\state#1{\unskip\ignorespaces}
               2048
                    \newcommand\department[2][0]{\unskip\ignorespaces}
               2049
               2051 \else
                    2052
                    \def\institution#1{\if@ACM@affiliation@obeypunctuation#1\else#1\par\fi}%
               2053
                    \newcommand\department[2][0]{\if@ACM@affiliation@obeypunctuation
               2054
                      #2\else#2\par\fi}%
               2055
               2056% \def\streetaddress#1{\left.\right.}1{\if@ACM@affiliation@obeypunctuation#1\else#1\par\fi}%
               2057 \let\city\@ACM@addtoaddress
               2058 \let\state\@ACM@addtoaddress
               2059% \def\postcode#1{\if@ACM@affiliation@obeypunctuation#1\else\unskip\space#1\fi}%
               2060 \let\country\@ACM@addtoaddress
               2061\fi
              Typesetting the authors
  \@mkauthors
               2062 \def\@mkauthors{\begingroup
                   \hsize=\textwidth
               2063
                   \ifcase\ACM@format@nr
               2064
               2065 \relax % manuscript
                      \@mkauthors@i
               2067
                   \or % acmsmall
               2068
                      \@mkauthors@i
                    \or % acmlarge
               2069
                      \@mkauthors@i
               2070
```

```
\or % acmtog
                    2071
                            \@mkauthors@i
                    2072
                          \or % sigconf
                    2073
                            \@mkauthors@iii
                    2074
                         \or % siggraph
                    2075
                    2076
                            \@mkauthors@iii
                    2077
                         \or % sigplan
                            \@mkauthors@iii
                    2078
                         \or % sigchi
                    2079
                           \@mkauthors@iii
                    2080
                         \or % sigchi-a
                    2081
                           \@mkauthors@iv
                    2082
                    2083
                         \fi
                          \endgroup
                    2084
                    2085 }
                    Somehow different conferences use different fonts for author names. Why?
     \@authorfont
                    2086 \def\@authorfont{\Large\sffamily}
\@affiliationfont Font for affiliations
                    2087 \def\@affiliationfont{\normalsize\normalfont}
                        Adjusting fonts for different formats
                    2088 \ifcase\ACM@format@nr
                    2089 \relax % manuscript
                    2090 \or % acmsmall
                    2091 \def\@authorfont{\large\sffamily}
                    2092 \def\@affiliationfont{\small\normalfont}
                    2093 \or % acmlarge
                    2094 \or % acmtog
                    2095 \def\@authorfont{\LARGE\sffamily}
                    2096 \def\@affiliationfont{\large}
                    2097 \or % sigconf
                    2098 \def\@authorfont{\LARGE}
                    2099 \def\@affiliationfont{\large}
                    2100 \or % siggraph
                    2101 \def\@authorfont{\normalsize\normalfont}
                         \def\@affiliationfont{\normalsize\normalfont}
                    2103 \or % sigplan
                    {\tt 2104} \quad {\tt \def\@authorfont{Large\normalfont}}
                    2105 \def\@affiliationfont{\normalsize\normalfont}
                    2106 \or % sigchi
                    2107 \def\@authorfont{\bfseries}
                    2108 \def\@affiliationfont{\mdseries}
                    2109 \or % sigchi-a
                    2110 \def\@authorfont{\bfseries}
                    2111 \def\@affiliationfont{\mdseries}
                    2112 \fi
```

```
\@typeset@author@line At this point we have \@currentauthors and \@currentaffiliations. We typeset
                        them in the journal style
                        2113 \def\@typeset@author@line{%
                        2114
                             \andify\@currentauthors\par\noindent
                             \@currentauthors\def\@currentauthors{}%
                        2115
                             \ifx\@currentaffiliations\@empty\else
                        2116
                               \andify\@currentaffiliations
                        2117
                        2118
                                  \unskip, {\@currentaffiliations}\par
                        2119
                             \fi
                             \def\@currentaffiliations{}}
                        This version is used in most journal formats. Note that \and between authors with the
        \@mkauthors@i
                        same affiliation becomes _and_:
                        2121 \def\@mkauthors@i{%
                             \def\@currentauthors{}%
                             \def\@currentaffiliations{}%
                             \global\let\and\@typeset@author@line
                        2124
                              \def\@author##1{%
                        2125
                               \ifx\@currentauthors\@empty
                        2126
                                  \gdef\@currentauthors{\@authorfont\MakeTextUppercase{##1}}%
                        2127
                        2128
                                \else
                                   \g@addto@macro{\@currentauthors}{\and\MakeTextUppercase{##1}}%
                        2129
                               \fi
                        2130
                               \gdef\and{}}%
                        2131
                             \def\email##1##2{}%
                        2132
                              \def\affiliation##1##2{%
                        2133
                               \def\@tempa{\##2}\ifx\@tempa\@empty\else
                        2134
                                   \ifx\@currentaffiliations\@empty
                        2135
                                      \gdef\@currentaffiliations{%
                        2136
                                        \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
                        2137
                                        \setkeys{@ACM@affiliation@}{##1}%
                        2138
                                        \@affiliationfont##2}%
                        2139
                        2140
                                   \else
                                     \g@addto@macro{\@currentaffiliations}{\and
                        2141
                                       \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
                        2142
                                       \setkeys{@ACM@affiliation@}{##1}##2}%
                        2143
                                  \fi
                        2144
                                \fi
                        2145
                                 \global\let\and\@typeset@author@line}%
                        2146
                              \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par\medskip
                        2147
                               \noindent\addresses\@typeset@author@line
                               \par\medskip}%
                        2149
                        2150 }
       \@mkauthors@ii
                        The \@mkauthors@ii command was the version used in acmtog. It is no longer neces-
                        sary.
           \author@bx
                        The box to put an individual author in
```

2151 \newbox\author@bx

```
\author@bx@wd The width of the author box
                     2152 \newdimen\author@bx@wd
     \author@bx@sep
                    The separation between author boxes
                     2153 \newskip\author@bx@sep
                     2154 \author@bx@sep=1pc\relax
\@typeset@author@bx
                     Typesetting the box with authors. Note that in sigchi-a the box is not centered.
                     2155 \def\@typeset@author@bx{\bgroup\hsize=\author@bx@wd
                          2156
                          \global\setbox\author@bx=\vtop{\if@ACM@sigchiamode\else\centering\fi
                     2157
                     2158
                            \@authorfont\@currentauthors\par\@affiliationfont
                     2159
                            \@currentaffiliation}\egroup
                          \box\author@bx\hspace{\author@bx@sep}%
                     2160
                          \gdef\@currentauthors{}%
                     2161
                          \gdef\@currentaffiliation{}}
    \@mkauthors@iii The sigconf version. Here we use a centered design with each author in a separate box.
                     2163 \def\@mkauthors@iii{%
                     First, we need to determine the design of the author strip. The boxes are separated by
                     \author@bx@sep plus two \author@bx@sep margins. This means that each box must
                     be of width (\text{width} - \text{width} - \text{where } N is the
                     number of boxes per row.
                          \author@bx@wd=\textwidth\relax
                          \advance\author@bx@wd by -\author@bx@sep\relax
                          \ifnum\@ACM@authorsperrow>0\relax
                     2166
                            \divide\author@bx@wd by \@ACM@authorsperrow\relax
                     2167
                          \else
                     2168
                            \ifcase\num@authorgroups
                     2169
                            \relax % 0?
                     2170
                            \or % 1=one author per row
                     2171
                            \or % 2=two authors per row
                     2172
```

\divide\author@bx@wd by \num@authorgroups\relax

\divide\author@bx@wd by \num@authorgroups\relax

Now, parsing of \addresses:

\fi

2173

2174

2175

2176 2177

2178

2179

2180 2181

2182

```
2183 \gdef\@currentauthors{}%
2184 \gdef\@currentaffiliation{}%
2185 \def\@author##1{\ifx\@currentauthors\@empty
2186 \gdef\@currentauthors{\par##1}%
2187 \else
```

\or % 3=three authors per row

\or % 4=two authors per row (!)

\else % three authors per row

\divide\author@bx@wd by 2\relax

\divide\author@bx@wd by 3\relax

\advance\author@bx@wd by -\author@bx@sep\relax

```
\g@addto@macro\@currentauthors{\par##1}%
2188
               \fi
2189
               2190
               2191
2192
                     \gdef\@currentaffiliation{\bgroup
                           \mathchardef\UrlBreakPenalty=10000\nolinkurl{##2}\egroup}%
2193
               \else
2194
                      \g@addto@macro\@currentaffiliation{\par\bgroup
2195
                           2196
2197
               \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
2198
                     \gdef\@currentaffiliation{%
                           \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2200
                           \setkeys{@ACM@affiliation@}{##1}##2}%
2201
               \else
2202
                     \g@addto@macro\@currentaffiliation{\par
2203
                           \label{lem:condition} $$\end{affiliation@} {\bf Obeypunctuation=false} % $$\end{affiliation@} $$\end{affiliation@}
2204
                           \setkeys{@ACM@affiliation@}{##1}##2}%
2205
               \fi
2206
2207
               \global\let\and\@typeset@author@bx
2208 }%
Actual typesetting is done by the \and macro:
               \hsize=\textwidth
2209
               \global\setbox\mktitle@bx=\vbox{\noindent
2210
                     \box\mktitle@bx\par\medskip\leavevmode
2211
                     \lineskip=1pc\relax\centering\hspace*{-1em}%
2212
                     2213
```

\@mkauthors@iv

The sigchi-a version. We put authors in the main text with no more than 2 authors per line, unless overriden.

```
2214 \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 (\textwidth - \author@bx@sep)/N - \author@bx@sep, where N is the number of boxes per row.

```
\author@bx@wd=\columnwidth\relax
2215
     \advance\author@bx@wd by -\author@bx@sep\relax
2216
     \ifnum\@ACM@authorsperrow>0\relax
2217
       \divide\author@bx@wd by \@ACM@authorsperrow\relax
2218
2219
     \else
       \ifcase\num@authorgroups
2220
       \relax % 0?
       \or % 1=one author per row
2222
       \else % 2=two authors per row
2223
           \divide\author@bx@wd by 2\relax
2224
       \fi
2225
     \fi
2226
     \advance\author@bx@wd by -\author@bx@sep\relax
2227
```

```
\gdef\@currentauthors{}%
                      2228
                      2229
                            \gdef\@currentaffiliation{}%
                            \def\@author##1{\ifx\@currentauthors\@empty
                      2230
                      2231
                              \gdef\@currentauthors{\par##1}%
                      2232
                            \else
                      2233
                              \g@addto@macro\@currentauthors{\par##1}%
                            \fi
                      2234
                            2235
                            \def\email##1##2{\ifx\@currentaffiliation\@empty
                      2236
                      2237
                              \gdef\@currentaffiliation{\nolinkurl{##2}}%
                      2238
                              \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
                      2239
                            \fi}%
                      2240
                            \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
                      2241
                              \gdef\@currentaffiliation{%
                      2242
                                \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
                      2243
                      2244
                                     \setkeys{@ACM@affiliation@}{##1}##2}%
                      2245
                              \g@addto@macro\@currentaffiliation{\par
                      2246
                                \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
                      2247
                                \setkeys{@ACM@affiliation@}{##1}##2}%
                      2248
                            \fi
                      2249
                            \global\let\and\@typeset@author@bx}%
                      2250
                      Actual typesetting is done by the \and macro
                      2252
                              \bgroup\hsize=\columnwidth
                      2253
                              \par\raggedright\leftskip=\z@
                      2254
                              \lineskip=1pc\noindent
                              \addresses\let\and\@typeset@author@bx\and\par\bigskip\egroup}
                      2255
\@mkauthorsaddresses
                      Typesetting authors' addresses in the footnote style
                      2256 \def\@mkauthorsaddresses{%
                            \ifnum\num@authors>1\relax
                      2257
                      2258
                            Authors' \else Author's \fi
                            \ifnum\num@authorgroups>1\relax
                            addresses: \else address: \fi
                      2260
                      2261
                            \bgroup
                            \def\streetaddress##1{\unskip, ##1}%
                      2262
                            \def\postcode##1{\unskip, ##1}%
                      2263
                            \def\position##1{\unskip\ignorespaces}%
                      2264
                            \def\institution##1{\unskip, ##1}%
                            \def\city##1{\unskip, ##1}%
                      2266
                            \def\state##1{\unskip, ##1}%
                      2267
                            \renewcommand\department[2][0]{\unskip\@addpunct, ##2}%
                      2268
                            \def\country##1{\unskip, ##1}%
                      2269
                            \def\and{\unskip; }%
                      2270
                      2271
                            \def\@author##1{##1}%
                            \def\email##1##2{\unskip, \nolinkurl{##2}}%
```

Now, parsing of \addresses:

```
\addresses
                   2273
                        \egroup}
                   2274
                   2275 \AtEndDocument{\if@ACM@nonacm\else\if@ACM@journal
                        \ifx\@authorsaddresses\@empty
                   2276
                        \ClassWarningNoLine{\@classname}{Authors'
                   2277
                          addresses are mandatory for ACM journals}%
                        \fi\fi\fi}
   \@setaddresses This is an amsart macro that we do not need.
                   2280 \def\@setaddresses{}
 \@authornotemark Adding a footnote mark to authors. This version adds a "normal" footnote mark.
                   \@@authornotemark   Adding a footnote mark to authors with a given number
                   2282 \def\@@authornotemark#1{\g@addto@macro\@currentauthors{\footnotemark[#1]}}
      \@mkteasers Typesetting the teasers
                   2283 \def\@mkteasers{%
                        \ifx\@teaserfigures\@empty\else
                   2285
                          \def\@teaser##1{\par\bigskip\bgroup
                            \captionsetup{type=figure}##1\egroup\par}
                   2286
                          \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par
                   2287
                   2288
                            \noindent\@Description@presentfalse
                   2289
                            \@teaserfigures\par\if@Description@present\else
                               \global\@undescribed@imagestrue
                   2290
                   2291
                               \ClassWarning{\@classname}{A possible image without
                                 description}\fi
                   2292
                          \medskip}%
                   2293
                   2294
                       \fi}
     \@mkabstract Typesetting the abstract
                   2295 \def\@mkabstract{\bgroup
                        \ifx\@abstract\@lempty\else
                        {\bf \{hantomsection \ add contents line \{toc\} \{section\} \{Abstract\} \%}
                   2297
                          \if@ACM@journal
                   2298
                             \everypar{\setbox\z@\lastbox\everypar{}}\small
                   2299
                          \else
                   2300
                            \section*{\abstractname}%
                   2301
                   2302
                         \ignorespaces\@abstract\par}%
                   2303
                        \fi\egroup}
  \@mkbibcitation Print the bibcitation format
                   2305 \def\@mkbibcitation{\bgroup
                       \let\@vspace\@vspace@orig
                   2306
                       \let\@vspacer\@vspacer@orig
                   2308 \def\@pages@word{\ifnum\getrefnumber{TotPages}=1\relax page\else pages\fi}%
```

```
\def\\{\unskip{} \ignorespaces}%
                                                  2310
                                                             \def\footnote{\ClassError{\@classname}{Please do not use footnotes
                                                  2311
                                                                      inside a \string\title{} or \string\author{} command! Use
                                                  2312
                                                  2313
                                                                      \string\titlenote{} or \string\authornote{} instead!}}%
                                                             \def\@article@string{\ifx\@acmArticle\@empty{\ }\else,
                                                  2314
                                                                 Article \@acmArticle \fi}%
                                                  2315
                                                             \par\medskip\small\noindent{\bfseries ACM Reference Format:}\par\nobreak
                                                  2316
                                                             \noindent\bgroup
                                                  2317
                                                                 2318
                                                             \ifx\@subtitle\@empty. \else: \@subtitle. \fi
                                                  2319
                                                             \if@ACM@nonacm\else
                                                                 % The 'nonacm' option disables 'printacmref' by default,
                                                                 % and the present \@mkbibcitation definition is never used
                                                  2322
                                                                 % in this case. The conditional remains useful if the user
                                                  2323
                                                                 % explicitly sets \settopmatter{printacmref=true}.
                                                  2324
                                                                 \if@ACM@journal@bibstrip
                                                  2325
                                                                        \textit{\@journalNameShort}
                                                  2326
                                                                        \@acmVolume, \@acmNumber \@article@string (\@acmPubDate),
                                                  2327
                                                                        \ref{TotPages}~\@pages@word.
                                                  2328
                                                  2329
                                                                        In \textit{\@acmBooktitle}%
                                                  2330
                                                                        \ifx\@acmEditors\@empty\textit{.}\else
                                                  2331
                                                                            \andify\@acmEditors\textit{, }\@acmEditors~\@editorsAbbrev.%
                                                  2332
                                                  2333
                                                                        ACM, New York, NY, USA%
                                                  2334
                                                                             \@article@string\unskip, \ref{TotPages}~\@pages@word.
                                                  2335
                                                  2336
                                                                 \fi
                                                             \fi
                                                  2337
                                                             \ifx\end{0}\end{0}\
                                                  2339 \par\egroup}
    \@printendtopmatter
                                                 End the top matter
                                                  2340 \def\@printendtopmatter{%
                                                            \let\@vspace\@vspace@orig
                                                             \let\@vspacer\@vspacer@orig
                                                             \par\bigskip
                                                             \let\@vspace\@vspace@acm
                                                  2344
                                                             \let\@vspacer\@vspacer@acm
                                                  2345
                     \@setthanks
                                                 We redefine \setthanks using \long
                                                  2347 \end{array} $$2347 \end{a
\@setauthorsaddresses
                                                  2348 \def\@setauthorsaddresses{\@authorsaddresses\unskip\@addpunct.}
```

3.16 Headers and Footers

\def\footnotemark{}%

2309

We use fancyhdr for our headers and footers:

```
2349 \RequirePackage{fancyhdr}
\ACM@restore@pagestyle The following code by Ross Moore protects against changes by the totpages package:
                        2350 \let\ACM@ps@plain\ps@plain
                        2351 \let\ACM@ps@myheadings\ps@myheadings
                        2352 \let\ACM@ps@headings\ps@headings
                        2353 \def\ACM@restore@pagestyle{%
                        2354 \let\ps@plain\ACM@ps@plain
                             \let\ps@myheadings\ACM@ps@myheadings
                        2356 \let\ps@headings\ACM@ps@headings}
                        2357 \AtBeginDocument{\ACM@restore@pagestyle}
                        This is the box displayed in review mode
     \ACM@linecount@bx
                        2358 \if@ACM@review
                        2359
                             \newsavebox{\ACM@linecount@bx}
                        2360
                             \newlength\ACM@linecount@bxht
                        2361
                             \newcount\ACM@linecount
                             \ACM@linecount\@ne\relax
                        2362
                             \def\ACM@mk@linecount{%
                        2363
                               2364
                        2365
                                    \normalsize
                                    \setlength{\ACM@linecount@bxht}{0pt}%
                        2366
                        2367
                                    \loop{\color{red}\scriptsize\the\ACM@linecount}\\
                                    \global\advance\ACM@linecount by \@ne
                        2368
                                    \addtolength{\ACM@linecount@bxht}{\baselineskip}%
                        2369
                                    \ifdim\ACM@linecount@bxht<\textheight\repeat
                        2370
                                    {\color{red}\scriptsize\the\ACM@linecount}\hfill
                        2371
                                    \global\advance\ACM@linecount by \@ne}}}
                        2372
                        2373 \fi
       \ACM@linecountL How to display the box on the left
                        2374 \def\ACM@linecountL{%
                        2375 \if@ACM@review
                             \ACM@mk@linecount
                        2376
                             \begin{picture}(0,0)%
                        2377
                               \put(-26, -22){\usebox{\ACM@linecount@bx}}%
                        2378
                        2379
                             \end{picture}%
       \ACM@linecountR How to display the box on the right. In one column formats we do not step the numbers.
                        2381 \def\ACM@linecountR{%
                             \if@ACM@review
                        2382
                               \ifcase\ACM@format@nr
                        2383
                               \relax % manuscript
                        2384
                        2385
                                    \relax
                                  \or % acmsmall
                        2386
                                    \relax
                        2387
                        2388
                                  \or % acmlarge
```

\relax

2389

```
\or % acmtog
                                            2390
                                                                          \ACM@mk@linecount
                                            2391
                                                                    \or % sigconf
                                            2392
                                                                          \ACM@mk@linecount
                                            2393
                                            2394
                                                                    \or % siggraph
                                                                          \ACM@mk@linecount
                                                                    \or % sigplan
                                            2396
                                                                          \ACM@mk@linecount
                                            2397
                                                                    \or % sigchi
                                            2398
                                                                          \ACM@mk@linecount
                                            2399
                                                                    \or % sigchi-a
                                            2400
                                                                          \ACM@mk@linecount
                                            2401
                                                            \fi
                                            2402
                                                             \begin{picture}(0,0)%
                                            2403
                                                                 \put(20,-22){\usebox{\ACM@linecount@bx}}%
                                            2404
                                                               \end{picture}%
                                            2405
                                                       \fi}
                                            2406
       \ACM@timestamp
                                           The timestamp system
                                            2407 \if@ACM@timestamp
                                                       % Subtracting 30 from \time gives us the effect of rounding down despite
                                                       % \numexpr rounding to nearest
                                                        \newcounter{ACM@time@hours}
                                            2410
                                                        \setcounter{ACM@time@hours}{\numexpr (\time - 30) / 60 \relax}
                                            2411
                                                       \newcounter{ACM@time@minutes}
                                            2412
                                            2414
                                                       \newcommand\ACM@timestamp{%
                                            2415
                                                            \footnotesize%
                                                            \ifx\@acmSubmissionID\@empty\relax\else
                                            2416
                                                            Submission ID: \@acmSubmissionID.{ }%
                                            2417
                                            2418
                                                            2419
                                                            \label{two@digits{theACM@time@minutes}{.}} \\ $$ \two@digits{theACM@time@minutes}{.} \\ $% \two@digits{theACM@time@minu
                                            2420
                                                            Page \thepage\ of \@startPage--\pageref*{TotPages}.%
                                            2422
                                            2423\fi
                                           Even if the author redefined \shortauthors, we do not print it in the headers when in
       \@shortauthors
                                            anonymous mode:
                                            2424 \def\@shortauthors{%
                                            2425 \if@ACM@anonymous
                                            2426
                                                            \ifx\@acmSubmissionID\@empty\else Submission Id: \@acmSubmissionID\fi
                                            2427
                                            2428 \else\shortauthors\fi}
       \@headfootfont The font to typeset header and footer text.
                                            2429 \def\@headfootfont{\sffamily\footnotesize}
standardpagestyle The page style for all pages but the first one The page style for all pages but the first one
```

```
2430 \AtBeginDocument{%
2431 \fancypagestyle{standardpagestyle}{%
     \fancyhf{}%
2432
     \mbox{\ensuremath{\mbox{\headrulewidth}}{\sc}}% \label{theadrulewidth}
2433
2434
     \renewcommand{\footrulewidth}{\z@}%
     \def\@acmArticlePage{%
2435
       \ifx\@acmArticle\empty%
2436
2437
          \if@ACM@printfolios\thepage\fi%
2438
       \else%
          \@acmArticle\if@ACM@printfolios:\thepage\fi%
2439
2440
       \fi%
2441
     \if@ACM@journal@bibstrip
2442
       \ifcase\ACM@format@nr
2443
       \relax % manuscript
2444
          \fancyhead[LE]{\ACM@linecountL\if@ACM@printfolios\thepage\fi}%
2445
          \fancyhead[RO]{\if@ACM@printfolios\thepage\fi}%
2446
          \fancyhead[RE]{\@shortauthors}%
2447
          \fancyhead[LO]{\ACM@linecountL\shorttitle}%
2448
          \if@ACM@nonacm\else%
2449
2450
            \fancyfoot[RO,LE]{\footnotesize Manuscript submitted to ACM}
          \fi%
2451
       \or % acmsmall
2452
          \fancyhead[LE]{\ACM@linecountL\@headfootfont\@acmArticlePage}%
2453
          \fancyhead[RO]{\@headfootfont\@acmArticlePage}%
2454
          \fancyhead[RE]{\@headfootfont\@shortauthors}%
2455
          \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2456
          \if@ACM@nonacm\else%
2457
         \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2458
           \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2459
          \fi
2460
       \or % acmlarge
2461
2462
          \fancyhead[LE]{\ACM@linecountL\@headfootfont
2463
          \@acmArticlePage\quad\textbullet\quad\@shortauthors}%
          \fancyhead[L0]{\ACM@linecountL}%
2464
          \footnotemark
2465
            \shorttitle\quad\textbullet\quad\@acmArticlePage}%
2466
          \if@ACM@nonacm\else%
2467
         \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
           \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2469
          \fi
2470
       \or % acmtog
2471
          \fancyhead[LE]{\ACM@linecountL\@headfootfont
2472
            \@acmArticlePage\quad\textbullet\quad\@shortauthors}%
2473
          \fancyhead[L0]{\ACM@linecountL}%
2474
2475
          \fancyhead[RE]{\ACM@linecountR}%
2476
          \fancyhead[RO]{\@headfootfont
2477
            \shorttitle\quad\textbullet\quad\@acmArticlePage\ACM@linecountR}%
          \if@ACM@nonacm\else%
2478
         \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2479
```

```
\fi
                2481
                       \else % Proceedings
                2482
                         \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
                2483
                         \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
                2484
                         \fancyhead[RE]{\@headfootfont\@shortauthors\ACM@linecountR}%
                2485
                         \if@ACM@nonacm\else%
                2486
                           \fancyhead[LE]{\ACM@linecountL\@headfootfont\footnotesize
                2487
                             \acmConference@shortname,
                2488
                             \acmConference@date, \acmConference@venue}%
                2489
                           \footnotemark
                2490
                             \acmConference@shortname,
                             \acmConference@date, \acmConference@venue\ACM@linecountR}%
                         \fi
                2493
                       \fi
                2494
                     \else % Proceedings
                2495
                       2496
                       \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
                2497
                       2498
                2499
                       \if@ACM@nonacm\else%
                         \fancyhead[LE]{\ACM@linecountL\@headfootfont
                2500
                           \acmConference@shortname,
                2501
                           \acmConference@date, \acmConference@venue}%
                2502
                         \footnotemark
                2503
                2504
                           \acmConference@shortname,
                2505
                           \acmConference@date, \acmConference@venue\ACM@linecountR}%
                       \fi
                2506
                     \fi
                2507
                     \if@ACM@sigchiamode
                2508
                        \fancyheadoffset[L]{\dimexpr(\marginparsep+\marginparwidth)}%
                2509
                2510
                2511
                     \if@ACM@timestamp
                2512
                        \fancyfoot[LO,RE]{\ACM@timestamp}
                2513
                2514 }%
                2515 \pagestyle{standardpagestyle}
                2516 }
    \@folio@wd Folio blob width, height, offsets and max number
    \@folio@ht
                2517 \newdimen\@folio@wd
\@folio@voffset
                2518 \@folio@wd=\z@
                2519 \newdimen\@folio@ht
   \@folio@max
                2520 \@folio@ht=\z@
                2521 \newdimen\@folio@voffset
                2522 \@folio@voffset=\z@
                2523 \def\@folio@max{1}
                2524 \ifcase\ACM@format@nr
                2525 \relax % manuscript
                2526 \or % acmsmall
                2527 \@folio@wd=45.75pt\relax
```

2480

\@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%

```
\ensuremath{\texttt{Qfolio@ht=1.25in}\ensuremath{\texttt{relax}}}
                2528
                      \@folio@voffset=.2in\relax
                2529
                     \def\@folio@max{8}
                2530
                2531 \or % acmlarge
                2532 \@folio@wd=43.25pt\relax
                     \@folio@ht=79pt\relax
                     \@folio@voffset=.55in\relax
                    \def\@folio@max{10}
                2535
                2536 \fi
  \@folioblob The macro to typeset the folio blob.
                2537 \def\@folioblob{\@tempcnta=0\@acmArticleSeq\relax
                     \ifnum\@tempcnta=0\relax\else
                First, we calculate \@acmArticleSeq modulo \@folio@max
                2539
                2540
                         \ifnum\@tempcnta>\@folio@max\relax
                          \advance\@tempcnta by - \@folio@max
                2541
                       \repeat
                2542
                        \advance\@tempcnta by -1\relax
                2543
                        \@tempdima=\@folio@ht\relax
                2544
                        \multiply\@tempdima by \the\@tempcnta\relax
                2545
                        2546
                2547
                        \begin{picture}(0,0)
                        \mbox[\z@]{\raisebox{-\end{-}}}
                2548
                2549
                            \rlap{%
                              \raisebox{-0.45\@folio@ht}[\z@][\z@]{%
                2550
                                \rule{\@folio@wd}{\@folio@ht}}}%
                2551
                            \parbox{\@folio@wd}{%
                2552
                2553
                              \centering
                              \textcolor{white}{\LARGE\sffamily\bfseries\@acmArticle}}}
                2554
                2555
                      \end{picture}\fi}
                2556
                The page style for the first page only.
firstpagestyle
                2557 \AtBeginDocument{%
                2558 \fancypagestyle{firstpagestyle}{%
                     \fancyhf{}%
                2559
                     \renewcommand{\headrulewidth}{\z@}%
                2560
                      \renewcommand{\footrulewidth}{\z@}%
                2561
                      \if@ACM@journal@bibstrip
                2562
                        \ifcase\ACM@format@nr
                2563
                2564
                        \relax % manuscript
                          \fancyhead[L]{\ACM@linecountL}%
                2565
                          \fancyfoot[RO,LE]{\if@ACM@printfolios\small\thepage\fi}%
                2566
                          \if@ACM@nonacm\else%
                2567
                            \fancyfoot[RE,LO]{\footnotesize Manuscript submitted to ACM}%
                2568
                          \fi%
                2569
                2570
                        \or % acmsmall
                2571
                          \if@ACM@nonacm\else%
```

```
\fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2572
           \@acmNumber, Article \@acmArticle. Publication date:
2573
           \@acmPubDate.}%
2574
         \fi%
2575
         \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2576
         \fancyhead[L0]{\ACM@linecountL}%
2577
2578
         \fancyhead[RO]{\@folioblob}%
         \fancyheadoffset[RO,LE]{0.6\@folio@wd}%
2579
       \or % acmlarge
2580
         \if@ACM@nonacm\else%
2581
        \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2582
           \@acmNumber, Article \@acmArticle. Publication date:
2583
           \@acmPubDate.}%
2584
2585
         \fancyhead[RO]{\@folioblob}%
2586
         \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2587
         \fancyhead[LO]{\ACM@linecountL}%
2588
         \fine {RO, LE}{1.4\ensuremath{\mbox{\tt Molio@wd}}}\%
2589
2590
       \or % acmtog
2591
         \if@ACM@nonacm\else%
        \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2592
           \@acmNumber, Article \@acmArticle. Publication date:
2593
           \@acmPubDate.}%
2594
         \fi%
2595
         \fancyhead[L]{\ACM@linecountL}%
2596
2597
         \fancyhead[R]{\ACM@linecountR}%
       \else % Conference proceedings
2598
2599
         \fancyhead[L]{\ACM@linecountL}%
         \fancyhead[R]{\ACM@linecountR}%
2600
         \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2601
       \fi
2602
2603
     \else
2604
       \fancyhead[L]{\ACM@linecountL}%
       \fancyhead[R]{\ACM@linecountR}%
2605
       2606
     \fi
2607
     \if@ACM@timestamp
2608
       2609
       \foot[LO,RE]{\ACM@timestamp\quad}
         \if@ACM@nonacm\else
2611
2612
           \footnotesize Manuscript submitted to ACM
         \fi}
2613
       \else
2614
       \fancyfoot[LO,RE]{\ACM@timestamp}
2615
2616
       \fi
2617
    \fi
2618 }}
```

3.17 Sectioning

\ACM@NRadjust Ross Moore's macro.

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

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

```
2619 \def\ACM@NRadjust#1{%
2620 \begingroup
     \expandafter\ifx\csname Sectionformat\endcsname\relax
     % do nothing when \Sectionformat is unknown
2622
      \def\next{\endgroup #1}%
2623
2624 \else
     \def\next{\endgroup
2625
      \let\realSectionformat\Sectionformat
2626
      \def\ACM@sect@format@{#1}%
2627
      \let\Sectionformat\ACM@NR@adjustedSectionformat
2628
2629 %% next lines added 2018-06-17 to ensure section number is styled
      \let\real@adddotafter\@adddotafter
2630
      \let\@adddotafter\ACM@adddotafter
2631
      #1{}% imposes the styles, but nullifies \MakeUppercase
2632
      \let\@adddotafter\real@adddotafter
2635 \fi \next
2636 }
2637 \def\ACM@NR@adjustedSectionformat#1#2{%
2638 \realSectionformat{\ACM@sect@format{#1}}{#2}%
```

```
2637 \def\ACM@NR@adjustedSectionformat#1#2{%
2638 \realSectionformat{\ACM@sect@format{#1}}{#2}%
2639 \let\Sectionformat\realSectionformat}
2640 \DeclareRobustCommand{\ACM@sect@format}{\ACM@sect@format@}
2641 \def\ACM@sect@format@null#1{#1}
2642 \let\ACM@sect@format@\ACM@sect@format@null
```

```
2644 \expandafter\ifx\csname LTX@adddotafter\endcsname\relax
                                                                                   \let\LTX@adddotafter\@adddotafter
                                                                      2646 \fi
                                                                      2647 }
            \ACM@adddotafter
                                                                      2648 \ensuremath{$\def{\acmath}$} 1 = 1 \ensuremath{$\def{\acmath}$} 1 = 1 \ensuremath{$\def{\acmath}$} 1 \ensuremath{\acmath}$ 2 \ensuremath{$\def{\acmath}$} 1 \ensuremath{\acmath}$ 2 \ensuremath}$ 2 \ensuremath{\acmath}$ 2 \ensuremath{\acmath}$ 2 \ensuremath{\acmath}$ 2 \ensuremath{\acmath}$ 2 \ensuremath}$ 
                                                                                Sectioning is different for different levels
                                                                      2649 \renewcommand\section{\@startsection{section}{1}{\z@}%
                                                                      \{-.75\baselineskip \eqrup{eplus } -2\p@ \eqrup{eminus } -.2\p@}
                                                                      2651 {.25\baselineskip}%
                                                                      2652 {\ACM@NRadjust\@secfont}}
                                                                      2653 \renewcommand\subsection{\@startsection{subsection}{2}{\z@}%
                                                                      \{-.75\baselineskip \eqlus -2\p@ \eqlus -.2\p@}
                                                                      2655 {.25\baselineskip}%
                                                                      2656 {\ACM@NRadjust\@subsecfont}}
                                                                      2657 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{\z@}%
                                                                      2658 {-.5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
                                                                      2659 {-3.5\p@}%
                                                                      2660 {\ACM@NRadjust{\@subsubsecfont\@adddotafter}}}
                                                                      2661 \renewcommand\paragraph{\@startsection{paragraph}{4}{\parindent}%
                                                                      2662 {-.5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
                                                                      2663 {-3.5\p@}%
                                                                      2664 {\ACM@NRadjust{\@parfont\@adddotafter}}}
                                                                      2665 \newcommand\noindentparagraph{\@startsection{paragraph}{4}{\z@}%
                                                                      2666 {-.5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
                                                                                       \{-3.5\p0\}\%
                                                                                     {\ACM@NRadjust{\@parfont}}}
                                                                      2668
                                                                      2669
                                                                      2670 \renewcommand\part{\@startsection{part}{9}{\z@}%
                                                                      2671 {-10\p@ \@plus -4\p@ \@minus -2\p@}%
                                                                      2672 {4\p@}%
                                                                      2673 {\ACM@NRadjust\@parfont}}
                                                                     Special version of \raggedright compatible with \MakeUppercase
\section@raggedright
                                                                      2674 \def\section@raggedright{\@rightskip\@flushglue
                                                                      2675
                                                                                      \rightskip\@rightskip
                                                                      2676
                                                                                     \leftskip\z@skip
                                                                      2677 \parindent\z@}
                                   \@secfont Fonts for sections etc. are different for different formats.
                         \verb|\descfont| $$ \escfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase} $$
               \verb|\del{contorder}| \end{constraint} $$ \end{
                                   \@parfont 2680 \def\@subsubsecfont{\sffamily\itshape}
                                                                      2681 \def\@parfont{\itshape}
                                                                      2682 \setcounter{secnumdepth}{3}
                                                                      2683 \ifcase\ACM@format@nr
```

2643 \AtBeginDocument{%

```
2684 \relax % manuscript
                 2685 \or % acmsmall
                 2686 \or % acmlarge
                 2688 \def\@subsecfont{\sffamily\large\section@raggedright}
                 2690 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
                 2691 \def\@subsecfont{\sffamily\large\section@raggedright}
                 2692 \or % sigconf
                 2693 \def\@secfont{\bfseries\Large\section@raggedright\MakeTextUppercase}
                 2694 \def\@subsecfont{\bfseries\Large\section@raggedright}
                 2695 \or % siggraph
                 2696 \def\@secfont{\sffamily\bfseries\Large\section@raggedright\MakeTextUppercase}
                 2697 \def\@subsecfont{\sffamily\bfseries\Large\section@raggedright}
                 2698 \or % signlan
                 2699 \def\@secfont{\bfseries\Large\section@raggedright}
                 2700 \def\@subsecfont{\bfseries\section@raggedright}
                 2701 \def\@subsubsecfont{\bfseries\section@raggedright}
                 2702 \def\@parfont{\bfseries\itshape}
                 2703 \def\@subparfont{\itshape}
                 2704 \or % sigchi
                 2705 \setcounter{secnumdepth}{1}
                 2706 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
                 2707 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
                 2708 \or % sigchi-a
                 2709 \setcounter{secnumdepth}{0}
                 2710 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
                 2711 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
                 2712 \fi
 \@adddotafter Add punctuation after a sectioning command
                 2713 \ensuremath{\mbox{def}\ensuremath{\mbox{@adddotafter#1{#1}@addpunct{.}}}
\@addspaceafter Add space after a sectioning command
                 {\tt 2714 \ def\@addspaceafter\#1\{\#1\@addpunct{\enspace}\}}
```

3.18 TOC lists

\@dotsep

Related to the \tableofcontents are all the horizontal fillers. Base LTEX 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.

2715 \providecommand*\@dotsep{4.5}

3.19 Theorems

\@acmplainbodyfont

The font to typeset the body of the acmplain theorem style.

2716 \def\@acmplainbodyfont{\itshape}

```
\@acmplainindent The amount to indent the acmplain theorem style.
                          2717 \def\@acmplainindent{\parindent}
     \@acmplainheadfont The font to typeset the head of the acmplain theorem style.
                          2718 \def\@acmplainheadfont{\scshape}
     \ensuremath{\texttt{Qacmplainnotefont}} The font to typeset the note of the acmplain theorem style.
                          2719 \def\@acmplainnotefont{\@empty}
                              Customization of the acmplain theorem style:
                          2720 \ifcase\ACM@format@nr
                          2721 \relax % manuscript
                          2722 \or % acmsmall
                          2723 \or % acmlarge
                          2724 \or % acmtog
                          2725 \or % sigconf
                          2726 \or % siggraph
                          2727 \or % sigplan
                          2728 \def\@acmplainbodyfont{\itshape}
                          2729 \def\@acmplainindent{\z@}
                          2730 \def\@acmplainheadfont{\bfseries}
                          2731 \def\@acmplainnotefont{\normalfont}
                          2732 \or % sigchi
                          2733 \or % sigchi-a
                          2734\fi
               acmplain The acmplain theorem style
                          2735 \newtheoremstyle{acmplain}%
                          2736 {.5\baselineskip\@plus.2\baselineskip
                                  \@minus.2\baselineskip}% space above
                          2737
                          2738
                              {.5\baselineskip\@plus.2\baselineskip
                          2739
                                  \@minus.2\baselineskip}% space below
                          2740 {\@acmplainbodyfont}% body font
                          2741 {\@acmplainindent}% indent amount
                          2742 {\@acmplainheadfont}% head font
                          2743 {.}% punctuation after head
                          2744 {.5em}% spacing after head
                          2745 {\thmname{#1}\thmnumber{ #2}\thmnote{ (\@acmplainnotefont(#3))}}% head spec
\@acmdefinitionbodyfont The font to typeset the body of the acmdefinition theorem style.
                          2746 \def\@acmdefinitionbodyfont{\normalfont}
  \@acmdefinitionindent The amount to indent the acmdefinition theorem style.
                          2747 \def\@acmdefinitionindent{\parindent}
\@acmdefinitionheadfont The font to typeset the head of the acmdefinition theorem style.
```

2748 \def\@acmdefinitionheadfont{\itshape}

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

2749 \def\@acmdefinitionnotefont{\@empty}

```
Customization of the acmdefinition theorem style:
```

```
2750 \ifcase\ACM@format@nr
2751 \relax % manuscript
2752 \or % acmsmall
2753 \or % acmlarge
2754 \or % acmtog
2755 \or % sigconf
2756 \or % siggraph
2757 \or % sigplan
2758 \def\@acmdefinitionbodyfont{\normalfont}
     \def\@acmdefinitionindent{\z@}
2759
     \def\@acmdefinitionheadfont{\bfseries}
2760
2761 \def\@acmdefinitionnotefont{\normalfont}
2762 \or % sigchi
2763 \or % sigchi-a
2764\fi
```

acmdefinition The acmdefinition theorem style

```
2765 \newtheoremstyle{acmdefinition}%
    {.5\baselineskip\@plus.2\baselineskip
2766
2767
       \@minus.2\baselineskip}% space above
     {.5\baselineskip\@plus.2\baselineskip
2768
       \@minus.2\baselineskip}% space below
2769
2770 {\@acmdefinitionbodyfont}% body font
2771 {\@acmdefinitionindent}% indent amount
2772 {\@acmdefinitionheadfont}% head font
2773 {.}% punctuation after head
2774 {.5em}% spacing after head
2775 {\thmname{#1}\thmnumber{ #2}\thmnote{ {\@acmdefinitionnotefont(#3)}}}% head spec
```

Make acmplain the default theorem style.

```
2776 \theoremstyle{acmplain}
```

Delay defining the theorem environments until after other packages have been loaded. In particular, the cleveref package must be loaded before the theorem environments are defined in order to show the correct environment name (see https: //github.com/borisveytsman/acmart/issues/138). The acmthm option is used to suppress the definition of any theorem environments. Also, to avoid obscure errors arising from these environment definitions conflicting with environments defined by the user or by user-loaded packages, we only define environments that have not yet been defined.

```
2777 \AtEndPreamble{%
2778 \if@ACM@acmthm
     \theoremstyle{acmplain}
2779
     \@ifundefined{theorem}{%
     \newtheorem{theorem}{Theorem}[section]
```

```
2782
                       }{}
                        \@ifundefined{conjecture}{%
                  2783
                        \newtheorem{conjecture}[theorem]{Conjecture}
                  2784
                  2785
                        \@ifundefined{proposition}{%
                  2786
                  2787
                        \newtheorem{proposition}[theorem]{Proposition}
                  2788
                        }{}
                        \@ifundefined{lemma}{%
                  2789
                        \newtheorem{lemma}[theorem]{Lemma}
                  2790
                  2791
                        \@ifundefined{corollary}{%
                  2792
                        \newtheorem{corollary}[theorem]{Corollary}
                  2793
                  2794
                        \theoremstyle{acmdefinition}
                  2795
                        \@ifundefined{example}{%
                  2796
                        \newtheorem{example}[theorem]{Example}
                  2797
                  2798
                       \@ifundefined{definition}{%
                  2799
                       \verb|\newtheorem{definition}[theorem]{Definition}|
                  2801
                       }{}
                  2802
                       \fi
                       \theoremstyle{acmplain}
                  2803
                  2804 }
\@proofnamefont The font to typeset the proof name.
                  2805 \def\@proofnamefont{\scshape}
  \@proofindent Whether or not to indent proofs.
                  2806 \def\@proofindent{\indent}
                     Customization of the proof environment.
                  2807 \ifcase\ACM@format@nr
                  2808 \relax % manuscript
                  2809 \or % acmsmall
                  2810 \or % acmlarge
                  2811 \or % acmtog
                  2812 \or % sigconf
                  2813 \or % siggraph
                  2814 \or % sigplan
                  2815 \def\@proofnamefont{\itshape}
                  2816 \def\@proofindent{\noindent}
                  2817 \or % sigchi
                  2818 \or % sigchi-a
                  2819\fi
          proof We want some customization of the proof environment.
                  2820 \renewenvironment{proof}[1][\proofname]{\par
                       \pushQED{\qed}%
                  2821
                       \normalfont \topsep6\p@\@plus6\p@\relax
```

```
2823 \trivlist
2824 \item[\@proofindent\hskip\labelsep
2825 {\@proofnamefont #1\@addpunct{.}}]\ignorespaces
2826 }{%
2827 \popQED\endtrivlist\@endpefalse
2828 }
```

3.20 Balancing columns

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

```
2829 \AtEndPreamble{%
2830
     \if@ACM@balance
2831
       \ifcase\ACM@format@nr
       \relax % manuscript
2832
             \global\@ACM@balancefalse
2833
           \or % acmsmall
2834
             \global\@ACM@balancefalse
2835
           \or % acmlarge
2836
             \global\@ACM@balancefalse
           \or % acmtog
              \RequirePackage{balance}%
2839
           \or % sigconf
2840
              \RequirePackage{balance}%
2841
           \or % siggraph
2842
              \RequirePackage{balance}%
2844
           \or % sigplan
              \RequirePackage{balance}%
2845
           \or % sigchi
2846
              \RequirePackage{balance}%
2847
           \or % sigchi-a
2848
              \global\@ACM@balancefalse
2849
       \fi
2850
2851
     \fi
2852 }
2853 \AtEndDocument{%
2854 \if@ACM@balance
     \if@twocolumn
2855
2856
     \balance
2857
     \fi\fi}
```

3.21 Acknowledgments

```
\acksname
2858 \newcommand\acksname{Acknowledgments}
\acks This is a comment-like structure
2859 \specialcomment{acks}{%
2860 \begingroup
2861 \section*{\acksname}
```

```
2862 \phantomsection\addcontentsline{toc}{section}{\acksname}
2863 }{%
2864 \endgroup
2865 }

\grantsponsor We just typeset the name of the sponsor
2866 \def\grantsponsor#1#2#3{#2}

\grantnum

2867 \newcommand\grantnum[3][]{#3%
2868 \def\@tempa{#1}\ifx\@tempa\@empty\else\space(\url{#1})\fi}
```

3.22 Conditional typesetting

We use the comment package for conditional typesetting:

```
2869 \AtEndPreamble{%
2870 \if@ACM@screen
2871 \includecomment{screenonly}
2872 \excludecomment{printonly}
2873 \else
2874 \excludecomment{screenonly}
2875 \includecomment{printonly}
2876 \fi
2877 \if@ACM@anonymous
2878 \excludecomment{anonsuppress}
2879 \excludecomment{acks}
2880 \else
2881 \includecomment{anonsuppress}
2882 \fi}
```

3.23 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/).

```
2883 \newcommand\showeprint[2][arxiv]{%
2884 \def\@tempa{#1}%
2885 \ifx\@tempa\@empty\def\@tempa{arxiv}\fi
2886 \def\@tempb{arxiv}%
2887 \ifx\@tempa\@tempb
2888 arXiv:\href{http://arxiv.org/abs/#2}{#2}\else arXiv:#2%
2889 \fi}
```

3.24 End of Class

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

2890 \let\@vspace@orig=\@vspace

2891 \let\@vspacer@orig=\@vspacer

```
only be used to provide space above/below surrounding
                                                                                                  2893
                                                                                                                              objects}}{}{}
                                                                                                  2894
                                                                                                  only be used to provide space above/below surrounding
                                                                                                  2896
                                                                                                                              objects}}{}{}
                                                                                                  2898 \let\@vspace@acm=\@vspace
                                                                                                  2899 \let\@vspacer@acm=\@vspacer
\ACM@origbaselinestretch
                                                                                                 We produce an error if the user tries to change \baselinestretch
                                                                                                  2900 \let\ACM@origbaselinestretch\baselinestretch
                                                                                                  {\tt 2901 \ AtEndDocument \{ \ if x \ baselinest retch \ ACM@origbase linest retch \ else \ and \
                                                                                                  2902 \ClassError{\@classname}{An attempt to redefine
                                                                                                  2903
                                                                                                                              \string\baselinestretch\space detected. Please do not do this for
                                                                                                  2904
                                                                                                                              ACM submissions!}\fi}
                                                                                                  2905 \normalsize \normalfont \frenchspacing
                                                                                                   2906 (/class)
```

References

- [1] UK TeX Users Group. UK list of TeX frequently asked questions. https://texfaq.org, 2019.
- [2] Michael Downes and Barbara Beeton. *The amsart, amsproc, and amsbook document classes.* American Mathematical Society, August 2004. http://www.ctan.org/pkg/amslatex.
- [3] Cristophe Fiorio. *algorithm2e.sty—package for algorithms*, October 2015. http://www.ctan.org/pkg/algorithm2e.
- [4] Rogério Brito. *The algorithms bundle*, August 2009. http://www.ctan.org/pkg/algorithms.
- [5] Carsten Heinz, Brooks Moses, and Jobst Hoffmann. *The Listings Package*, June 2015. http://www.ctan.org/pkg/listings.
- [6] Simon Fear. *Publication quality tables in LaTeX*, April 2005. http://www.ctan.org/pkg/booktabs.
- [7] Association for Computing Machinery. *ACM Visual Identity Standards*, 2007. http://identitystandards.acm.org.
- [8] Axel Sommerfeldt. The subcaption package, April 2013. http://www.ctan.org/pkg/subcaption.
- [9] Boris Veytsman, Bern Schandl, Lee Netherton, and C. V. Radhakrishnan. *A package to create a nomenclature*, September 2005. http://www.ctan.org/pkg/nomencl.
- [10] Nicola L. C. Talbot. *User Manual for glossaries.sty v4.44*, December 2019. http://www.ctan.org/pkg/glossaries.
- [11] David Carlisle. *The textcase package*, October 2004. http://www.ctan.org/pkg/textcase.

Change History

1.48	\if@ACM@printacmref: Added
General: Added prologue option to	warning for longer papers 67
xcolor	\keywords: Added warning for
Bib code cleanup (Zack Weinberg) 32	missing keywords 66
Documentation update (siggraph) . 32	General: ACM reference format is now
1.49	mandatory for papers over one
General: New journal: DTRAP 32	page; CCS concepts and keywords
1.53	are now mandatory for papers
General: New journals: PACMCGIT,	over two pages
TIOT, TDSCI 32	Authors' addresses are mandatory
Rearranged docs 32	for journal articles 32
1.54	1.69
General: Moved footnote stuff before	\vspace: Added the changed
hyperref call (Ross Moore) 32	command to avoid grouping 103
1.56	
General: Documented \Description 32	v1.00
1.57	General: First released version 32
General: Booktabs package is now the	v1.01
default	General: Changed hyperref colors in
1.58	screen mode (closes https:
General: Changes in samples (Enrico	//github.com/borisveytsman/
Gregorio)	
New journal: HEALTH. TDS is	Defined ACM colors 32
renamed to TDSCI 32	
1.60	https:
\if@ACM@urlbreakonhyphens:	//github.com/borisveytsman/
introduced macro 33	acmart/issues/4) 35
General: New option:	Set headheight to 1pc for all
urlbreakonhyphens 32	formats (closes https:
1.62	//github.com/borisveytsman/
General: New journal: TELO 32	
1.63	v1.02
General: New journal: FACMP 32	General: Added TOPS and TSC (closes
New journal: TQUANT 32	
1.63a	//github.com/borisveytsman/
General: Move: TQUANT to TQC 32	
1.64	Documentation changes (closes
General: Putting abstract after	https:
\maketitle now causes an error . 32	//github.com/borisveytsman/
1.65	acmart/issues/13) 32
General: New journal: DGOV 32	v1.03
1.66	\@formatdoi: Added macro 71
\@mkauthorsaddresses: Added	\if@ACM@authorversion: Added
warning for missing addresses 88	macro
\ccsdesc@parse: Added warning for	\maketitle: Added special case of
missing concepts 69	authorversion

General: Added anonsuppress	v1.08
environment 3	2 General: SIGPLAN reformatting by
Added authorversion option (closes	Matthew Fluet 32
https:	Typos corrected (Tobias Pape) 32
<pre>//github.com/borisveytsman/</pre>	v1.09
acmart/issues/9) 3	2 General: Revert SIGPLAN caption
v1.04	rules
\acmArticleSeq: Name change by	v1.10
Matthew Fluet 6	5 \maketitle: Corrected a bug with doi
\acmDOI: Name change by Matthew	in manuscript and author vertsion,
Fluet 6	5 https:
\acmISBN: Name change by Matthew	//github.com/borisveytsman/
Fluet 6	5 acmart/issues/36 75
General: Updated bibliography for	General: Changes of
siggraph 3	
v1.05	standardpagestyle: Reversed folios
General: Added processing doi	location 91
numbers for acmsiggraph and doi	v1.11
numbers for sigproc.bib 3	2 General: Customization of ACM
Patched \setcitestyle command;	theorem styles and proof
closes https:	environment by Matthew Fluet 32
<pre>//github.com/borisveytsman/</pre>	v1.12
acmart/issues/19 3	2 \@marginfigure: Now centering by
v1.06	default 51
\@ACM@badge@skip: Added macro 6	6 \@margintable: Now centering by
	5 default 51
\@ACM@title@width: Added macro . 6	5 \@parfont: Moved to
\@mktitle@i: Added processing	\section@raggedright 97
	<pre>0 \copyrightpermissionfootnoterule:</pre>
	Added macro
\@mktitle@ii: Now this macro is	\descriptionlabel: Redefined 53
	\footnoterule: Made shorter 47
\@mktitle@iii: Added processing	\if@ACM@natbib@override: Added
	macro
	\if@ACM@newfonts: Added macro 48
	\maketitle: Moved thankses to
\@printtopmatter: Added processing	copyrightpermission box/5
	\section@raggedright: Introduced
	macro 9/
	General: Added graceful benavior
and the second s	when insertine folits are absent 40
	Documentation apaates 32
	V1.13
	temprodenote text: Made minipage
v1.07	footnotes centered
\maketitle: Corrected a bug with abstract footnotes	\bibliographystyle: Redefined 5 macro
Corrected a bug with permssion	
	\bibstyle@acmauthoryear: Added 5 macro
and identified that i /	J 1110C1U

\bibstyle@acmnumeric: Added	v1.16
macro	\@headfootfont: Added macro 91
\if@ACM@printfolios: Added macro 67	General: Formatting header/footer
General: Font adjustments for	(Matthew Fluet) 32
acmsmall	standardpagestyle: Customize
Increased font size for ACM Large 37	header/footer text font 91
Print bibliographic information by	v1.17
default for the proceedings 67	\@makefnmark: Redefined 43
standardpagestyle: Added headers	\@mkauthors: TOG now uses the same
for sigs 91	authors block as other journals 82
Expanded headers for sigchi-a 91	\@mkauthors@ii: Deleted 84
Suppressed folios if sig 91	\@mkbibcitation: Added \nobreak 88
v1.14	Changed format for sigs 88
\bibstyle@acmauthoryear: Moved	\acmArticle: The default is now
defof \bibstyle@acmauthoryear	numerical
before use	\acmMonth: The default must be
\bibstyle@acmnumeric: Moved def of	numerical. Closes #50 65
\bibstyle@numeric before use 40	numerical
General: \citestyle updates	\acmVolume: The default is now
(Matthew Fluet)	numerical
Patched \citestyle 38	\acmYear: The default is now
v1.15	numerical 65
\@ACM@addtoaddress: Added macro 81	\description: Decreased indent 53
\@mkauthors@iii: New authors	\grantnum: Added url 103
system	\grantsponsor: Renamed 103
\@shortauthors: Introduced macro . 91	\if@ACM@printacmref: Renamed
\@typeset@author@bx: Moved to	from \if@ACM@printbib 67
separate macro	General: Slightly decreased margins
\acks: Added macro 102	for sigs
\affiliation: Added code for author	standardpagestyle: Added paper
groups	title to sigs 91
\author: Added code for author	v1.18
groups	\@mkauthors@i: Now we andify
\city: Added macro 82 \country: Added macro 82	affiliations 84
\department: Added macro 82	\@typeset@author@line: Added
\grantnum: Added macro 82	macro
\grantsponsor: Added macro 103	General: Natbib is now the default for
\if@insideauthorgroup: Introduced	all formats
macro	v1.19
\institution: Added macro 82	\@mkabstract: Include 'Abstract' in
\num@authorgroups: Renamed 61	PDF bookmarks (Matthew Fluet) . 88
\orcid: Introduced macro 63	\acks: Include 'Acknowledgements' in
\position: Added macro 82	PDF bookmarks (Matthew Fluet) 102 General: Include 'Abstract',
\postcode: Added macro 82	'Acknowledgements', and
\state: Added macro 82	'References' in PDF bookmarks
\streetaddress: Added macro 82	(Matthew Fluet)
standardpagestyle: Better handling	Include 'References' in PDF
of anonymous mode91	bookmarks (Matthew Fluet) 38

v1.20	\@startsection: Added	
\@mkabstract: Deleted spurious space 88	\tochangmeasure	40
General: Bug fixes for bst 32	Rededined macro	42
v1.21	\@textbottom: Redefined	48
\showeprint: Added macro 103	\acmMonth: The default now is the	
v1.22	current month (Matteo Riondato)	65
General: More bibliography changes	\acmYear: The default now is the	
for Aptara	current year (Matteo Riondato)	65
v1.23	\additionalaffiliation: Added	
General: Add PACMPL journal option 32	macro	63
v1.24	\l@subsection: Redefined macro	42
General: Add IMWUT journal option 54	\1@subsubsection: Redefined macro	42
v1.25	General: Documentation changes	32
General: Updated PACMPL 54	v1.32	
v1.26	\@formatdoi: New doi format	71
General: Corrected \shortcite bug . 32	General: Added POMACS journal	
Documentation typos fixed (thanks	option	32
to Stephen Spencer) 32	Format siggraph is now obsolete .	32
v1.27	v1.33	
\if@ACM@printccs: Typo corrected . 67	\@ACM@addtoaddress: Added	
v1.28	obeypunctuation code	81
\ccsdesc@parse: Change from \to to	\@mkauthors@i: Added	
\textrightarrow (Matteo	obeypunctuation code	84
Riondato) 68	\@mkauthors@iii: Added	
General: Corrected option natbib	obeypunctuation code	85
behavior	\@mkauthors@iv: Added	
Got rid of warnings in pdf keywords 43	obeypunctuation code	86
v1.29	\@subtitlefont: Added	
\@mkabstract: Removed spurious	\normalsize	80
indentation (John Wickerson) 88	\ACM@linecountL: Renamed macro .	90
\ccsdesc@parse: Add spacing after	\ACM@linecountR: Added macro	90
bullet and around rightarrow;	\ACM@timestamp: Added current page	
semicolon separators no longer in	number	91
bold/italic (John Wickerson) 68	Added macro (Michael D. Adams) .	91
General: Increased head to 13pt 45	Added submission id	91
standardpagestyle: Corrected	$\verb \acmSubmissionID: Added macro $	65
printfolios (Matthew Fluet) 91	\city: Added obeypunctuation code	82
v1.30	\country: Added obeypunctuation	
\department: Added optional	code	82
parameter 82	\department: Added obeypunctuation	
General: Added \frenchspacing 104	code	
Bibtex style now recognizes https://	\if@ACM@affiliation@obeypunctuati	ion:
in doi		63
Switched to T1: looks like libertine	\if@ACM@authordraft: Added macro	35
has problems with \1 in OT1 49	\if@ACM@natbib@override: Deleted	
Updated IMWUT and PACMPL 54	macro	34
v1.31	\if@ACM@timestamp: Added macro	
\@additionalaffiliation: Added	(Michael D. Adams)	35
macro 63	\institution: Added	
\@mkbibcitation: Disabled linebreak 88	obeypunctuation code	82

\maketitle: Fixed the bug with	v1.35
figures on top and bottom of the	\bibstyle@acmauthoryear: Square
title page, thanks to David Epstein 75	brackets for author-year style 39
\position: Added obeypunctuation	General: BibTeX bug fixed: et al 32
code	If the copyright is set to usgov or
\postcode: Added obeypunctuation	rigtsretained, the price is
code	suppressed 69
\state: Added obeypunctuation code 82	v1.36
\streetaddress: Added	\@ACM@authorsperrow: Added macro 67
obeypunctuation code 82	\@mkauthors@iii: Added
· -	authorsperrow overrride 85
General: Added acmart-preload-hook 32	\@mkauthors@iv: Added
Added cmap and glyphtounicode . 48	authorsperrow overrride 86
BibTeX comma before articleno bug	\if@ACM@authordraft: Corrected
corrected	typo, thanks to bargteil 35
BibTeX crossref bug corrected 32	General: Added PACMHCI journal
BibTeX numpages bug corrected . 32	options
Documentation updates 32	Added the possibility to adjust
Moved \citename definition for	number of author boxes per row
non-natbib bibliography, so a	in conference formats 32
package may redefine it 44	v1.37
Switched to Type 1 fonts for	\description: Reduce list
libertine even if OTF-capable	indentation (Matthew Fluet) 53
engine is used (Kai Mindermann) . 49	\descriptionlabel: Reduce list
firstpagestyle: Added right	indentation (Matthew Fluet) 53
linecount for two-column formats 94	\normalparindent: Set
Added timestamp (Michael	\normalparindent (Matthew
D. Adams)	Fluet)
standardpagestyle: Added right	General: Reduce list indentation
linecount for two-column formats 91	(Matthew Fluet) 53
Added timestamp (Michael	Set \normalparindent; Reduce list
D. Adams) 91	indentation (Matthew Fluet) 32
v1.34	v1.38
\@mkbibcitation: Deleted DOI from	General: Increase default font size for
doi numbers	SIGPLAN
\ACM@linecount@bx: Rulers now are	v1.39
continuous 90	$\ensuremath{\texttt{@Qauthornotemark: Added macro}}$. 88
\ACM@linecountL: Rulers now are	\authornotemark: Added macro 64
continuous 90	v1.40
\ACM@linecountR: Rulers now are	\@copyrightowner: Added new
continuous 90	copyright version: licensedcagov . 71
	\@copyrightpermission: Added new
\maketitle: Added date to the	copyright version: licensedcagov . 71
bibstrip in conf proceedings 75	\@mkauthors@i: Switched to
Deleted 'DOI' from doi numbers . 75	MakeTextUppercase 84
Rearranged bibstrip	\@parfont: Switched to
The \terms command is now	MakeTextUppercase 97
obsolete	\ACM@linecount@bx: Work around a
\terms: The \terms command now	bug in xcolor: looks like cmyk
just produces a warning 66	colors in boxes do not work 90

\ccdesc@parse@finish: Added		General: Added package refcount	32
macro	69	Deleted package cleveref	32
\city: We now do not print this even		Put theorem defs in a separate style	32
in SIG	82	v1.45	
\country: Fixed bugs with extra		\@folioblob: Switched	
spaces	82	\bfeseries\sffamily to	
\l@subsection: Redefined macro	42	\sffamily\bfseries	94
\postcode: We now do not print this		\@parfont: Switched	
even in SIG	82	\bfeseries\sffamily to	
\state: We now do not print this even		\sffamily\bfseries	97
in SIG	82	\@titlefont: Switched	
\streetaddress: We now do not		\bfeseries\sffamily to	
print this even in SIG	82	\sffamily\bfseries	79
General: Added 'textcase' package	38	v1.46	
Added heightrounded to geometry	45	\@mkauthorsaddresses: Introduced	
Added new copyright version:		macro	87
licensedcagov	32	\@mkbibcitation: Added subtitle	88
Added package cleveref	32		00
Added Ross Moore code for		\@printendtopmatter: Made it \par\bigskip uniformly	90
glyphtounicode		· · · · · · · · · · · · · · · · · · ·	89
Bibliography changes	32	\@printtopmatter: Deleted rule	78
v1.41		\@setauthorsaddresses: Introduced	00
General: Added new badges	32	macro	89
v1.42		\ACM@linecount@bx: Rearranged the	
General: Deleted ACM badges	32	code to get rid of spurious	
v1.43		underfull messages (Benjamin	
\@startsection: Added		Byholm)	
\makeatletter	42	\author: Started counting authors	62
\country: Added comma before	0.0	\authorsaddresses: Introduced	
country for journals	82	macro	63
v1.44		\country: Corrected spacing for	
\@acmBooktitle: Added macro	61	institution	82
\@acmEditors: Added macro	61	\if@ACM@acmthm: Modified	
\@editorsAbbrev: Added macro	61	description	33
\@folioblob: Suppress the blob if	0.4	\liningnums: Workaround for	
acmArticleSeq is empty	94	compatibility with fontspec	49
\@mkbibcitation: If the paper has		\maketitle: Added authors' addresses	75
just one page, use 'page' instead of	0.0	Thankses go before authors'	
'pages'	88	addresses	75
\ACM@restore@pagestyle: Added	00	\num@authors: Introduced macro	61
macro	90	General: Added etoolbox	32
empty	65	Bst file bug fixes: label width is	
\acmArticleSeq: Now acmArticle	03	calculated correctly	32
might be empty	65	Delayed hypersetup since journal	
\acmBooktitle: Added macro	61	options may change screen mode	43
\editor: Added macro	61	PACM now set screen to true	54
\if@ACM@acmthm: Added macro	33	Restore theorem defs to class file .	32
\maketitle: Empty DOI or ISBN are	55	v1.47	
not printed (by Michael Ekstrand)	75	General: New journal: THRI	32

v1.48		v1.54	
\@headfootfont: Deleted		\@mkbibcitation: Bug corrected	
unnecessary switch (Michael		(Ross Moore)	88
D. Adams)	91	\@shortauthors: Added submission	
\@mkabstract: Removed spurious		id in anonymous mode	91
indentation if abstract is followed		\ACM@NR@adjustedSectionformat:	
by an empty line	88	Added macro	96
\ACM@timestamp: Fromatting change		\ACM@NRadjust: Added macro	96
(Michael D. Adams)	91	\ACM@adddotafter: Added macro	97
\if@ACM@review: Review mode now		\author: Added submission id in	71
switches on folios	34	_	62
\maketitle: Added acmart and		\if@ACM@nonacm: Added macro	34
version info to pdfcreator tag	75	General: Added Ross's patch for	Jī
Added language and doctitle			97
attributes to PDF (Andreas		Deleted indent for subsubsection .	97
Reichinger)	75	XeTeX now uses T1 encoding	49
Suppressed empty DOI (Serguei		v1.55	47
Mokhov)	75	\@mkbibcitation: Bug corrected	00
General: \citeyear no longer		\maketitle: Fixes topnum	88 75
behaves like \citeyearpar	44	General: Now we use purple color for	/3
Code prettying (Michael D. Adams)	32	links	43
Initial support for Biblatex (Daniel			43
Thomas)	32	Table captions for SIGCHI now use	
Misc entries in the bibliography no		the same font size as figure captions (Luis Leiva)	EO
longer produce a separate date	32		
Typos fixed (Jamie Davis)	32	Typo corrected (Zack Weinberg) .	38
v1.50		v1.56	
\@copyrightpermission: New		\@marginfigure: Added checking for	E 1
copyright statements for		description	31
iw3c2w3[g]	71	\@mkteasers: Added check for	0.0
v1.51		description	
General: Corrected the bug with price		•	49
suppression	69	\acksname: Added macro (Philip	
Suppress price if the copyright is		Quinn)	02
set to iw3c2w3 or iw3c2w3g	69	\ccsdesc@parse: End the concepts	
XeTeX now uses OTF fonts		1 1 2 /	68
(Joachim Breitner)	49	\if@Description@present: Added	
firstpagestyle: We now use journal			49
abbreviation for footers	94	\if@undescribed@images: Added	
standardpagestyle: We now use		macro	49
journal abbreviation for footers $$. $$	91	General: Looks like XeTeX requires	
v1.52		explicit monotype font delcaration	49
\@copyrightowner: Rewording of		Make two-column layouts flush	
licenses	71	(Philip Quinn)	45
\@copyrightpermission: Another		v1.57	
rewording of copyright statements		\ACM@origbaselinestretch: Added	
for iw3c2w3[g]	71	check whether the user changed	
v1.53			104
General: Added PACMCGIT, TIOT,		\author: Added warning if \author	
TDSCI	54	has comma	62

\email: Added warning if \author	v1.61	
has comma 63	\@typeset@author@bx: Added	
\if@ACM@balance: Added macro 34	\normalbaselines	85
\vspace: Added warning 103	v1.64	
v1.58	\ACM@linecount@bx: Bug fix: made	
\@dblfloat: Deleted spurious	the spacing on the left and the	
\vspace warning 52	right size equal	90
\@marginfigure: Deleted spurious	\if@ACM@maketitle@typeset:	
\vspace warning 51	Introduced macro	54
\@margintable: Deleted spurious	\maketitle: Added a switch setting to	
\vspace warning 51	show that \maketitle is typeset .	75
\@mkbibcitation: Deleted spurious	v1.65	
\vspace warning 88	\@mkauthorsaddresses: Deleted	
\@printendtopmatter: Deleted	cs@addpunct	87
spurious \vspace warning 89	v1.66	
\@sidebar: Deleted spurious \vspace	\@specialsection: Suppress	
warning 51	warnings about \vspace	77
\maketitle: Original \vspace inside	General: Patching algorithm and	
\maketitle 75	algorithm* to prevent spurious	
\vspace: Preserved old versions as		50
\@vspace@orig and	v1.67	
\@vspace@orig 103	\@parfont: Deleted redefinitions of	
General: Added HEALTH. TDSCI is		97
renamed to TDS 54	\@specialsection: Paragraph inside	
Suppressed \addtocounter in pdf	group does not print its argument.	
subject		77
v1.59	General: Patching lstlisting and	
\acmConference: Setting	lstlisting* to prevent spurious	
\@ACM@journal@bibstrip 60	space warnings	50
\acmJournal: Setting \@ACM@journal@bibstrip 60	v1.68	
\if@ACM@journal@bibstrip:	\@specialsection: Deleted grouping	
Introduced macro 36	altogether	77
firstpagestyle: Added logic for	General: New command for unindent	
conference papers using journal	paras	97
format	v1.69	
Moved page styles to	\@printendtopmatter: Deleted	
\AtBeginDocument 94		89
standardpagestyle: Added logic for	\@specialsection: Changed dot to	
conference papers using journal	colon for sigplan	77
format	\ACM@linecountR: Do not increase	
Moved page styles to	numbers in one column format	90
\AtBeginDocument 91	\ccsdesc@parse: Use math right	
v1.60	arrow in text	68
\@headfootfont: Moved to	General: No dots for unindented	
footnotesize 91	naragranhs	97

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
                                \@ACM@manuscripttrue
                                                               \@acmBadgeR@image ..
\$ ..... 1792, 1796
                                \@ACM@newfontsfalse
                                                                        . . . . 1361, 1363,
\- .... 478
                                       . . . . . . 669, 672, 675
                                                                       1899, 1901, 1976,
\@ 1546, 1558, 1561, 1564,
                                \@ACM@newfontstrue . 666
                                                                       1992, 1995, 2020, 2022
                                                               \@acmBadgeR@url . 1360,
        1569, 1649, 1670, 1683
                                \@ACM@printacmreffalse
\@@authornotemark ..
                                        . . . . . . . . . . . . . . . 92
                                                                       1362, 1900, 1994, 2021
        . . . . . . . . 1326, 2282
                                \@ACM@printfoliostrue 75
                                                               \@acmBooktitle ....
\@@par ..... 347, 404
                                \@ACM@reviewtrue ... 133
                                                                       . . . <u>1202</u>, 1781, 2330
\ensuremath{\texttt{QACM@addtoaddress}} .
                                \@ACM@screentrue 955,
                                                               \@acmDOI . . 1350, 1783,
        2034, 2057, 2058, 2060
                                       984, 990, 996, 1002
                                                                       1786, 1793, 1797, 2338
\@ACM@authorsperrow
                                \@ACM@sigchiamodefalse
                                                               \@acmEditors 1207, 1208,
        . . . . . . . . . 1410,
                                       . . . . . . . . . . . . . . 162
                                                                       1209, 1212, 2331, 2332
       2166, 2167, 2217, 2218
                               \@ACM@sigchiamodetrue 182
                                                               \@acmISBN . . . . . 1348, 1795
\@ACM@badge@skip ...
                                \@ACM@timestamptrue
                                                               \@acmMonth 1338, 1340, 1791
        .... <u>1357</u>, 1897,
                                \@ACM@title@width ..
                                                               \@acmNumber . . . . 1330,
        1974, 1978, 1984,
                                       . . . . . . . . . 1356,
                                                                       2327, 2459, 2469,
        1993, 2003, 2009, 2018
                                       1971, 1973, 1974,
                                                                       2480, 2573, 2583, 2593
\@ACM@badge@width ..
                                       1977, 1978, 1986,
                                                               \@acmPrice 1344, 1792, 1796
        . . . . 1354, 1896,
                                       2000, 2002, 2003, 2011
                                                               \@acmPubDate ... 1340,
        1901, 1973, 1977,
                                \@DeclareACMFormat .
                                                                       2327, 2459, 2469,
        1983, 1995, 2002,
                                        . . . 37, 38, 39, 40,
                                                                       2480, 2574, 2584, 2594
        2004, 2007, 2019, 2022
                                       41, 42, 43, 44, 45, 46
                                                                \@acmSubmissionID ..
\@ACM@badgefalse ... 1353
                                \@Description@presentfalse
                                                                       . . . . . . . . 1233,
\@ACM@badgetrue 1359, 1364
                                        . . 700, 703, 768, 2288
                                                                       1234, 1249, 1250,
\@ACM@balancefalse .
                                \@Description@presenttrue
                                                                       1346, 2416, 2417, 2427
        2833, 2835, 2837, 2849
                                       . . . . . . . . . 694, 697
                                                                \@acmVolume .... 1328,
\@ACM@commabox ....
                                \@M . . . . . 347, 386, 404, 413
                                                                       2327, 2458, 2468,
        . . . 2034, 2038, 2039
                               \@abstract 1384, 2296, 2303
                                                                       2479, 2572, 2582, 2592
\@ACM@journal@bibstripfalse\@acmArticle ... 1332,
                                                               \@acmYear . . . . . 1336,
        . . . . . . . . . 187, 1196
                                       1335, 1791, 2314,
                                                                       1343, 1702, 1791, 2318
                                       2315, 2436, 2439,
\@ACM@journal@bibstriptrue
                                                               \@acmdefinitionbodyfont
        . . . . . . . . . 185, 1182
                                       2459, 2469, 2480,
                                                                       ... <u>2746</u>, 2758, 2770
\@ACM@journalfalse .
                                       2554, 2573, 2583, 2593
                                                               \@acmdefinitionheadfont
        173, 175, 177, 179, 181
                                \@acmArticlePage ...
                                                                       ... <u>2748</u>, 2760, 2772
\@ACM@journaltrue ..
                                         2435, 2453, 2454,
        . . . 165, 167, 169, 171
                                       2463, 2466, 2473, 2477
                                                               \@acmdefinitionindent
\@ACM@labelwidth ...
                                                                       ... <u>2747</u>, 2759, 2771
                                \@acmArticleSeq 1334, 2537
        816, 819, 827, 832, 858
                               \@acmBadgeL@image ..
                                                               \@acmdefinitionnotefont
\@ACM@maketitle@typesetfalse
                                        . . . . 1366, 1368,
                                                                       . . . 2749, 2761, 2775
        . . . . . . . . . . . . . . 865
                                       1894, 1896, 1972,
                                                               \@acmownedfalse . 1497,
\@ACM@maketitle@typesettrue
                                       1981, 1983, 2005, 2007
                                                                       1500, 1503, 1509,
        . . . . . . . . . . . . 1715
                               \@acmBadgeL@url . 1365,
                                                                       1513, 1516, 1519,
\@ACM@manuscriptfalse 160
                                       1367, 1895, 1982, 2006
                                                                       1522, 1528, 1531, 1535
```

\@acmownedtrue	98, 102, 107, 109,	\@empty 189,
1484, 1493, 1525	110, 115, 117, 118,	337, 1193, 1208,
\@acmplainbodyfont .	123, 125, 126, 131,	1230, 1233, 1247,
<u>2716</u> , 2728, 2740	135, 136, 147, 153,	1249, 1254, 1255,
\@acmplainheadfont .	211, 667, 670, 673,	1261, 1374, 1375,
2718, 2730, 2742	699, 708, 711, 771,	1428, 1429, 1435,
\@acmplainindent	956, 985, 991, 997,	1442, 1447, 1473,
<u>2717</u> , 2729, 2741	1003, 1177, 1179,	1739, 1743, 1783,
\@acmplainnotefont .	1223, 1274, 1288,	1792, 1795, 1796,
2719, 2731, 2745	1371, 1377, 1382,	1797, 1807, 1812,
\@adddotafter	1389, 1391, 1392,	1866, 1894, 1899,
2630, 2631, 2633,	1395, 1397, 1398,	1972, 1976, 1981,
2645, 2660, 2664, 2713	1401, 1406, 1408,	1989, 1992, 2005,
\@additionalaffiliation	1409, 1411, 1412,	2013, 2020, 2030,
1275, 1276	1475, 2277, 2291,	2116, 2126, 2134,
\@addpunct . 2268, 2347,	2311, 2892, 2895, 2902	2135, 2185, 2191,
2348, 2713, 2714, 2825	\@clubpenalty 392	2198, 2230, 2236,
\@addspaceafter 2714	\@concepts . <u>1447</u> , <u>1459</u> ,	2241, 2276, 2284,
\@affiliationfont	1473, 1807, 1809, 1830	2314, 2319, 2331,
2087, 2092, 2096,	\@copyrightowner	2338, 2416, 2427,
2099, 2102, 2105,	1540, 1767	2719, 2749, 2868, 2885
2108, 2111, 2139, 2158	\@copyrightpermission	\@endfloatbox 783
\@afterheading . 378, 1841	1578, 1759	\@endpefalse 2827
\@afterindentfalse .	\@copyrightyear	\@endwidefloatbox 783,791
324, 1840	1701, 1767, 1769	\@finalstrut 436, 449
\@afterindenttrue 322	\@currbox 797, 798, 799	\@float 785
\@article@string	\@currentaffiliation	\@flushglue 2674
2314, 2327, 2335	2159, 2162, 2184,	\@fnsymbol 1725
\@author	2191, 2192, 2195,	\@folio@ht
1232, 1237, 1242,	2198, 2199, 2203,	2517, 2544, 2550, 2551
2125, 2185, 2230, 2271	2229, 2236, 2237,	\@folio@max <u>2517</u> , <u>2540</u> , <u>2541</u>
\@authorfont	2239, 2241, 2242, 2246	\@folio@voffset <u>2517</u> , <u>2546</u>
2086, 2091, 2095,	\@currentaffiliations	\@folio@wd 2517,
2098, 2101, 2104,	2116,	2551, 2552, 2579, 2589
2107, 2110, 2127, 2158	2117, 2118, 2120,	\@folioblob 2537,
\@authornotemark	2123, 2135, 2136, 2141	2576, 2578, 2586, 2587
1318, 1324, 2281	\@currentauthors	\@footnotemark . 452, 1723
\@authornotes	2114, 2115,	\@footnotemark@nolink
1315, 1319, 1735	2122, 2126, 2127,	452, 1723
\@authorsaddresses .	2129, 2158, 2161,	\@footnotetext
1294, 1743, 2276, 2348	2183, 2185, 2186,	427, 453, 1724
\@auxout 514	2188, 2228, 2230,	\@footnotetext@nolink
\@begindocumenthook 510	2231, 2233, 2281, 2282	453, 1724
\@botnum 1838	\@currentlabel . 431,445	\@for 232
\@citestyle 256	\@dblarg 333	\@formatdoi 1577,
\@classname	\@dblfloat <u>780</u>	1786, 1793, 1797, 2338
24, 26, 34, 50, 52,	\@department 1279, 1280	\@fps 784
53, 58, 60, 61, 66,	\@dotsep <u>2715</u>	\@fpsadddefault 784
68, 69, 74, 77, 78,		
00, 07, 71, 77, 70,	\@editorsAbbrev	\@gobble 254, 298
83, 85, 86, 91, 97,	\@editorsAbbrev	\@gobble 254, 298 \@hangfrom 346, 403

```
\@headfootfont . 2429,
                                     988, 994, 1000,
                                                           \@mkteasers . . . 1728, <u>2283</u>
       2453, 2454, 2455,
                                     1006, 1010, 1014,
                                                           \@mktitle .... 1728, <u>1906</u>
       2456, 2462, 2465,
                                     1017, 1021, 1029,
                                                           \@mktitle@i .... 1909,
       2472, 2476, 2484,
                                     1035, 1039, 1043,
                                                                   1911, 1913, 1915, 1970
       2485, 2487, 2490,
                                     1047, 1051, 1055,
                                                           \@mktitle@ii ..... <u>1998</u>
       2497, 2498, 2500, 2503
                                     1059, 1063, 1067,
                                                           \@mktitle@iii .. 1917,
\@ifnextchar ..... 1279
                                     1071, 1075, 1079,
                                                                   1919, 1921, 1923, 1998
\@ifnotempty .... 1707
                                     1083, 1087, 1091,
                                                           \@mktitle@iv .. 1925, 2026
\@ifnum ..... 270, 272
                                     1095, 1099, 1106,
                                                           \@mpargs .... 633
                                     1110, 1113, 1118,
\@ifstar ..... 331
                                                           \@mparswitchfalse .. 595
                                     1122, 1126, 1130,
\@ifundefined .....
                                                           \@mpfootins .....
        2780, 2783, 2786,
                                     1134, 1138, 1142,
                                                                   440, 441, 625, 626, 628
                                     1146, 1150, 1154,
       2789, 2792, 2796, 2799
                                                           \@mpfootnotetext ... 439
\@iiiparbox ..... 633
                                     1158, 1162, 1166,
                                                           \@ne . 258, 262, 266, 268,
                                     1170, 1174, 1185,
\@input ..... 415
                                                                   500, 2362, 2368, 2372
\@insideauthorgroupfalse
                                     2326, 2458, 2468,
                                                           \@nil .... 277
                                     2479, 2572, 2582, 2592
       . . . . . . . 1221, 1269
                                                           \@nobreakfalse . 380,420
\@insideauthorgrouptrue
                              \@keywords . 1373, 1374,
                                                           \@noskipsecfalse ... 384
                                     1375, 1812, 1818, 1831
       . . . . . . . . . . . . . 1228
                                                           \@noskipsectrue . . . .
\@journalCode ....
                              \@latex@error .... 300
                                                           \@pages@word .....
       . . . 866, 956, 985,
                              \@lempty .... 1386, 2296
                                                                   . . . 2308, 2328, 2335
                             \@listI ..... 840, 844
       991, 997, 1003, 1177
                                                           \@par .... 1741, 1747
                              \@listi ..... 837, 844
\@journalCode@nr ...
                                                           \@parboxrestore . . . . 444
                             \@listii ..... 845
       . . . . . 866, 929, 1183
                                                           \@parfont . . . . . . . .
                              \@listiii ......
\@journalName ....
                                                                   2664, 2668, 2673, 2678
       . . . 931, 935, 939,
                              \@listiv .....
                                                           \@permissionCodeOne
       943, 947, 951, 958,
                              \@listv ......
                                                      852
                              \@listvi ..... 854
                                                                   . . . . . . 933, 937,
       962, 966, 970, 974,
                                                                   941, 945, 949, 954,
       978, 981, 987, 993,
                              \@m .... 335
                                                                   960, 964, 968, 972,
                              \@makefnmark ... 426,
       999, 1005, 1009,
                                                                   976, 983, 989, 995,
       1013, 1016, 1020,
                                     451, 1727, 1732, 1736
                                                                   1001, 1007, 1011,
       1024, 1026, 1028,
                              \@makefntext .....
       1032, 1034, 1038,
                                     . . 426, 435, 448, 1738
                                                                   1018, 1022, 1030,
                                                                   1036, 1040, 1044,
       1042, 1046, 1050,
                              \@marginfigure . 763, 764
                              \@margintable .. 774, <u>775</u>
                                                                   1048, 1052, 1056,
       1054, 1058, 1062,
                                                                   1060, 1064, 1068,
       1066, 1070, 1074,
                              \@minipagefalse . 630,793
                                                                   1072, 1076, 1080,
       1078, 1082, 1086,
                              \@minus 2650, 2654, 2658,
                                                                   1084, 1088, 1092,
       1090, 1094, 1098,
                                     2662, 2666, 2671,
                                     2737, 2739, 2767, 2769
                                                                   1096, 1100, 1103,
       1102, 1105, 1109,
                                                                   1107, 1114, 1119,
       1112, 1117, 1121,
                              \@mkabstract . . 1805, 2295
       1125, 1129, 1133,
                              \@mkauthors 1728, 1730, 2062
                                                                   1123, 1127, 1131,
                                                                   1135, 1139, 1143,
       1137, 1141, 1145,
                              \@mkauthors@i .. 2066,
                                                                   1147, 1151, 1155,
                                     2068, 2070, 2072, 2121
       1149, 1153, 1157,
                                                                   1159, 1163, 1167,
       1161, 1165, 1169,
                              \@mkauthors@ii .... 2151
                              \@mkauthors@iii . 2074,
                                                                   1171, 1175, 1186, 1791
       1173, 1184, 1185, 1779
\@journalNameShort .
                                     2076, 2078, 2080, 2163
                                                           \@permissionCodeTwo
                              \@mkauthors@iv 2082, 2214
                                                                   . . . . . . . . 1115, 1187
       . . . . . . . . . 932,
       936, 940, 944, 948,
                                                           \@plus .... 413,
                              \@mkauthorsaddresses
       953, 959, 963, 967,
                                     421, 634, 2650,
       971, 975, 979, 982,
                              \@mkbibcitation 1825, 2305
                                                                   2654, 2658, 2662,
```

2666, 2671, 2736,	\@subtitle . 1214, 1307,	\@titlefont 1928, 1980,
2738, 2766, 2768, 2822	1989, 1990, 2013,	1987, 1999, 2011, 2027
\@printcopyrightfalse	2014, 2030, 2031, 2319	\@titlenotes
1496, 1508	\@subtitlefont	1296, 1300, 1303, 1733
\@printcopyrighttrue	1949, 1990, 2014, 2031	\@tochangmeasure 351, 364
1480, 1492	\@subtitlenotes	\@toclevel 335
\@printendtopmatter	1305, 1309, 1312, 1734	\@tocline 423, 424, 425
1839, <u>2340</u>	\@svsec . 337, 340, 346, 361	\@topnum 1836
\@printpermissionfalse	\@svsechd 359, 387, 407	\@typeset@author@bx
	\@teaser 1705, 2285	2155,
\@printpermissiontrue	\@teaserfigures	$2207, 2213, 2\overline{250}, 2255$
1482, 1491, 1507	<u>1703</u> , 1705, 2284, 2289	\@typeset@author@line
\@printtopmatter	\@tempa 232,	<u>2113</u> , 2124, 2146, 2148
1729, <u>1865</u>	233, 235, 237, 239,	\@undefined 510,687
\@proofindent	241, 243, 245, 247,	\@undescribed@imagesfalse
<u>2806</u> , 2816, 2824	249, 251, 253, 255,	696
\@proofnamefont	257, 259, 261, 263,	\@undescribed@imagestrue
2805, 2815, 2825	265, 267, 269, 271,	707, 710, 770, 2290
	273, 275, 277, 280,	\@vspace
\@received . <u>1426</u> , 1429,	282, 284, 286, 288,	701, 704, 712, 714,
1430, 1432, 1435,	290, 1253, 1254,	716, 718, 720, 722,
1436, 1438, 1442, 1443	1427, 1428, 2134,	760, 765, 775, 781,
\@rightskip 2674, 2675	2868, 2884, 2885, 2887	1721, 2306, 2341,
\@saveabstract 1380, <u>1381</u>	\@tempb 233, 235,	2344, 2890, 2892, 2898
\@saveteaser 1704, <u>1705</u>	237, 239, 241, 243,	\@vspace@acm 2344, 2898
\@seccntformat . 340, 397	245, 247, 249, 251,	\@vspace@orig
\@secfont 2652, <u>2678</u>	253, 255, 257, 259,	701, 704, 712, 714,
\@secpenalty 329	261, 263, 265, 267,	716, 718, 720, 722,
\@sect 333, 334	269, 271, 273, 275,	760, 765, 775, 781,
\@setaddresses <u>2280</u>	280, 282, 284, 286,	1721, 2306, 2341, 2890
\@setauthorsaddresses	288, 290, 2886, 2887	\@vspacer
1747, <u>2348</u>	\@tempboxa 633	702, 705, 713, 715,
\@setthanks 1741, <u>2347</u>	\@tempc . 278, 279, 281,	717, 719, 721, 723,
\@shortauthors	283, 285, 287, 289, 291	761, 766, 776, 782,
<u>2424,</u> 2447, 2455,	\@tempcnta . 2537, 2538,	1722, 2307, 2342,
2463, 2473, 2485, 2498	2540, 2541, 2543, 2545	2345, 2891, 2895, 2899
\@sidebar 759, 760	\@tempdima	\@vspacer@acm . 2345, 2899
\@specialsection	2544, 2545, 2546, 2548	\@vspacer@orig
1808, 1814, 1816, 1843	\@tempskipa	702, 705, 713, 715,
\@ssect 332, 398	321, 323, 324, 329,	717, 719, 721, 723,
\@startPage 1369,	342, 343, 374, 373,	761, 766, 776, 782,
1866, 1867, 1869, 2421	377, 389, 390, 399, 400	1722, 2307, 2342, 2891
\@startsection . <u>318</u> ,	\@textbottom <u>634</u>	\@width 614, 621
410, 2649, 2653,	\@textsuperscript	\@xp 417, 418
2657, 2661, 2665, 2670	451, 1727, 1732	\@xsect 372, 373, 409
\@starttoc 410	\@texttop 635 \@thefnmark . 432,446,	\\ 531, 1233, 1767, 1772, 1787, 1792,
\@subparfont 2703	451, 1727, 1732, 1737	1772, 1787, 1792, 1796, 2310, 2318, 2367
\@subsecfont 2656, <u>2678</u>	\@title 1298, 1829,	\{
\@subsubsectont 2660, 2678	1988, 2012, 2029, 2318	\} 240
\esubsubsectiont 2000, <u>20/8</u>	1700, 2012, 2027, 2318	\5

	\ACM@linecountR	\acmISBN 15, 1348
\ 1205, 1455, 1465,	2381, 2475, 2477,	\acmJournal 9, $\overline{1181}$
1767, 1769, 1792,	2485, 2492, 2498,	\acmMonth 15, 1338
2314, 2315, 2333, 2421	2505, 2597, 2600, 2605	\acmNumber 15, 1330
	\ACM@mk@linecount	\acmplain
Α	2363,	\acmPrice 15, 1344,
\abstract <u>1380</u>	2376, 2391, 2393,	1504, 1510, 1532, 1536
abstract (environment) 17	2395, 2397, 2399, 2401	\acmSubmissionID 15, 1346
\abstractname 2301		matacmVolume 15, 1328
\acks 2859	2628, 2637	\acmYear 15, 1336
acks (environment) 23	\ACM@NRadjust	\addcontentsline 228,
\acksname . <u>2858</u> , 2861, 2862	2619, 2652, 2656,	353, 366, 2297, 2862
\ACM@adddotafter	2660, 2664, 2668, 2673	\additionalaffiliation
2631, 2648	\ACM@origbaselinestretch	11, 1275
\acm@copyrightinput 1486	2900	\addpenalty 329
\acm@copyrightmode .	\ACM@ps@headings	\addresses
1486, 1494,	2352, 2356	1230, 1232, 1237,
1499, 1502, 1506,	\ACM@ps@myheadings .	
1512, 1515, 1518,		1242, 1271, 1291,
	2351, 2355	1318, 1324, 1326,
1521, 1524, 1527,	\ACM@ps@plain . 2350, 2354	2148, 2213, 2255, 2273
1530, 1534, 1541, 1579	\ACM@restore@pagestyle	\addtocounter 456, 1467
\ACM@fontsize		\addtolength 825,
<u>139</u> , 189, 192, 194,	\ACM@sect@format	826, 827, 831, 832, 2369
196, 198, 200, 202,	2638, 2640	\addvspace 329, 421
204, 206, 208, 211, 212	\ACM@sect@format@	\advance 841,
\ACM@format 31, 147	2627, 2640, 2642	846, 849, 851,
\ACM@format@nr 31, 147,	\ACM@sect@format@null	853, 855, 1225,
152, 157, 163, 190,	2641, 2642	1227, 1973, 1974,
463, 535, 600, 636,	\ACM@timestamp	1977, 1978, 2002,
734, 801, 1844,	<u>2407</u> , 2512, 2610, 2615	2003, 2165, 2182,
1873, 1907, 1929,	\acmArticle 15, <u>1332</u>	2216, 2227, 2368,
1950, 2064, 2088,	\acmArticleSeq . 15, <u>1334</u>	2372, 2541, 2543, 2546
2383, 2443, 2524,	\acmBadgeL 16, <u>1364</u>	\affiliation 10,
2563, 2609, 2683,	\acmBadgeR 16, <u>1359</u>	<u>1268</u> , 2133, 2198, 2241
2720, 2750, 2807, 2831	\acmBooktitle 9, 1202	\and 1212, 1242,
\ACM@linecount	\acmConference 9 , $\underline{1188}$	1243, 1258, 1264,
2361, 2362,	\acmConference@date	2124, 2129, 2131,
2367, 2368, 2371, 2372	1191, 1763,	2141, 2146, 2156,
\ACM@linecount@bx	2489, 2492, 2502, 2505	2190, 2207, 2213,
<u>2358</u> , 2378, 2404	\acmConference@name	2235, 2250, 2255, 2270
\ACM@linecount@bxht	1190, 1203, 1204	\andify 1820,
2360, 2366, 2369, 2370	\acmConference@shortname	1821, 2114, 2117, 2332
\ACM@linecountL	1189, 1193, 1194,	anonsuppress (environ-
<u>2374</u> , 2445,	1204, 1205, 1763,	ment) 23
2448, 2453, 2456,	2488, 2491, 2501, 2504	\apptocmd 2892, 2895
2462, 2464, 2472,	\acmConference@venue	\AtBeginDocument
2474, 2484, 2487,	1192, 1763,	75, 92, 503,
2497, 2500, 2565,	2489, 2492, 2502, 2505	511, 817, 1504,
2576, 2577, 2587,	\acmdefinition <u>2765</u>	1510, 1532, 1536,
2588, 2596, 2599, 2604	\acmDOI 15, <u>1350</u>	2357, 2430, 2557, 2643

\	0/70 0/70 0/00	100
\AtBeginEnvironment	2678, 2679, 2693,	\citeN 492
700, 703, 712,	2694, 2696, 2697,	\citename 505
714, 716, 718, 720, 722	2699, 2700, 2701,	\citeNN 495
\AtEndDocument . 698,	2702, 2706, 2707,	\citeNP 497
1375, 1399, 1441,	2710, 2711, 2730, 2760	\citep 493
1473, 2275, 2853, 2901	\bgroup . 760, 764, 775,	\citestyle 24, 296, 316
\AtEndEnvironment 706, 709	781, 1276, 1807,	\citeyear 496
\AtEndPreamble . 476,	1812, 2155, 2192,	\citeyearNP 496
688, 2777, 2829, 2869	2195, 2252, 2261,	\citeyearpar 495, 508
\author 10,	2285, 2295, 2305, 2317	\city 11, 1282, <u>2042</u> , 2266
<u>1222</u> , 1717, 1718, 2312	\bibfont 230	\ClassError . 34, 1179,
\author@bx <u>2151</u> , 2157, 2160	\bibliofont 230	1274, 1382, 1392,
\author@bx@sep	\bibliographystyle . <u>509</u>	1398, 1409, 2311, 2902
2153, 2160,	\bibsection 226	\ClassInfo
2165, 2182, 2216, 2227	\bibstyle 254, 256, 298, 514	147, 211, 1177,
\author@bx@wd	\bibstyle@acmauthoryear	1389, 1391, 1395,
2152, 2155,	304	1397, 1406, 1408, 1411
2164, 2165, 2167,	\bibstyle@acmnumeric 310	\ClassWarning
2173, 2175, 2177,	\bigskip 1443, 1891,	26, 153, 667, 670,
2179, 2182, 2215,	1997, 2025, 2033,	673, 708, 711, 771,
2216, 2218, 2224, 2227	2213, 2255, 2285, 2343	1223, 1288, 1371,
\authornote	\box 798, 1875, 1877, 1879,	1412, 2291, 2892, 2895
. 14, 1275, 1316, 2313	1881, 1883, 1885,	\ClassWarningNoLine
\authornotemark . 14, 1322	1887, 1889, 1891,	699,
		· · · · · · · · · · · · · · · · · · ·
\authore		
\authors	2147, 2160, 2211, 2287	1377, 1401, 1475, 2277
1235, 1238, 1243,		\cleaders 2039
1235, 1238, 1243, 1820, 1822, 1828, 2318	C	\cleaders 2039 \clubpenalty 386,392
1235, 1238, 1243,	C \c@footnote 1725	<pre>\cleaders 2039 \clubpenalty 386,392 \CodelineIndex 16</pre>
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses 14, 1294	C \c@footnote 1725 \c@secnumdepth	\cleaders 2039 \clubpenalty 386,392 \CodelineIndex 16 \Collect@Body 759,
$1235, 1238, 1243, \\ 1820, 1822, 1828, 2318 \\ \texttt{\authorsaddresses} \textit{14}, \\ \frac{1294}{B}$	C \c@footnote 1725 \c@secnumdepth	\cleaders 2039 \clubpenalty 386, 392 \CodelineIndex 16 \Collect@Body 759,
$1235, 1238, 1243,\\ 1820, 1822, 1828, 2318\\ \texttt{\authorsaddresses} 14, \underline{1294}\\ \\ \textbf{B}\\ \texttt{\balance} \dots 2856\\$	C \c@footnote 1725 \c@secnumdepth	\cleaders 2039 \clubpenalty 386,392 \CodelineIndex 16 \Collect@Body 759,
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses 14, 1294 B \balance 2856 \baselineskip	C \c@footnote 1725 \c@secnumdepth	\cleaders 2039 \clubpenalty 386, 392 \CodelineIndex 16 \Collect@Body 759,
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses 14, 1294 B \balance 2856 \baselineskip 1757, 1982,	C \c@footnote 1725 \c@secnumdepth	\cleaders 2039 \clubpenalty 386, 392 \CodelineIndex 16 \Collect@Body 759,
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses 14, 1294 B \balance 2856 \baselineskip 1757, 1982, 1994, 2006, 2021,	C \c@footnote 1725 \c@secnumdepth	\cleaders 2039 \clubpenalty 386, 392 \CodelineIndex 16 \Collect@Body 759,
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses 14, 1294 B \balance	C \c@footnote 1725 \c@secnumdepth	\cleaders
$1235, 1238, 1243, \\ 1820, 1822, 1828, 2318 \\ \texttt{\text{authorsaddresses}} 14, \underline{1294} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	C \c@footnote 1725 \c@secnumdepth	\cleaders
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses 14, 1294 B \balance	C \c@footnote 1725 \c@secnumdepth	\cleaders
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses 14, 1294 B \balance	C \c@footnote 1725 \c@secnumdepth 336, 350, 354, 363, 367 \captionsetup 726, 728, 730, 732, 741, 743, 746, 748, 751, 753, 761, 767, 776, 2286 \ccdesc@parse@finish 1478 \ccsdesc 16, 1449 \ccsdesc@parse@end .	\cleaders
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses 14, 1294 B \balance	C \c@footnote 1725 \c@secnumdepth	\cleaders
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses	C \c@footnote 1725 \c@secnumdepth	\cleaders
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses 14, 1294 B \balance	C \c@footnote 1725 \c@secnumdepth	\cleaders
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses	C \c@footnote 1725 \c@secnumdepth	\cleaders
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses	C \c@footnote 1725 \c@secnumdepth	\cleaders
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses	C \c@footnote 1725 \c@secnumdepth	\cleaders
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses	C \c@footnote 1725 \c@secnumdepth	\cleaders
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses	C \c@footnote 1725 \c@secnumdepth	\cleaders
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses	C \c@footnote 1725 \c@secnumdepth	\cleaders
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses	C \c@footnote	\cleaders
1235, 1238, 1243, 1820, 1822, 1828, 2318 \authorsaddresses 14, 1294 B \balance	C \c@footnote	\cleaders

```
1005, 1006, 1007,
                                                                          1306, 1315, 1316,
        1461, 1464, 1466,
                                                                          1328, 1330, 1332,
        1833, 1835, 2621, 2644
                                         1009, 1010, 1011,
\CurrentOption . 140,
                                         1013, 1014, 1016,
                                                                          1334, 1336, 1338,
                                         1017, 1018, 1020,
                                                                          1340, 1344, 1346,
        141, 142, 143, 144, 145
                                         1021, 1022, 1024,
                                                                          1348, 1350, 1360,
              D
                                         1026, 1028, 1029,
                                                                          1361, 1362, 1363,
\day . . . . . . . . . . . . 2419
                                         1030, 1032, 1034,
                                                                          1365, 1366, 1367,
                                         1035, 1036, 1038,
\DeclareNewFootnote
                                                                          1368, 1369, 1371,
                                         1039, 1040, 1042,
                                                                          1373, 1381, 1386,
        . . . . . . . . 617, 619
                                         1043, 1044, 1046,
                                                                          1414, 1426, 1427,
\DeclareOptionX . . . .
                                         1047, 1048, 1050,
                                                                          1451, 1452, 1478,
        ..... 37, 140,
        141, 142, 143, 144, 145
                                         1051, 1052, 1054,
                                                                          1538, 1540, 1577,
                                         1055, 1056, 1058,
                                                                          1578, 1701, 1703,
\DeclareRobustCommand
        . . . . . . . . 498, 2640
                                         1059, 1060, 1062,
                                                                          1705, 1714, 1727,
\verb|\DeclareTextFontCommand| \\
                                         1063, 1064, 1066,
                                                                          1732, 1741, 1747,
                                         1067, 1068, 1070,
                                                                          1843, 1865, 1906,
        . . . . . . . . . . . . 689
                                         1071, 1072, 1074,
                                                                          1928, 1949, 1970,
\def 24, 37, 139, 192, 194,
                                         1075, 1076, 1078,
                                                                          1998, 2026, 2035,
        196, 198, 200, 202,
                                         1079, 1080, 1082,
                                                                          2042, 2043, 2045,
        204, 206, 208, 233,
        235, 237, 239, 241,
                                         1083, 1084, 1086,
                                                                          2046, 2047, 2048,
                                         1087, 1088, 1090,
                                                                          2050, 2052, 2053,
        243, 245, 247, 249,
                                         1091, 1092, 1094,
                                                                          2056, 2059, 2062,
        251, 253, 255, 257,
                                         1095, 1096, 1098,
                                                                          2086, 2087, 2091,
        258, 259, 260, 261,
                                                                          2092, 2095, 2096,
                                         1099, 1100, 1102,
        262, 263, 264, 265,
                                         1103, 1105, 1106,
                                                                          2098, 2099, 2101,
        266, 267, 269, 271,
                                         1107, 1109, 1110,
                                                                          2102, 2104, 2105,
        273, 275, 276, 280,
                                                                          2107, 2108, 2110,
                                         1112, 1113, 1114,
        282, 284, 286, 288,
                                         1115, 1117, 1118,
                                                                          2111, 2113, 2115,
        290, 318, 334, 359,
                                                                          2120, 2121, 2122,
                                         1119, 1121, 1122,
        373, 397, 398, 407,
                                         1123, 1125, 1126,
                                                                          2123, 2125, 2132,
        410, 423, 424, 425,
                                         1127, 1129, 1130,
                                                                          2133, 2134, 2155,
        426, 428, 439, 451,
                                         1131, 1133, 1134,
                                                                          2156, 2163, 2185,
        456, 457, 458, 459,
        460, 478, 509, 613,
                                         1135, 1137, 1138,
                                                                          2191, 2198, 2214,
                                                                          2230, 2236, 2241,
        620, 622, 634, 760,
                                         1139, 1141, 1142,
                                         1143, 1145, 1146,
                                                                          2256, 2262, 2263,
        764, 775, 781, 784,
                                         1147, 1149, 1150,
                                                                          2264, 2265, 2266,
        788, 791, 809, 810,
                                                                          2267, 2269, 2270,
                                         1151, 1153, 1154,
        811, 812, 840, 845,
                                                                          2271, 2272, 2280,
                                         1155, 1157, 1158,
        848, 850, 852, 854,
                                         1159, 1161, 1162,
                                                                          2281, 2282, 2283,
        931, 932, 933, 935,
                                         1163, 1165, 1166,
                                                                          2285, 2295, 2305,
        936, 937, 939, 940,
                                         1167, 1169, 1170,
                                                                          2308, 2309, 2310,
        941, 943, 944, 945,
                                         1171, 1173, 1174,
                                                                          2311, 2314, 2318,
        947, 948, 949, 951,
                                                                          2340, 2347, 2348,
                                         1175, 1181, 1183,
        953, 954, 958, 959,
                                         1184, 1185, 1186,
                                                                          2353, 2363, 2374,
        960, 962, 963, 964,
                                         1187, 1202, 1206,
                                                                          2381, 2424, 2429,
        966, 967, 968, 970,
        971, 972, 974, 975,
                                         1207, 1208, 1214,
                                                                          2435, 2523, 2530,
        976, 978, 979, 981,
                                         1253, 1275, 1276,
                                                                          2535, 2537, 2619,
        982, 983, 987, 988,
                                         1277, 1278, 1279,
                                                                          2623, 2625, 2627,
                                         1280, 1293, 1294,
                                                                          2637, 2641, 2648,
        989, 993, 994, 995,
                                         1296, 1297, 1305,
                                                                          2674, 2678, 2679,
        999, 1000, 1001,
```

```
2680, 2681, 2687,
                                     134, 159, 186, 278,
                                                                    2624, 2648, 2868,
       2688, 2690, 2691,
                                     299, 328, 335, 338,
                                                                    2873, 2880, 2888, 2901
       2693, 2694, 2696,
                                     350, 354, 358, 363,
                                                             \email .... 10, 1287,
       2697, 2699, 2700,
                                     367, 379, 391, 406,
                                                                    2132, 2191, 2236, 2272
       2701, 2702, 2703,
                                     486, 502, 508, 510,
                                                             \emph ..... 1779, 1781
       2706, 2707, 2710,
                                     625, 681, 706, 709,
                                                             \empty .... 2436
       2711, 2713, 2714,
                                     731, 769, 1172,
                                                             \EnableCrossrefs .... 18
       2716, 2717, 2718,
                                     1198, 1204, 1210,
                                                             \end . . . 21, 2379, 2405, 2555
       2719, 2728, 2729,
                                     1226, 1233, 1236,
                                                             \end@dblfloat .... 787
       2730, 2731, 2746,
                                     1240, 1241, 1249,
                                                             \end@float .....
       2747, 2748, 2749,
                                     1252, 1257, 1260,
                                                             \endcsname .... 297,
       2758, 2759, 2760,
                                     1263, 1270, 1290,
                                                                    298, 349, 351, 355,
       2761, 2805, 2806,
                                     1302, 1311, 1317,
                                                                    362, 364, 368, 397,
       2815, 2816, 2866,
                                      1325, 1375, 1390,
                                                                    417, 418, 432, 446,
       2868, 2884, 2885, 2886
                                      1396, 1399, 1407,
                                                                    1454, 1455, 1457,
                                      1418, 1421, 1431,
\define@boolkey 48,56,
                                                                    1458, 1459, 1460,
                                     1434, 1437, 1442,
       64, 72, 81, 89, 101,
                                                                    1461, 1464, 1466,
                                     1463, 1468, 1469,
       105, 113, 121, 129,
                                                                    1833, 1835, 2621, 2644
       1273, 1387, 1393, 1404
                                     1470, 1473, 1710,
                                                             \ensuremath{\mbox{\colored}} \enddescription .... 863
\define@choicekey ..
                                      1728, 1739, 1743,
                                                             \endgroup . . . 348, 387,
       . . . . . . 31, 866, 1485
                                     1744, 1751, 1758,
                                                                    405, 420, 1803,
\define@cmdkey .... 1410
                                     1761, 1762, 1768,
                                                                    2084, 2623, 2625, 2864
                                     1773, 1780, 1785,
\definecolor .....
                                                             \endlist .... 861,863
                                     1788, 1789, 1792,
       . . . 518, 519, 520,
                                                             \endminipage .... 622
       521, 522, 523, 524, 525
                                     1794, 1795, 1796,
                                                             \endtrivlist ..... 2827
                                     1797, 1807, 1812,
\department .....
                                      1815, 1868, 1894,
       . 11, 1279, 2042, 2268
                                                             \enspace ..... 2714
\Description .... 22, \underline{697}
                                      1899, 1972, 1976,
                                                             environments:
                                     1981, 1989, 1992,
\description ..... <u>857</u>
                                                                2005, 2013, 2020,
\descriptionlabel 856,859
                                                                acks . . . . . . . . . . . 23
                                     2030, 2036, 2037,
\dimexpr .. 779, 798, 2509
                                                                anonsuppress .... 23
                                     2050, 2051, 2052,
\divide 2167, 2173, 2175,
                                                                CCSXML ..... 16
       2177, 2179, 2218, 2224
                                     2053, 2055, 2056,
                                                                marginfigure .... 21
                                     2059, 2116, 2128,
\do . . . . . . . . . . 232, 478
                                                                margintable .... 21
                                     2134, 2140, 2157,
\do@url@hyp .... 478
                                                                printonly ..... 22
                                     2168, 2178, 2187,
\DocInput .... 20
                                                                screenonly ..... 22
                                     2194, 2202, 2219,
\documentclass ..... 8
                                                                sidebar ..... 21
                                     2223, 2232, 2238,
\dots ..... 1796
                                                                teaserfigure .... 17
                                     2245, 2258, 2260,
                                                             \everypar 327, 382, 393, 2299
                                      2275, 2284, 2289,
             E
\edef 140, 141, 142, 143, 335
                                     2296, 2300, 2308,
                                                             \excludecomment . 1446,
                                                                    2872, 2874, 2878, 2879
                                     2314, 2319, 2320,
\editor .... 9, <u>1208</u>
                                     2329, 2331, 2338,
                                                             \ExecuteOptionsX ...
\egroup .... 632,
                                     2416, 2427, 2428,
       762, 773, 777, 789,
                                                                    . . . . . . . 47, 55,
                                     2438, 2449, 2457,
                                                                    63, 71, 80, 88, 100,
       795, 1286, 1809,
       1818, 2159, 2193,
                                     2467, 2478, 2482,
                                                                    104, 112, 120, 128, 138
       2196, 2255, 2274,
                                     2486, 2495, 2499,
                                                             \expandafter 277, 279,
       2286, 2304, 2318, 2339
                                     2538, 2567, 2571,
                                                                    511, 633, 1454,
                                     2581, 2591, 2598,
\else . 51, 59, 67, 76, 84,
                                                                    1455, 1457, 1458,
                                     2603, 2611, 2614,
       96, 108, 116, 124,
                                                                    1464, 1466, 2621, 2644
```

```
1251, 1259, 1265,
                                                                       2494, 2496, 2506,
\verb| familydefault .... 691| \\
                                       1266, 1267, 1272,
                                                                       2507, 2510, 2513,
\fancyfoot .....
                                       1292, 1304, 1314,
                                                                       2536, 2555, 2566,
                                                                       2569, 2575, 2585,
                                       1321, 1327, 1343,
         2450, 2458, 2468,
                                                                       2595, 2601, 2602,
        2479, 2483, 2496,
                                       1379, 1383, 1392,
        2512, 2566, 2568,
                                       1398, 1403, 1409,
                                                                       2606, 2607, 2613,
        2572, 2582, 2592,
                                       1423, 1424, 1433,
                                                                       2616, 2617, 2635,
                                                                       2646, 2648, 2712,
       2601, 2606, 2610, 2615
                                       1439, 1440, 1444,
                                       1462, 1470, 1471,
                                                                       2734, 2764, 2802,
\fancyhead . 2445, 2446,
                                       1477, 1498, 1501,
                                                                       2819, 2850, 2851,
        2447, 2448, 2453,
                                                                       2857, 2868, 2876,
                                       1505, 1511, 1514,
        2454, 2455, 2456,
        2462, 2464, 2465,
                                       1517, 1520, 1523,
                                                                       2882, 2885, 2889, 2904
        2472, 2474, 2475,
                                       1526, 1529, 1533,
                                                               \firstpagestyle .... 2557
                                       1537, 1576, 1700,
        2476, 2484, 2485,
                                                               \floatname .....
                                                               \flushbottom .....
        2487, 2490, 2497,
                                       1712, 1718, 1719,
                                       1728, 1730, 1742,
        2498, 2500, 2503,
                                                                       641, 643, 645, 647, 649
        2565, 2576, 2577,
                                       1748, 1749, 1750,
                                                               \footnote . . . . . . . . . 2311
        2578, 2586, 2587,
                                       1756, 1759, 1760,
                                                               \footnotemark 460, 1298,
        2588, 2596, 2597,
                                       1764, 1765, 1770,
                                                                       1307, 2281, 2282, 2309
       2599, 2600, 2604, 2605
                                       1782, 1787, 1792,
                                                               \footnoterule .... 620
                                       1796, 1797, 1798,
                                                               \footnotesep ... 436, 449
\fancyheadoffset ...
                                       1799, 1800, 1801,
        . . . 2509, 2579, 2589
                                                               \footnotesize .. 442,
                                       1802, 1810, 1811,
\fancyhf .... 2432, 2559
                                                                       2415, 2429, 2450,
                                       1817, 1819, 1826,
\fancypagestyle 2431, 2558
                                                                       2458, 2468, 2479,
                                       1863, 1870, 1898,
\fi .... 53, 61, 69, 78,
                                                                       2483, 2487, 2496,
                                       1902, 1903, 1904,
       86, 98, 110, 118,
                                                                       2568, 2572, 2582,
                                       1926, 1948, 1969,
                                                                       2592, 2601, 2606, 2612
        126, 136, 156, 161,
                                       1975, 1979, 1985,
                                                               \footnotetext . . 1301,
        183, 188, 209, 210,
                                       1991, 1996, 2008,
        222, 234, 236, 238,
                                                                       1303, 1310, 1313, 1320
                                       2010, 2015, 2023,
        240, 242, 244, 246,
                                                               \footnotetextauthorsaddresses
                                       2024, 2032, 2040,
        248, 250, 252, 254,
                                                                       . . . . . . . . 1740, 1746
                                       2050, 2052, 2053,
        256, 258, 260, 262,
                                                               \footnotetextcopyrightpermission
        264, 266, 268, 270,
                                       2055, 2056, 2059,
                                                                       . . . . . . . . . . . . 1751
                                       2061, 2083, 2112,
        272, 274, 276, 281,
                                                               \footrulewidth 2434, 2561
                                       2119, 2130, 2144,
        283, 285, 287, 289,
                                                               \format ..... <u>31</u>
                                       2145, 2157, 2180,
        291, 292, 301, 303,
                                                               \frenchspacing .... 2905
                                       2181, 2189, 2197,
        317, 319, 325, 330,
                                                               \fulltextwidth ....
                                       2206, 2225, 2226,
        335, 341, 352, 356,
                                                                       2234, 2240, 2249,
        365, 369, 371, 394,
        395, 408, 419, 438,
                                       2258, 2260, 2279,
                                                                             G
                                       2292, 2294, 2302,
        475, 479, 488, 506,
                                                               \g@addto@macro ....
                                       2304, 2308, 2315,
        508, 512, 515, 533,
                                                                        1212, 1242, 1243,
                                       2319, 2333, 2336,
        597, 611, 629, 651,
                                                                       1258, 1264, 1271,
                                       2337, 2338, 2373,
        663, 683, 686, 692,
                                                                       1291, 1298, 1300,
                                       2380, 2402, 2406,
        699, 708, 711, 755,
                                                                       1303, 1307, 1309,
        756, 772, 786, 790,
                                       2418, 2423, 2427,
                                                                       1312, 1318, 1319,
        815, 1176, 1195,
                                       2428, 2437, 2439,
                                                                       1324, 1326, 1432,
        1201, 1205, 1213,
                                       2440, 2445, 2446,
                                                                       1438, 1459, 1466,
                                       2451, 2460, 2470,
        1229, 1234, 1239,
                                                                       1705, 1709, 1711,
                                       2481, 2483, 2493,
        1244, 1245, 1250,
                                                                       2129, 2141, 2188,
```

```
2195, 2203, 2233,
                                \hspace ..... 1589,
                                                                        2457, 2467, 2478,
        2239, 2246, 2281, 2282
                                       1600, 1609, 1634,
                                                                        2486, 2499, 2567,
\gdef ..... 1189,
                                       1646, 1667, 2160, 2212
                                                                        2571, 2581, 2591, 2611
       1190, 1191, 1192,
                                \Huge . . . . . 1937, 1939,
                                                                \if@ACM@printacmref
        1194, 1202, 1209,
                                       1941, 1943, 1945, 1947
                                                                        ..... <u>1393</u>, 1824
        1211, 1232, 1235,
                                                                \if@ACM@printccs ...
                                \hypersetup .....
        1237, 1238, 1248,
                                        . . 481, 487, 489, 1827
                                                                        ..... <u>1387</u>, 1806
        1256, 1262, 1384,
                                                                \if@ACM@printfolios
        1413, 1430, 1436,
                                              I
                                                                         1404, 2437, 2439,
        1455, 1457, 1458,
                                \if ..... 278
                                                                        2445, 2446, 2483,
        1464, 1867, 2127,
                                \if@ACM@acmthm . \underline{64}, 2778
                                                                        2496, 2566, 2601, 2606
        2131, 2136, 2161,
                                \if@ACM@affiliation@obeypun\i@atừM@review ....
        2162, 2183, 2184,
                                        . . . . . . . . <u>1273</u>,
                                                                        . <u>72</u>, 2358, 2375, 2382
        2186, 2190, 2192,
                                       2037, 2050, 2052,
                                                                \if@ACM@screen 48, 480, 2870
        2199, 2228, 2229,
                                       2053, 2054, 2056, 2059
                                                                \if@ACM@sigchiamode
       2231, 2235, 2237, 2242
                                \if@ACM@anonymous 113,
                                                                        . . . . . . . . . <u>151</u>,
                                       1231, 1241, 1246,
                                                                        427, 690, 780, 787,
\geometry . . . . . . . . .
                                       1270, 1290, 1299,
        537, 540, 547, 554,
                                                                        1728, 1730, 2157, 2508
        561, 568, 575, 582, 589
                                       1308, 1317, 1708,
                                                                \if@ACM@timestamp ..
\getrefnumber ....
                                       1716, 1744, 2425, 2877
                                                                         121, 2407, 2511, 2608
        1376, 1400, 1474, 2308
                                \if@ACM@authordraft
                                                                \if@ACM@urlbreakonhyphens
                                        . . . . . <u>129</u>, 526, 1752
\global ..... 381,
                                                                        . . . . . . . . . . . <u>56</u>, 477
                                \if@ACM@authorversion
        384, 420, 440, 697,
                                                                \if@acmowned ..... <u>1483</u>
        707, 710, 770, 797,
                                        . . . . . <u>81</u>, 1758, 1774
                                                                \if@Description@present
        1182, 1196, 1225,
                                \if@ACM@badge .....
                                                                        . . . . . . . . 693,
        1227, 1228, 1269,
                                        1352, 1892, 2001, 2017
                                                                       706, 709, 769, 2289
        1822, 1823, 1836,
                                \if@ACM@balance ....
                                                                \if@filesw .... 416,513
                                        . . . . <u>101</u>, 2830, 2854
        1838, 2124, 2146,
                                                                \if@insideauthorgroup
                                \if@ACM@journal ....
        2147, 2157, 2207,
                                                                        ..... <u>1220</u>, 1226
        2210, 2250, 2287,
                                        . . . . . . <u>149</u>, 184,
                                                                \if@nobreak ..... 326
       2290, 2368, 2372,
                                       727, 1198, 1419,
                                                                \if@noskipsec .. 319, 383
       2833, 2835, 2837, 2849
                                       1813, 2044, 2275, 2298
                                                                \if@printcopyright .
\grantnum . . . . . . 23, 2867
                                \if@ACM@journal@bibstrip
                                                                        . . . . . . . 1479, 1766
\grantsponsor . . 23, <u>2866</u>
                                        . . . . . . . . . <u>150</u>,
                                                                \if@printpermission
                                       1745, 1762, 1778,
                                                                        . . . . . . . . <u>1481</u>, 1759
             Η
                                       1790, 2325, 2442, 2562
                                                                \if@twocolumn .... 2855
\hbox . 451, 1727, 1732, 2038
                                \if@ACM@maketitle@typeset
                                                                \if@undescribed@images
\headrulewidth 2433, 2560
                                       . . . . . . . . 864, 1381
                                                                        \hfill ..... 2028, 2371
                                \if@ACM@manuscript .
                                                               \ifcase .....
\href . 1895, 1900, 1982,
                                                                        163, 190, 463, 535,
                                        . . . . . . . . . <u>148</u>,
        1994, 2006, 2021, 2888
                                       219, 1416, 1761, 1771
                                                                        600, 636, 734, 801,
\hrule .... 614, 621, 2028
                                \if@ACM@natbib ....
                                                                        929, 1340, 1541,
\hsize ..... 443,
                                        . . . 105, 224, 315, 491
                                                                        1579, 1844, 1873,
       1726, 1970, 1971,
                                \if@ACM@natbib@override
                                                                        1907, 1929, 1950,
                                                                        2064, 2088, 2169,
        1998, 2000, 2026,
                                       . . . . . . . . . . . . . . 105
       2063, 2155, 2209, 2252
                                \if@ACM@newfonts 665, 676
                                                                        2220, 2383, 2443,
\hskip ..... 346,
                                \if@ACM@nonacm ....
                                                                        2524, 2563, 2683,
        360, 390, 403, 407,
                                        . . 89, 1375, 1399,
                                                                        2720, 2750, 2807, 2831
        1897, 1984, 1993,
                                       1473, 1751, 1789,
                                                                \ifcsname ..... 297
        2009, 2018, 2039, 2824
                                       2275, 2320, 2449,
                                                                \ifdim 323, 343, 375, 400, 2370
```

\text{ViFInteger} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	\IfFileExists 667, 670, 673	449, 697, 1277,	\Large 2086, 2104, 2693,
\iffnatTenumbers			
\\ \text{NiFnum} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			
336, 350, 354, 363, 367, 1376, 1400, 367, 1376, 1400, 367, 1376, 1400, 367, 1376, 1400, 367, 1376, 1400, 367, 1376, 1400, 367, 1376, 1400, 367, 1376, 1400, 367, 1376, 1400, 367, 1376, 1400, 367, 1376, 1400, 367, 1376, 1400, 367, 1376, 1400, 367, 1376, 1400, 367, 1376, 1400, 367, 1376, 1400, 367, 1376, 1400, 367, 1376, 1400, 367, 367, 367, 367, 367, 367, 367, 367			•
367, 1376, 1400, 2303, 2310, 2318, 2825 lastbox 385, 2299 1468, 1469, 1470, large			
1468, 1469, 1470,			
1474, 1494, 1499,			
1502, 1506, 1512, 1515, 1518, 1521, 1512, 1518, 1521, 1524, 1527, 1530, 1534, 1718, 2166, 2217, 2257, 2259, 10dent 2806 2217, 2257, 2259, 10dent 2806 2308, 2538, 2540, 2609 1nput 654 281, 832, 833, 845, 846 281, 832, 833, 845, 846 16thargini 830, 831, 832, 833, 845, 846 16thargini 830, 831, 832, 833, 845, 846 16thargini 830, 831, 832, 833, 845, 846 16thargini 1 830, 831, 832, 833, 845, 846 16thargini			
1515, 1518, 1521, 1524, 1527, 1530, 1534, 1718, 2166, 1983, 1995, 2007, 2022 2217, 2257, 2259, 10nput 654 2038, 2538, 2540, 2609 10nput 654 2018 2			
1524, 1527, 1530, 1896, 1901, 1534, 1718, 2166, 2137, 2257, 2259, (indent 2806 2308, 2538, 2540, 2699 (input 654 \$825, 826, 827, 840, 841 \$16PDFTeX 653 (input) 654 \$81, 832, 833, 834, 848, 849 (iffworde 2036 11, 1278, 2042, 2265 (institution 2806 (input) 654 (iffworde 2036 (interfootnotelinepenalty (iffx 189, 233, 235, 237, 239, 241, (interlinepenalty 2824 (ist) 2824 (ist) 2825 (ist) 2826 (ist) 2826 (ist) 2826 (ist) 2827 (ist) 2828 (ist) .			\leftmargin 840,
1534, 1718, 2166, 2217, 2257, 2259, 10		= ·	845, 848, 850, 852, 854
2217, 2257, 2259,			\leftmargini 824,
Company			825, 826, 827, 840, 841
\text{YifPDFTeX} \tag{55} \text{ViffyDiff} \text{Constraints} \text{Constraints} \text{Constraints} \text{Constraints} \text{ViffyOid} \tag{55} \text{ViffyOid} \tag{55} \text{Constraints} Constrain			\leftmarginii 830,
\text{\fightbolder} \tag{1} 123, 1288 \tag{1} \text{\text{institution} \tag{2} \tag{2} \text{\text{leftmarginii}} \tag{1} \tag{1} \tag{1} \text{\text{leftmarginii}} \tag{1} \tag{1} \tag{1} \tag{1} \text{\text{leftmarginii}} \tag{1}			
Nifymode 2036 11, 1278, 2042, 2265		·	
\text{Nitwoole} 15, 258, 259, 237, 239, 241, 243, 245, 247, 249, 347, 404, 430 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 2681, 2702, 2703, 286, 288, 290, 510, 1193, 1204, 1208, 1230, 1233, 1247, 1230, 1233, 1247, 1248, 1429, 1435, 1428, 1429, 1435, 1473, 1739, 1743, 1739, 1743, 1739, 1743, 1792, 1795, 1812, 1866, 1894, 1812, 1866, 1894, 1812, 1866, 1894, 1812, 1866, 1894, 1818, 1989, 1972, 1976, 2030, 2116, 2126, 2134, 2135, 2185, 2191, 2198, 2230, 2236, 2241, 2276, 2284, 2266, 288, 290, 2114, 2134, 2135, 2355, 2356, 2366, 2385, 2355, 2356, 2366, 2368, 2385, 2385, 2355, 2356, 2366, 2368, 2365,			_
\text{\frac{1}{1}} \text{\frac{1}} \text{\frac{1}} \text{\frac{1}{1}} \text{\frac{1}{1}}			
235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 259, 261, 263, 265, 267, 269, 271, 273, 268, 288, 290, 510, 1193, 1204, 1208, 1230, 1233, 1247, 1249, 1254, 1255, 1261, 1323, 1375, 1428, 1429, 1435, 1428, 1429, 1435, 1486, 1894, 1995, 1812, 1866, 1894, 1812, 1866, 1894, 1899, 1972, 1976, 1981, 1989, 1992, 2005, 2013, 2020, 2014, 2024, 2026, 2284, 2026, 2284, 2026, 2284, 2027, 2728, 2748, 2815 270, 2703, 2716, 2728, 2748, 2815 270, 270, 272, 298, 337, 286, 288, 290, 510, 452, 453, 492, 493, 452, 453, 493, 452, 453, 492, 493, 452, 453, 493, 452, 453, 493, 452, 453, 493, 452, 453, 493, 452, 453, 493, 462, 473, 473, 473, 473, 473, 473, 473, 473			_
243, 245, 247, 249,		430	
251, 253, 255, 257, \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		\interlinepenalty	
259, 261, 263, 265, \itshape . 1763, 2680, \leftskip . 2027, 2253, 2676 267, 269, 271, 273,	243, 245, 247, 249,	347, 404, 430	
267, 269, 271, 273,	251, 253, 255, 257,	\item 2824	
275, 280, 282, 284, 2716, 2728, 2748, 2815 270, 272, 298, 337, 286, 288, 290, 510, 452, 453, 492, 493, 1193, 1204, 1208, J 494, 495, 496, 497, 1230, 1233, 1247, \jobname 415, 418 500, 504, 635, 687, 701, 702, 704, 705, 1261, 1323, 1375, K 712, 713, 714, 715, 1428, 1429, 1435, \kern 613, 614, 620, 621, 2028 716, 717, 718, 719, 1442, 1454, 1463, \keywords 16, 1373 720, 721, 722, 723, 1473, 1739, 1743, 1792, 1795, L 775, 776, 781, 782, 1796, 1797, 1807, \lessection 423, 424 1281, 1282, 1283, 1899, 1972, 1976, \lessection 423, 424 1281, 1282, 1283, 1899, 1972, 1976, \lessection 423, 424 1281, 1282, 1283, 1899, 1972, 1976, \lessection 425 1284, 1285, 1374, 1981, 1989, 1992, \labelenumi 809 1447, 1721, 1722, 2005, 2013, 2020, \labelenumi 809 1447, 1721, 1722, 2005, 2013, 2020, \labelenumi 809 1447, 1721, 1722, 203, 216, 2126, \labelenumi 811 1737, 1738, 1741, 2134, 2135, 2185, \labelenumi 812 1747, 1822, 1823, 2191, 2198, 2230, \labelenumi 812 1747, 1822, 1823, 2191, 2198, 2230, \labelenumi 818, 2057, 2058, 2060, 2236, 2241, 2276, 826, 831, 841, 846, 214, 225, 2255, 2319, 2331, 2338, \labelwidth . 841, 846, 2306, 2307, 2341, 2416, 2427, 2436, 849, 851, 853, 855, 858 2342, 2344, 2345, 246, 2427, 2436, 849, 851, 853, 855, 858 2342, 2344, 2345, 246, 2427, 2436, 849, 851, 853, 855, 858 2342, 2344, 2345, 2466, 2427, 2436, 849, 851, 853, 855, 858 2342, 2344, 2345, 2466, 2427, 2436, 849, 851, 853, 855, 858 2342, 2344, 2345, 2466, 2427, 2436, 849, 851, 853, 855, 858 2342, 2344, 2345, 2466, 2427, 2436, 849, 851, 853, 855, 858 2342, 2344, 2345, 2466, 2468, 2464, 2648, \$1486 1931, 2350, 2351, 2352, 2868, 2885, 2887, 2901 1933, 1935, 1958, 2354, 2355, 2356, \$160, 2464, 2648, \$1486 1930, 1962, 1964, 2626, 2628, 2630,	259, 261, 263, 265,	\itshape 1763, 2680,	\leftskip . 2027, 2253, 2676
286, 288, 290, 510, 1193, 1204, 1208, J 494, 495, 496, 497, 1230, 1233, 1247, 1249, 1254, 1255, T01, 702, 704, 705, 1261, 1323, 1375, K 712, 713, 714, 715, 1428, 1429, 1435, 1442, 1454, 1463, 1473, 1739, 1743, 1796, 1797, 1807, 1812, 1866, 1894, 1812, 1866, 1894, 1981, 1989, 1972, 1976, 1981, 1989, 1992, 1abelenumi 1981, 1989, 1992, 1abelenumi 1981, 1989, 1992, 1abelenumi 1981, 1989, 2136, 2030, 2116, 2126, 2134, 2135, 2185, 2191, 2198, 2230, 2236, 2241, 2276, 2284, 2296, 2314, 2416, 2427, 2436, 2868, 2885, 2887, 2901 1933, 1935, 1958, 2415, 4188 2050, 5046, 497, 2194, 494, 495, 493, 494, 495, 493, 494, 495, 493, 494, 495, 496, 497, 1994, 495, 496, 497, 1494, 495, 496, 497, 1494, 495, 496, 497, 1494, 495, 496, 497, 1494, 495, 496, 497, 1494, 495, 496, 497, 1494, 495, 496, 497, 1494, 495, 496, 497, 1494, 495, 496, 497, 1494, 495, 496, 497, 1494, 495, 496, 497, 1494, 495, 496, 497, 1494, 495, 496, 497, 1494, 495, 496, 497, 1494, 494, 495, 496, 497, 1494, 494, 495, 496, 497, 1494, 494, 495, 496, 497, 1494, 494, 495, 496, 497, 1494, 494, 495, 496, 497, 1494, 494, 495, 496, 497, 1494, 494, 495, 496, 497, 1494, 494, 495, 496, 497, 1494, 494, 495, 496, 497, 1418, 418, 418, 418, 418, 418, 418, 428, 428, 4288, 2388, 2388, 2388, 2384, 2354, 2355, 2356, 14121, 1218, 235, 2354, 2355, 2356, 14121, 2114, 21	267, 269, 271, 273,	2681, 2702, 2703,	\let 254, 256, 268,
1193, 1204, 1208,	275, 280, 282, 284,	2716, 2728, 2748, 2815	270, 272, 298, 337,
1230, 1233, 1247, \jobname 415, 418 500, 504, 635, 687, 1249, 1254, 1255, 701, 702, 704, 705, 1261, 1323, 1375, K 712, 713, 714, 715, 1428, 1429, 1435, \kern 613, 614, 620, 621, 2028 716, 717, 718, 719, 1442, 1454, 1463, \keywords 16, 1373 720, 721, 722, 723, 1473, 1739, 1743, 760, 761, 765, 766, 775, 776, 781, 782, 1796, 1797, 1807, \l@section 423 783, 844, 859, 863, 1812, 1866, 1894, \l@subsection 423, 424 1281, 1282, 1283, 1899, 1972, 1976, \l@subsubsection 425 1284, 1285, 1374, 1981, 1989, 1992, \labelenumi 809 1447, 1721, 1722, 2005, 2013, 2020, \labelenumii 810 1723, 1724, 1736, 2030, 2116, 2126, \labelenumiii 811 1737, 1738, 1741, 2134, 2135, 2185, \labelenumiv 812 1747, 1822, 1823, 2191, 2198, 2230, \labelenumiv 812 1747, 1822, 1823, 2191, 2198, 2314, 849, 851, 853, 855, 858 2342, 2344, 2345, 2284, 2296, 2314, 849, 851, 853, 855, 858 2342, 2344, 2345,	286, 288, 290, 510,		452, 453, 492, 493,
1249, 1254, 1255,	1193, 1204, 1208,	J	494, 495, 496, 497,
1261, 1323, 1375, K 712, 713, 714, 715, 1428, 1429, 1435, \kern 613, 614, 620, 621, 2028 716, 717, 718, 719, 1442, 1454, 1463, \keywords	1230, 1233, 1247,	\jobname 415, 418	500, 504, 635, 687,
1428, 1429, 1435, \ \kern 613, 614, 620, 621, 2028 \ 716, 717, 718, 719, 1442, 1454, 1463, \ \keywords \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	1249, 1254, 1255,		701, 702, 704, 705,
1442, 1454, 1463, \keywords 16, 1373 720, 721, 722, 723, 1473, 1739, 1743, 760, 761, 765, 766, 1783, 1792, 1795, L 775, 776, 781, 782, 1796, 1797, 1807, \l@section	1261, 1323, 1375,	K	712, 713, 714, 715,
1473, 1739, 1743, 1783, 1792, 1795, L 1796, 1797, 1807, \l@section	1428, 1429, 1435,	\kern 613, 614, 620, 621, 2028	716, 717, 718, 719,
1783, 1792, 1795, L 775, 776, 781, 782, 1796, 1797, 1807, \lesction	1442, 1454, 1463,	\keywords 16, <u>1373</u>	720, 721, 722, 723,
1796, 1797, 1807, \lesection	1473, 1739, 1743,		760, 761, 765, 766,
1812, 1866, 1894, \l@subsection	1783, 1792, 1795,	L	775, 776, 781, 782,
1899, 1972, 1976, \l@subsubsection	1796, 1797, 1807,	\1@section 423	783, 844, 859, 863,
1981, 1989, 1992, \labelenumi 809 1447, 1721, 1722, 2005, 2013, 2020, \labelenumi i 810 1723, 1724, 1736, 2030, 2116, 2126, \labelenumi i 811 1737, 1738, 1741, 2134, 2135, 2185, \labelenumi v 812 1747, 1822, 1823, 2191, 2198, 2230, \labelsep 818, 2057, 2058, 2060, 2236, 2241, 2276, 826, 831, 841, 846, 2124, 2146, 2207, 2284, 2296, 2314, 849, 851, 853, 855, 2824 2213, 2250, 2255, 2319, 2331, 2338, \labelwidth . 841, 846, 2306, 2307, 2341, 2416, 2427, 2436, 849, 851, 853, 855, 858 2342, 2344, 2345, 2621, 2644, 2648, \LARGE 1931, 2350, 2351, 2352, 2868, 2885, 2887, 2901 1933, 1935, 1958, 2354, 2355, 2356, \\iffxetex 678 1960, 1962, 1964, 2626, 2628, 2630,	1812, 1866, 1894,	\1@subsection <u>423</u> , <u>424</u>	1281, 1282, 1283,
2005, 2013, 2020, \labelenumii 810 1723, 1724, 1736, 2030, 2116, 2126, \labelenumiii 811 1737, 1738, 1741, 2134, 2135, 2185, \labelenumiv 812 1747, 1822, 1823, 2191, 2198, 2230, \labelsep 818, 2057, 2058, 2060, 2236, 2241, 2276, 826, 831, 841, 846, 2124, 2146, 2207, 2284, 2296, 2314, 849, 851, 853, 855, 2824 2213, 2250, 2255, 2319, 2331, 2338, \labelwidth 841, 846, 2306, 2307, 2341, 2416, 2427, 2436, 849, 851, 853, 855, 858 2342, 2344, 2345, 2621, 2644, 2648, \labelwidth 1931, 2350, 2351, 2352, 2868, 2885, 2887, 2901 1933, 1935, 1958, 2354, 2355, 2356, \\iffxetex 678 1960, 1962, 1964, 2626, 2628, 2630,	1899, 1972, 1976,	10subsubsection 425	1284, 1285, 1374,
2030, 2116, 2126, \labelenumiii 811 1737, 1738, 1741, 2134, 2135, 2185, \labelenumiv 812 1747, 1822, 1823, 2191, 2198, 2230, \labelsep 818, 2057, 2058, 2060, 2236, 2241, 2276, 826, 831, 841, 846, 2124, 2146, 2207, 2284, 2296, 2314, 849, 851, 853, 855, 2824 2213, 2250, 2255, 2319, 2331, 2338, \labelwidth . 841, 846, 2306, 2307, 2341, 2416, 2427, 2436, 849, 851, 853, 855, 858 2342, 2344, 2345, 2621, 2644, 2648, \labelwidth 1931, 2350, 2351, 2352, 2868, 2885, 2887, 2901 1933, 1935, 1958, 2354, 2355, 2356, \\iffxetex 678 1960, 1962, 1964, 2626, 2628, 2630,	1981, 1989, 1992,	\labelenumi 809	1447, 1721, 1722,
2134, 2135, 2185, \labelenumiv 812	2005, 2013, 2020,	\labelenumii 810	1723, 1724, 1736,
2191, 2198, 2230, \labelsep 818, 2057, 2058, 2060, 2236, 2241, 2276, 826, 831, 841, 846, 2124, 2146, 2207, 2284, 2296, 2314, 849, 851, 853, 855, 2824 2213, 2250, 2255, 2319, 2331, 2338, \labelwidth . 841, 846, 2306, 2307, 2341, 2416, 2427, 2436, 849, 851, 853, 855, 858 2342, 2344, 2345, 2621, 2644, 2648, \LARGE 1931, 2350, 2351, 2352, 2868, 2885, 2887, 2901 1933, 1935, 1958, 2354, 2355, 2356, \\iffxetex 678 1960, 1962, 1964, 2626, 2628, 2630,	2030, 2116, 2126,	\labelenumiii 811	1737, 1738, 1741,
2191, 2198, 2230, \labelsep 818, 2057, 2058, 2060, 2236, 2241, 2276, 826, 831, 841, 846, 2124, 2146, 2207, 2284, 2296, 2314, 849, 851, 853, 855, 2824 2213, 2250, 2255, 2319, 2331, 2338, \labelwidth . 841, 846, 2306, 2307, 2341, 2416, 2427, 2436, 849, 851, 853, 855, 858 2342, 2344, 2345, 2621, 2644, 2648, \LARGE 1931, 2350, 2351, 2352, 2868, 2885, 2887, 2901 1933, 1935, 1958, 2354, 2355, 2356, \\iffxetex 678 1960, 1962, 1964, 2626, 2628, 2630,	2134, 2135, 2185,	\labelenumiv 812	1747, 1822, 1823,
2284, 2296, 2314, 849,851,853,855,2824 2213, 2250, 2255, 2319, 2331, 2338, \labelwidth . 841,846, 2306, 2307, 2341, 2416, 2427, 2436, 849,851,853,855,858 2342, 2344, 2345, 2621, 2644, 2648, \LARGE			
2284, 2296, 2314, 849, 851, 853, 855, 2824 2213, 2250, 2255, 2319, 2331, 2338, \labelwidth . 841, 846, 2306, 2307, 2341, 2416, 2427, 2436, 849, 851, 853, 855, 858 2342, 2344, 2345, 2621, 2644, 2648, \LARGE	2236, 2241, 2276,	826, 831, 841, 846,	2124, 2146, 2207,
2319, 2331, 2338, \labelwidth . 841, 846, 2306, 2307, 2341, 2416, 2427, 2436, 849, 851, 853, 855, 858 2342, 2344, 2345, 2621, 2644, 2648, \LARGE 1931, 2350, 2351, 2352, 2868, 2885, 2887, 2901 1933, 1935, 1958, 2354, 2355, 2356, \\iffxetex 678 1960, 1962, 1964, 2626, 2628, 2630,			
2416, 2427, 2436, 849, 851, 853, 855, 858 2342, 2344, 2345, 2621, 2644, 2648, \LARGE \ldots 1933, 1935, 1958, 2354, 2355, 2356, \ifxetex \ldots 678 1960, 1962, 1964, 2626, 2628, 2630,			
2621, 2644, 2648, \LARGE 1931, 2350, 2351, 2352, 2868, 2885, 2887, 2901 1933, 1935, 1958, 2354, 2355, 2356, \iffxetex 678 1960, 1962, 1964, 2626, 2628, 2630,	2416, 2427, 2436,		
2868, 2885, 2887, 2901 1933, 1935, 1958, 2354, 2355, 2356, \ifxetex 678 1960, 1962, 1964, 2626, 2628, 2630,			
\ifxetex 678 1960, 1962, 1964, 2626, 2628, 2630,		·	

2642, 2645, 2890,	1980, 1999, 2027,	\newif 148, 149,
2891, 2898, 2899, 2900	2147, 2210, 2211, 2287	150, 151, 665, 693,
\libertineLF 689	\month 1339, 2419	695, 864, 1220,
\lineskip 2212, 2254	\moveleft 797	1352, 1479, 1481, 1483
\linespacing 413, 414	\multiply 2545	\newlength
\liningnums 687	\multiply 2343	1354, 1356, 1357, 2360
\list 857	N	\newsavebox 2359
\listisep 838, 839, 843	\NAT@@setcites 294	\newskip 838, 2153
\listparindent 842	\NAT@aysep 285	\newtheorem
\LoadClass 212	\NAT@citetp 500	2781, 2784, 2787,
\long 428, 439, 760,	\NAT@close	2790, 2793, 2797, 2800
764, 775, 1381,	234, 236, 238, 240, 283	\newtheoremstyle
1384, 1386, 1705, 2347	\NAT@cmprs 262, 264, 266	2735, 2765
\loop 2367, 2539	\NAT@cmt 289	\newwrite 417
\LTX@adddotafter	\NAT@ctype 500	\next 2623, 2625, 2635
2645, 2648	\NAT@find@eq 277	\nobreak 376, 2316
	\NAT@fullfalse 500	\noindent
M	\NAT@longnamestrue . 274	. 426, 1443, 1738,
\makeatletter 410	\NAT@merge 268, 270, 272	1809, 1818, 1846,
\makebox 1753, 2548	\NAT@nmfmt 276	1848, 1850, 1852,
\makelabel 859	\NAT@numbersfalse 248	1872, 1893, 1980,
\MakeTextUppercase .	\NAT@numberstrue 250, 252	1987, 1990, 2014,
2127, 2129,	\NAT@open 234,	2028, 2029, 2031,
2678, 2687, 2690,		2114, 2147, 2148,
2693, 2696, 2706, 2710	236, 238, 240, 281, 500	2210, 2254, 2287,
\maketitle 20, <u>1714</u>	\NAT@partrue 500	2288, 2316, 2317, 2816
\MakeUppercase 2632	\NAT@rem@eq 279	\noindentparagraph .
\marginfigure <u>763</u>	\NAT@sep 242, 244, 246, 291	1858, 2665
marginfigure (environ-	\NAT@sort 258, 260, 266	\nolinkurl 2193,
ment) <u>21</u>	\NAT@superfalse 250	2196, 2237, 2239, 2272
\marginpar \dots 428,	\NAT@supertrue 252	\normalbaselines 2156
762, 768, 777, 1893	\NAT@swafalse 499	\normalcolor 627
\marginparsep 779, 2509	\NAT@up 276	\normalfont
\marginparwidth . 779, 2509	\NAT@yrsep 287	. 451, 1443, 1732,
\margintable <u>774</u>	\NeedsTeXFormat 1	2087, 2092, 2101,
margintable (environ-	\newblock 501	2102, 2104, 2105,
ment) <u>21</u>	\newbox 1713, 2034, 2151	2364, 2731, 2746,
\mathchardef 2193, 2196	\newcommand . 304, 310,	2758, 2761, 2822, 2905
\mbox 276	507, 697, 1188,	\normalparindent <u>612</u>
\mdseries	1268, 1322, 1359,	\normalsize
1952, 1954, 1956,	1364, 1427, 1449,	1949, 2087, 2101,
1960, 1962, 1964,	2049, 2054, 2414,	2102, 2105, 2365, 2905
1966, 1968, 2108, 2111	2665, 2858, 2867, 2883	\num@authorgroups
\medskip 1846, 1848,	\newcount . 1216, 1218, 2361	
1850, 1852, 2147,	\newcounter 1448, 2410, 2412	1227, 1718, 2169,
2149, 2211, 2293, 2316	\newdimen 778, 816,	2173, 2175, 2220, 2259
\mktitle@bx <u>1713</u> ,	2152, 2517, 2519, 2521	\num@authors
1875, 1877, 1879,	\newenvironment	<u>1218</u> , 1225, 2257
1881, 1883, 1885,	763, 774, 1704	\number 335
1887, 1889, 1891,	\newfloat 757	\numberline 355, 368

```
\numexpr . 2409, 2411, 2413
                                        1694, 1847, 1849,
                                                                        61, 69, 78, 86, 98,
                                        1851, 1853, 1855,
                                                                        102, 110, 118, 126, 136
              o
                                        1857, 1859, 1861,
                                                                \PackageInfo .. 50, 52,
\onehalfspacing .... 221
                                        1876, 1878, 1880,
                                                                        58, 60, 66, 68, 74,
\openout .... 418
                                        1882, 1884, 1886,
                                                                        77, 83, 85, 91, 97,
                                        1888, 1890, 1910,
\or . . . . . . . 166, 168,
                                                                        107, 109, 115, 117,
       170, 172, 174, 176,
                                        1912, 1914, 1916,
                                                                        123, 125, 131, 135,
                                        1918, 1920, 1922,
                                                                        956, 985, 991, 997, 1003
        178, 180, 193, 195,
                                        1924, 1932, 1934,
        197, 199, 201, 203,
                                                                \PageIndex . . . . . . . . . 15
                                        1936, 1938, 1940,
        205, 207, 465, 466,
                                                                \pageref ..... 2421
                                        1942, 1944, 1946,
        467, 468, 469, 470,
                                                                \pagestyle . . . . . . . . 2515
        472, 473, 539, 546,
                                        1953, 1955, 1957,
                                                                \par . 320, 376, 412, 623,
                                        1959, 1961, 1963,
        553, 560, 567, 574,
                                                                        792, 1443, 1741,
        581, 588, 602, 603,
                                        1965, 1967, 2067,
                                                                        1747, 1759, 1763,
        604, 606, 607, 608,
                                        2069, 2071, 2073,
                                                                        1809, 1818, 1846,
                                        2075, 2077, 2079,
        609, 610, 638, 639,
                                                                        1848, 1850, 1852,
                                        2081, 2090, 2093,
        640, 642, 644, 646,
                                                                        1875, 1877, 1879,
                                        2094, 2097, 2100,
        648, 650, 736, 737,
                                                                        1891, 1990, 1997,
                                        2103, 2106, 2109,
        738, 739, 740, 742,
                                                                        2014, 2025, 2028,
        745, 750, 803, 804,
                                        2171, 2172, 2174,
                                                                        2031, 2033, 2052,
                                        2176, 2222, 2386,
        805, 806, 807, 808,
                                                                        2053, 2055, 2056,
                                        2388, 2390, 2392,
        813, 814, 934, 938,
                                                                        2114, 2118, 2147,
                                        2394, 2396, 2398,
        942, 946, 950, 957,
                                                                        2149, 2156, 2158,
                                        2400, 2452, 2461,
        961, 965, 969, 973,
                                                                        2186, 2188, 2195,
        977, 980, 986, 992,
                                        2471, 2526, 2531,
                                                                        2203, 2211, 2213,
                                        2570, 2580, 2590,
        998, 1004, 1008,
                                                                        2231, 2233, 2239,
                                        2685, 2686, 2689,
        1012, 1015, 1019,
                                                                        2246, 2253, 2255,
                                        2692, 2695, 2698,
        1023, 1025, 1027,
                                                                        2285, 2286, 2287,
                                        2704, 2708, 2722,
        1031, 1033, 1037,
                                                                        2289, 2303, 2316,
                                        2723, 2724, 2725,
        1041, 1045, 1049,
                                                                        2339, 2343, 2347, 2820
                                        2726, 2727, 2732,
        1053, 1057, 1061,
                                                                \paragraph . . . . . . . . 2661
        1065, 1069, 1073,
                                        2733, 2752, 2753,
                                                                \parbox 530, 1986, 2004,
        1077, 1081, 1085,
                                        2754, 2755, 2756,
                                                                        2011, 2019, 2364, 2552
                                        2757, 2762, 2763,
        1089, 1093, 1097,
                                                                \parindent 598, 612, 825,
                                        2809, 2810, 2811,
        1101, 1104, 1108,
                                                                        1741, 1747, 1757,
                                        2812, 2813, 2814,
        1111, 1116, 1120,
                                                                        2661, 2677, 2717, 2747
                                        2817, 2818, 2834,
        1124, 1128, 1132,
                                                                \parskip ..... <u>598</u>, <u>1757</u>
                                        2836, 2838, 2840,
        1136, 1140, 1144,
                                                                \part .... <u>2670</u>
                                        2842, 2844, 2846, 2848
        1148, 1152, 1156,
                                                                \PassOptionsToClass
                                \orcid ..... 10, 1293
        1160, 1164, 1168,
                                                                        . . . . . . . . . 144, 145
                                \outer@nobreak .... 794
        1340, 1341, 1342,
                                                                \pdfgentounicode ... 662
        1542, 1544, 1547,
                                              P
                                                                \pdfglyphtounicode .
        1549, 1550, 1552,
                                                                        . . . . . . 655, 656,
        1554, 1556, 1559,
                                \p@ . . . . . . . . . . . 421,
                                                                        657, 658, 659, 660, 661
        1562, 1565, 1567,
                                        598, 605, 613, 614,
        1570, 1573, 1580,
                                        620, 621, 2650,
                                                                \pdfstringdefDisableCommands
        1591, 1602, 1610,
                                        2654, 2658, 2659,
                                                                        . . . . . . . . . . . . . 455
        1616, 1622, 1636,
                                        2662, 2663, 2666,
                                                                \phantomsection . . . .
                                                                        . . . . 228, 2297, 2862
        1648, 1655, 1669,
                                        2667, 2671, 2672, 2822
        1676, 1682, 1689,
                                \PackageError ... 53,
                                                                \popQED .... 2827
```

\position <i>11</i> , 1277,	1322, 1323, 1376,	2841, 2843, 2845, 2847
1281, 1282, 1283,	1400, 1454, 1463,	\reset@font 429, 442
1284, 1285, <u>2042</u> , 2264	1473, 1474, 1494,	\reversemarginpar 596
\postcode	1499, 1502, 1506,	\rightarrow 1451
. 11, 1284, 2042, 2263	1512, 1515, 1518,	\rightskip 2675
printonly (environment) 22	1521, 1524, 1527,	\rlap 2549
\ProcessOptionsX 146	1530, 1534, 1541,	\rule 436, 449, 2551
\proof <u>2820</u>	1579, 1736, 1737,	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
\proofname 2820	1845, 1874, 1908,	0
\protect 355, 368	1930, 1951, 2065,	S
\protected@edef	2089, 2154, 2164,	\savebox 2364
	2165, 2166, 2167,	screenonly (environ-
340, 431, 445		ment)
\providecommand	2170, 2173, 2175,	\scriptsize 2367, 2371
501, 505, 2715	2177, 2179, 2182,	\scshape 2718, 2805
\ProvidesClass 5	2212, 2215, 2216,	\section 227,
\ProvidesFile 3	2217, 2218, 2221,	1854, 1856, 1860,
\ps@headings 2352, 2356	2224, 2227, 2257,	1862, 2301, 2649, 2861
\ps@myheadings 2351, 2355	2259, 2281, 2308,	
\ps@plain 2350, 2354	2362, 2384, 2385,	\section@raggedright
\pushQED 2821	2387, 2389, 2411,	<u>2674</u> , 2678,
\put 2378, 2404	2413, 2416, 2444,	2679, 2687, 2688,
,,	2525, 2527, 2528,	2690, 2691, 2693,
Q	2529, 2532, 2533,	2694, 2696, 2697,
\qed 2821	2534, 2537, 2538,	2699, 2700, 2701,
397, 2463,	2540, 2543, 2544,	2706, 2707, 2710, 2711
2466, 2473, 2477, 2610	2545, 2546, 2564,	\Sectionformat
2100, 2173, 2177, 2010	2609, 2621, 2644,	2622, 2626, 2628, 2639
R	2648, 2684, 2721,	\SelectFootnoteRule
\raggedright	2751, 2808, 2822, 2832	616, 618
1986, 2027, 2253		\setbox 385, 440,
\raisebox	\renewcommand 226,	797, 1980, 1999,
		2027, 2038, 2147,
1753, 1982, 1994,	230, 231, 234, 236,	2157, 2210, 2287, 2299
2006, 2021, 2548, 2550	238, 240, 242,	\setcitestyle
\real@adddotafter	244, 246, 296,	24, 231, 305, 311
2630, 2633	691, 856, 1222,	
\realSectionformat .	1287, 1706, 1725,	\setcopyright 17, <u>1538</u>
2626, 2638, 2639	2268, 2433, 2434,	\setcounter 1731,
\received 19, <u>1427</u>	2560, 2561, 2649,	1804, 1869, 2411,
\RecordChanges 17	2653, 2657, 2661, 2670	2413, 2682, 2705, 2709
\ref 2328, 2335	\renewenvironment	\setkeys 37,
\refname 227, 228	. 759, 857, 1380, 2820	155, 1181, 1414,
\refstepcounter 339	\repeat 2370, 2542	1538, 2137, 2138,
\relax 152, 157,	\RequirePackage 29,	2142, 2143, 2200,
164, 191, 277, 278,	30, 213, 214, 215,	2201, 2204, 2205,
321, 340, 342, 346,	216, 217, 218, 220,	2243, 2244, 2247, 2248
360, 374, 389, 399,	223, 225, 454, 516,	\setlength 598, 599, 605,
407, 418, 464, 536,		-
107, 110, 101, 000,	517, 527, 534, 615.	612, 818, 819, 824
601 635 637 735	517, 527, 534, 615, 652, 664, 677, 679	612, 818, 819, 824, 830, 833, 834, 835,
601, 635, 637, 735,	652, 664, 677, 679,	830, 833, 834, 835,
601, 635, 637, 735, 802, 930, 1217, 1219, 1225, 1227,		

\settopmatter . 19,95,	\subsubsection 2657	\tw@ 270		
1414, 1415, 1417,	\subtitle 10, 1214	\two@digits 2419, 2420		
1420, 1422, 1425, 2324	\subtitlenote 14, 1306	\twocolumn 1881,		
\setTrue 411	(642 07 07 07 07 07 07 07 07 07 07 07 07 07	1883, 1885, 1887, 1889		
\SetWatermarkColor . 529	Т	,,,,		
\SetWatermarkFontSize 528	\teaserfigure <u>1704</u>	\mathbf{U}		
\SetWatermarkText 530	teaserfigure (environ-	\unskip 388, 457,		
\sfdefault 691	ment) 17	624, 1280, 1286,		
\sffamily	\terms 16, 1371	1293, 2039, 2042,		
1931, 1933, 1935,	\textbf 1456, 1468	2043, 2045, 2046,		
1937, 1939, 1941,	\textbullet 458, 1455,	2047, 2048, 2049,		
1945, 2086, 2091,	2463, 2466, 2473, 2477	2059, 2118, 2262,		
2095, 2429, 2554,	\textcolor 2554	2263, 2264, 2265,		
2678, 2679, 2680,	\textheight 2370	2266, 2267, 2268,		
2687, 2688, 2690,	\textit 1469,	2269, 2270, 2272,		
2691, 2696, 2697,	2326, 2330, 2331, 2332	2310, 2318, 2335, 2348		
2706, 2707, 2710, 2711	\textrightarrow	\unvbox 441, 628, 633		
\shortauthors 20, 1247,	459, 1451, 1465	\upshape 856		
1248, 1255, 1256,	\textwidth 779, 798, 799,	\url 1577, 2868		
1258, 1261, 1262,	1726, 1970, 1998,	\UrlBreakPenalty		
1264, 1821, 1823, 2428	2026, 2063, 2164, 2209	2193, 2196		
\shortcite 504,507	\thanks 14, 1706, 2347	\urlstyle 462,471,474		
\shorttitle 2448, 2456,	\thankses	\usebox 2378, 2404		
2466, 2477, 2484, 2497	1709, 1711, 1739, 2347	\usepackage		
\showeprint 2883	\the 1337, 1339,	9, 10, 11, 12, 13, 14		
\sidebar <u>757</u>	2367, 2371, 2419, 2545			
\sidebar <u>757</u> sidebar (environment) . <u>21</u>	2367, 2371, 2419, 2545 \theACM@time@hours .	v		
		\value 1470		
sidebar (environment) . $\overline{21}$	\theACM@time@hours	\value		
sidebar (environment) . 21 \skip 626	$\label{eq:continuous} $$ \the ACM@time@hours$	\value		
sidebar (environment) 21 \skip 626 \small 429, 762, 769,	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	\value		
sidebar (environment) . 21 \skip 626 \small 429, 762, 769, 777, 1443, 1846,	$\label{eq:continuous} $$ \the ACM@time@hours$	\value		
sidebar (environment) . 21 \skip 626 \small 429, 762, 769,	\theACM@time@hours	\value		
sidebar (environment) . 21 \skip 626 \small 429, 762, 769,	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	\value		
sidebar (environment) . 21 \skip 626 \small 429, 762, 769,	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	\value		
sidebar (environment) . 21 \skip 626 \small 429, 762, 769,	\theACM@time@hours	\value		
sidebar (environment) . 21 \skip 626 \small 429, 762, 769,	\theACM@time@hours	\value		
sidebar (environment) . 21 \skip 626 \small 429, 762, 769,	\theACM@time@hours	\value		
sidebar (environment) . 21 \skip 626 \small 429, 762, 769,	\theACM@time@hours	\value		
sidebar (environment) . 21 \skip	\theACM@time@hours	\value		
sidebar (environment) . 21 \skip 626 \small 429, 762, 769,	\theACM@time@hours	\value		
sidebar (environment) . 21 \skip	\theACM@time@hours	\value		
sidebar (environment) . 21 \skip 626 \small 429, 762, 769,	\theACM@time@hours	\value		
sidebar (environment) . 21 \skip 626 \small 429, 762, 769,	\theACM@time@hours	\value 1470 \vbox 440,		
sidebar (environment) . 21 \skip 626 \small 429, 762, 769,	\theACM@time@hours	\value 1470 \vbox 440,		
sidebar (environment) . 21 \skip 626 \small 429, 762, 769,	\theACM@time@hours	\value 1470 \vbox 440,		
sidebar (environment) . 21 \skip 626 \small 429, 762, 769,	\theACM@time@hours	\value 1470 \vbox 440,		
sidebar (environment) . 21 \skip 626 \small 429, 762, 769,	\theACM@time@hours	\value 1470 \vbox 440,		
sidebar (environment) . 21 \skip 626 \small 429, 762, 769,	\theACM@time@hours	\value 1470 \vbox 440,		

830,	842,	1741,	2253,	2299,	2433,	2653	3, 2657, 2665,
1747,	1753,	1757,	2434,	2518,	2520,	2670	, 2677, 2729, 2759
1836,	1838,	1982,	2522,	2548,	2550,		
1994.	2006.	2021.	2560.	2561.	2649.	\z@skip	412, 792, 847, 2676