

Boris Veytsman †

2017/03/07, v1.32

Abstract

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

Contents

1	Intr	oduction	3					
2	Useı	User's guide						
	2.1	Installation	3					
	2.2	Invocation and options	5					
	2.3	Topmatter commands	7					
	2.4	Algorithms	16					
	2.5	Figures and tables	16					
	2.6	Theorems	18					
	2.7	Online-only and offline-only material	18					
	2.8	Note about anonymous mode	18					
	2.9	Acknowledgments	19					
	2.10	Bibliography	20					
	2.11	Colors	22					
	2.12	Other notable packages and typographic remarks	22					
3	Imp	lementation	24					
	3.1	Identification	24					
	3.2	Options	24					
	3.3	Setting switches	26					
	3.4	Loading base class and package						
	3.5	Paper size and paragraphing	34					

 $^{^*}$ ©2016–2017, Association for Computing Machinery

 $^{^\}dagger$ borisv@lk.net,boris@varphi.com

3.6	Fonts	37
3.7	Floats	38
3.8	Lists	40
3.9	Top matter data	40
3.10	Concepts system	51
3.11	Copyright system	52
3.12	Typesetting top matter	56
3.13	Headers and Footers	70
3.14	Sectioning	74
3.15	TOC Lists	75
3.16	Theorems	75
3.17	Acknowledgments	78
3.18	Conditional typesetting	78
3.19	Additional bibliography commands	79
3 20	End of Class	70

1 Introduction

Association for Computing Machinery is the world's largest educational and scientific computing society, which delivers resources that advance computing as a science and a profession¹. It was one of the early adopters of TeX for its typesetting.

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

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

The 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 the package.

I am grateful to Matthew Fluet, John Owens, Craig Rodkin, Bernard Rous, David Shamma, Stephen Spencer and many others for their invaluable help.

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

2 User's guide

2.1 Installation

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

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

If you decide to install the package yourself, follow the standard rules:

- 1. Run latex on acmart.ins. This will produce the file acmart.cls.
- 2. Put the file acmart.cls and the bibligoraphy files *.bst to the 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 TFX system for the system-specific details.
- 4. The file acmart.pdf provides the documentation for the package (this is the file you are probably reading now).

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

¹http://www.acm.org/

The 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
- caption, http://www.ctan.org/pkg/caption
- comment, http://www.ctan.org/pkg/comment
- environ, http://www.ctan.org/pkg/environ
- fancyhdr, http://www.ctan.org/pkg/fancyhdr
- float, http://www.ctan.org/pkg/float
- fontaxes, http://www.ctan.org/pkg/fontaxes
- geometry, http://www.ctan.org/pkg/geometry
- graphics, http://www.ctan.org/pkg/graphics
- hyperref, http://www.ctan.org/pkg/hyperref
- *ifluatex*, http://www.ctan.org/pkg/ifluatex
- ifxetex, http://www.ctan.org/pkg/ifxetex
- inconsolata, http://www.ctan.org/pkg/inconsolata
- *latex-tools*, http://www.ctan.org/pkg/latex-tools
- *libertine*, http://www.ctan.org/pkg/libertine
- manyfoot, http://www.ctan.org/pkg/manyfoot
- *microtype*, http://www.ctan.org/pkg/microtype
- ms, http://www.ctan.org/pkg/ms
- mweights, http://www.ctan.org/pkg/mweights
- *natbib*, http://www.ctan.org/pkg/natbib
- nccfoots, http://www.ctan.org/pkg/nccfoots
- newtx, http://www.ctan.org/pkg/newtx
- oberdiek, http://www.ctan.org/pkg/oberdiek

```
• pdftex-def, http://www.ctan.org/pkg/pdftex-def
```

- setspace, http://www.ctan.org/pkg/setspace
- totpages, http://www.ctan.org/pkg/totpages
- trimspaces, http://www.ctan.org/pkg/trimspaces
- upquote, http://www.ctan.org/pkg/upquote
- url, http://www.ctan.org/pkg/url
- xcolor, http://www.ctan.org/pkg/xcolor
- xkeyval, http://www.ctan.org/pkg/xkeyval

2.2 Invocation and options

To use the class put in the preamble of your document

```
\documentclass[\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.

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

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

Table 1: The possible values for the format option

Value	Meaning
manuscript	A manuscript. This is the default
acmsmall	Small single column format, used for CIE, CSUR, JACM, JDIQ, JEA,
	JERIC, JETC, TAAS, TACCESS, TACO, TALG, TALLIP (formerly
	TALIP), TCPS, TEAC, TECS, TIIS, TISSEC, TIST, TKDD, TMIS, TOCE,
	TOCHI, TOCL, TOCS, TOCT, TODAES, TODS, TOIS, TOIT, TOMACS,
	TOMM (formerly TOMCCAP), TOMPECS, TOMS, TOPC, TOPLAS,
	TOPS, TOS, TOSEM, TOSN, TRETS, TSAS, TSC, TSLP, TWEB.
acmlarge	Large single column format, used for IMWUT, JOCCH, PACMPL, PO-
	MACS, TAP
acmtog	Large double column format, used for TOG
sigconf	Proceedings format for most of ACM conferences (with the exceptions
	listed below) and all ICPS volumes
siggraph	As of March 2017, this format is no longer used. Please use sigconf
	for SIGGRAPH conferences.
sigplan	Proceedings format for SIGPLAN conferences
sigchi	Proceedings format for SIGCHI conferences
sigchi-a	Format for SIGCHI extended abstract

The option review is useful when combined with the manuscript format option: it provides a version suitable for reviewers and copyeditors.

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

The option natbib is used when the corresponding $\text{BibT}_{\!E\!}X$ style is based on natbib. In most cases you do not need to set it. See Section 2.10.

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

Table 2: Boolean options

Option	Default	Meaning
review	false	A review version: lines are numbered, hyperlinks are colored
screen	false	A screen version: hyperlinks are colored
natbib	true	Whether to use natbib package (see Section 2.10)
anonymous	false	Whether to make author(s) anonymous
authorversion	false	Whether to generate a special version for authors' personal use or posting (see Section 2.3)

2.3 Topmatter commands

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

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

\acmJournal

The macro $\armontomath{\armontenant{acmJournal}{\langle shortName\rangle}}$ 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 3. Note that conference proceedings published in *book* form do not set this macro.

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

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

date: the date(s) of the conference.

venue: the place of the conference.

Examples:

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

Normally this command is entered either by the editor or by the typesetter.

\title The command \title, as in 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.

Table 3: ACM publications and arguments of the $\acm Journal$ command

Abbreviation	Publication
CIE	ACM Computers in Entertainment
CSUR	ACM Computing Surveys
IMWUT	PACM on Interactive, Mobile, Wearable and Ubiquitous Technologies
JACM	Journal of the ACM
JDIQ	ACM Journal of Data and Information Quality
JEA	ACM Journal of Experimental Algorithmics
JERIC	ACM Journal of Educational Resources in Computing
JETC	ACM Journal on Emerging Technologies in Computing Systems
JOCCH	ACM Journal on Computing and Cultural Heritage
PACMPL	PACM on Programming Languages
POMACS	PACM on Measurement and Analysis of Computing Systems
TAAS	ACM Transactions on Autonomous and Adaptive Systems
TACCESS	ACM Transactions on Accessible Computing
TAC0	ACM Transactions on Architecture and Code Optimization
TALG	ACM Transactions on Algorithms
TALLIP	ACM Transactions on Asian and Low-Resource Language Information Processing
TAP	ACM Transactions on Applied Perception
TCPS	ACM Transactions on Cyber-Physical Systems
TEAC	ACM Transactions on Economics and Computation
TECS	ACM Transactions on Embedded Computing Systems
TIIS	ACM Transactions on Interactive Intelligent Systems
TISSEC	ACM Transactions on Information and System Security
TIST	ACM Transactions on Intelligent Systems and Technology
TKDD	ACM Transactions on Knowledge Discovery from Data
TMIS	ACM Transactions on Management Information Systems
TOCE	ACM Transactions on Computing Education
TOCHI	ACM Transactions on Computer-Human Interaction
TOCL	ACM Transactions on Computational Logic
TOCS	ACM Transactions on Computer Systems
TOCT	ACM Transactions on Computation Theory
TODAES	ACM Transactions on Design Automation of Electronic Systems
TODS	ACM Transactions on Database Systems
TOG	ACM Transactions on Graphics
TOIS	ACM Transactions on Information Systems
TOIT	ACM Transactions on Internet Technology
TOMACS	ACM Transactions on Modeling and Computer Simulation
TOMM	ACM Transactions on Multimedia Computing, Communications and Applications
TOMPECS	ACM Transactions on Modeling and Performance Evaluation of Computing Systems
TOMS	ACM Transactions on Mathematical Software
TOPC	ACM Transactions on Parallel Computing
TOPLAS	ACM Transactions on Programming Languages and Systems
TOPS	ACM Transactions on Privacy and Security
TOS	ACM Transactions on Storage
TOSEM	ACM Transactions on Software Engineering and Methodology
TOSN	ACM Transactions on Sensor Networks
TRETS	ACM Transactions on Reconfigurable Technology and Systems
TSAS	ACM Transactions on Spatial Algorithms and Systems
TSC	ACM Transactions on Social Computing
TSLP	ACM Transactions on Speech and Language Processing
TWEB	ACM Transactions on the Web

\subtitle

Besides title, ACM classes allow subtitle, set with the \subtitle{\subtitle}} macro. The commands for specification of authors are highly structured. The reason is, they serve double duty: the authors' information is typeset in the manuscript, *and* is used by the metadata extraction tools for indexing and cataloguing. Therefore it is very important to follow the guidelines exactly.

\author \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 LATEX \and macro! Each author deserves his or her own \author command. Note that some formats do not typset e-mails of ORCID identifiers. Do not worry: metadata tools will get them.

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

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

Similarly you can repeat \email command.

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

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

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

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

However, this format is not generally recommended.

\additionalaffiliation

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

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

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

\position
\institution
\department
\streetaddress
\city
\state
\postcode
\country

The \affiliation and \additionalaffiliation commands are further structured to interact with the metadata extraction tools. Inside the this command you should use \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 old ACM conference formats did not allow for more than six authors and required some efforts from the authors to achieve alignment. The new format is much better in this.

Sometimes an author works in several departments within the same 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 within JD Inst!
\department{John Doe Institute}
\institution{University of San Serriffe}
\country{San Serriffe}}
```

It is expected that these commands are inserted by the author of the manuscript. Like amsart (and unlike standard LTFX), we allow \thanks only outside of commands

\thanks

\title and \author. Example:

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

\titlenote
\subtitlenote
\authornote

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

While the command \thanks generates a note without 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}
```

Please never use \footnotes inside \author or \title commands, since this confuses metadata extraction software (actually these commands now produce errors).

\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, including \acmMonth, for example,

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

\acmArticleSeq

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

\acmPrice

The macro $\acmPrice{\langle price \rangle}$ sets the price for the article (by default 15.00), for example,

```
\acmPrice{25.00}
```

\acmISBN

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

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

\acmD0I

The macro $\acmDOI{\langle DOI \rangle}$ sets the DOI number of the article, for example,

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

It is normally set by the typesetter.

\acmBadgeR \acmBadgeL

Some conference articles get special distinction, 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. The 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 abstract, which puts the badges on the left margin. The argument 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 the journal or book. It is used by the typesetter.

\terms \keywords The macros terms(term, term,...) and keywords(keyword, keyword,...) set the main terms and the additional keywords for the article. Term and keywords must be separated by commas, for example,

```
\terms{wireless, interference}
\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 the various databases. Therefore you need to provide both TeX commands and XML metadata with the paper.

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

```
<concept_significance>500</concept_significance>
 </concept>
 <concept>
  <concept_id>10010520.10010575.10010755</concept_id>
 <concept_desc>Computer systems organization~Redundancy</concept_desc>
  <concept_significance>300</concept_significance>
 </concept>
 <concept>
  <concept_id>10010520.10010553.10010554</concept_id>
  <concept_desc>Computer systems organization~Robotics</concept_desc>
  <concept_significance>100</concept_significance>
 </concept>
 <concept>
  <concept_id>10003033.10003083.10003095</concept_id>
  <concept_desc>Networks~Network reliability</concept_desc>
  <concept_significance>100</concept_significance>
 </concept>
</cs2012>
\end{CCSXML}
\ccsdesc[500]{Computer systems organization~Embedded systems}
\ccsdesc[300]{Computer systems organization~Redundancy}
\ccsdesc{Computer systems organization~Robotics}
\ccsdesc[100]{Networks~Network reliability}
```

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

\setcopyright

There are several possibilities for the copyright of the papers published by ACM: the authors may transfer the rights to ACM, license them to ACM, some or all authors might be employees of the US or Canada Government, etc. Accordingly the command \setcopyright{\ldots\} is introduced. Its argument is the copyright status of the paper, for example, \setcopyright{acmcopyright}. The possible values for this command are listed in Table 4.

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

\copyrightyear

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

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

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

Table 4: Parameters for \setcopyright command

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

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* \maketitle command. Again, this is different from the standard \maketitle.

teaserfigure

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

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

\settopmatter

Some information in the top matter is printed for certain journals or proceedings and suppressed for others. You may override these defaults using the command $\texttt{settopmatter}\{\langle settings \rangle\}$. The settings and their meanings are listed in Table 5. For example,

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

\received

The command $\ensuremath{\mbox{received}[\langle stage\rangle]}{\langle date\rangle}$ sets the history of the publication. The $[\langle stage\rangle]$ argument is optional; the default is Received for the first date and revised for the subsequent ones. For example

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

Table 5: Settings for \settopmatter command

Parameter	Values	Meaning
printccs printacmref printfolios	true/false	Whether to print CCS categories Whether to print ACM bibliographic entry Whether to print page numbers (folios)

\maketitle

The macro \maketitle must be the last command in the top matter group: i.e., it must follow the commands defined in this section.

\shortauthors

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

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

2.4 Algorithms

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

2.5 Figures and tables

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

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

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

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

teaserfigure: a special figure before \maketitle.

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

- 3. Accordingly, when scaling the images, one should use the following sizes:
 - (a) For figure in one-column mode, figure* in two-column mode or teaserfigure— \textwidth (in the one-column you can also use \columnwidth, which coincides with \textwidth in this case).

- (b) For figure in two-column mode—\columnwidth.
- (c) For marginfigure—\marginparwidth.
- (d) For figure* in SIGCHI Extended abstracts—\fulltextwidth.

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

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

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

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

```
\begin{table}
\caption{Simulation Configuration}
\label{tab:conf}
\begin{minipage}{\columnwidth}
\begin{center}
\begin{tabular}{ll}
 \toprule
 TERRAIN\footnote{This is a table footnote. This is a
   table footnote. This is a table footnote.} &
   (200\,m\times\$200\,m) Square\\
 Node Number
               & 289\\
 Node Placement & Uniform\\
 Application & Many-to-Many/Gossip CBR Streams\\
 Payload Size & 32 bytes\\
 Routing Layer & GF\\
 MAC Layer
                 & CSMA/MMSN\\
 Radio Layer & RADIO-ACCNOISE\\
 Radio Bandwidth & 250Kbps\\
               & 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 abstract extensively uses margin space. The package provides three environments for this with option captions:

sidebar: textual information on the margin

marginfigure: a figure on the margin

margintable: a table on the margin

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

2.6 Theorems

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

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

2.7 Online-only and offline-only material

printonly
screenonly

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

```
\section{Supplementary materials}
\begin{printonly}
  This section is included in the online version of the paper.
\end{printonly}
\begin{screenonly}
  (The actual section).
\end{screenonly}
```

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

2.8 Note about anonymous mode

anonsuppress

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

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

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

2.9 Acknowledgments

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

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

acks

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

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

\grantsponsor \grantnum All the financial support *must* be listed using the commands \grantsponsor and \grantnum. These commands tell the postprocessing software about the granting organization and the grant. The format of the command 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 \sponsorID of a \grantsponsor command. Some awards have their own web pages, which you can include using the optional argument of \grantnum command.

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

Example:

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

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

2.10 Bibliography

ACM uses the *natbib* package for formatting references and the style ACM-Reference-Format. bst for BibTEX processing. You may disable loading of *natbib* by using the option natbib=false in \documentclass. However, it is not recommended, as well as the use of 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 sitation styles: the authoryear format acmauthoryear or the numeric format acmnumeric using the command \citestyle, for example,

```
\citestyle{acmauthoryear}
```

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

\setcitestyle

You may further customize *natbib* using \setcitestyle command, for example,

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

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

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

The style supports fields doi and url, for example,

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

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

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

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

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

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

For these entries you can use the lastaccessed field to add the access date to the URL. There are two ways to enter video and audio sources in the bibliograpy corresponding to two different possibilies. For standalone sources available on WWW you can use an online entry, setting there howpublished field, for example,

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

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

```
@Inproceedings{Novak03,
author = "Dave Novak";
               "Solder man",
title =
booktitle = {ACM SIGGRAPH 2003 Video Review on Animation theater
               Program},
               "2003",
year =
publisher = "ACM Press"
address = "New York, NY",
               "4",
pages =
month = "March 21, 2008",
doi = "99.9999/woot07-S422",
howpublished = "Video"
}
```

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

```
@periodical{JCohen96,
  key = "Cohen",
  editor = "Jacques Cohen",
  title = "Special issue: Digital Libraries",
  journal = CACM,
  volume = "39",
  number = "11",
  month = nov,
  year = "1996",
}
```

2.11 Colors

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

ACM provides the following recommendation on color use.

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

- 1. The most common type of inherited Color Vision Deficiency (CVD) is red-green (in which similar-brightness colors that only differ in their amounts of red or green are often confused), and it affects up to 8% of males and 0.5% of females of Northern European descent.
- 2. The most common type of acquired Color Vision Deficiency (CVD) is blue-yellow (including mild cases for many older adults).
- 3. Most printing is in Black & White.
- 4. Situational impairments (e.g., bright sunlight shining on a mobile screen) tend to reduce the entire color gamut, reducing color discriminability.

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

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

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

2.12 Other notable packages and typographic remarks

Several other packages are recommended for specialized tasks.

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

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

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

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

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

3 Implementation

3.1 Identification

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

```
1 (class)\NeedsTeXFormat{LaTeX2e}
2 (*gobble)
3 \ProvidesFile{acmart.dtx}
4 (/gobble)
5 (class)\ProvidesClass{acmart}
6[2017/03/07 v1.32 Typesetting articles for Association of
7 Computing Machinery]
  And the driver code:
8 (*gobble)
9\documentclass{ltxdoc}
10 \usepackage{array,booktabs,amsmath,graphicx,fancyvrb,tabularx}
11 \usepackage[tt=false]{libertine}
12 \usepackage[varqu]{zi4}
13 \usepackage[libertine]{newtxmath}
14 \usepackage[tableposition=top]{caption}
15 \usepackage{hypdoc}
16 \PageIndex
17 \CodelineIndex
18 \RecordChanges
19 \EnableCrossrefs
20 \begin{document}
21 \DocInput{acmart.dtx}
22 \end{document}
23 (/gobble)
24 (*class)
25 \def\@classname{acmart}
```

3.2 Options

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

```
26 \RequirePackage{xkeyval}
```

```
format The possible formats
```

```
27 \define@choicekey*+{acmart.cls}{format}[\ACM@format\ACM@format@nr]{%
28 manuscript, acmsmall, acmlarge, acmtog, sigconf, siggraph,
29 sigplan, sigchi, sigchi-a}[manuscript]{}{%
30 \ClassError{\@classname}{The option format must be manuscript,
31 acmsmall, acmlarge, acmtog, sigconf, siggraph,
32 sigplan, sigchi or sigchi-a}}
33 \def\@DeclareACMFormat#1{\DeclareOptionX{#1}{\setkeys{acmart.cls}{format=#1}}}
34 \@DeclareACMFormat{manuscript}
```

```
35 \@DeclareACMFormat{acmsmall}
                          36 \@DeclareACMFormat{acmlarge}
                          37 \@DeclareACMFormat{acmtog}
                          38 \@DeclareACMFormat{sigconf}
                          39 \@DeclareACMFormat{siggraph}
                          40 \@DeclareACMFormat{sigplan}
                          41 \@DeclareACMFormat{sigchi}
                          42 \@DeclareACMFormat{sigchi-a}
                          43 \ExecuteOptionsX{format}
         \if@ACM@screen Whether we use screen mode
                          44 \define@boolkey+{acmart.cls}[@ACM@]{screen}[true]{%
                          45 \if@ACM@screen
                                \PackageInfo{\@classname}{Using screen mode}%
                          47 \else
                                \PackageInfo{\@classname}{Not using screen mode}%
                          49 \fi{\PackageError{\@classname}{Option screen can be either true or
                          50
                                false}}
                          51 \ExecuteOptionsX{screen=false}
         \footnote{Moreview} Whether we use review mode
                          52 \define@boolkey+{acmart.cls}[@ACM@]{review}[true]{%
                          53 \if@ACM@review
                                \PackageInfo{\@classname}{Using review mode}%
                          55 \else
                                \PackageInfo{\@classname}{Not using review mode}%
                          57 \fi}{\PackageError{\@classname}{Option review can be either true or
                                false}}
                          59 \ExecuteOptionsX{review=false}
  \if@ACM@authorversion Whether we use author's version
                          60 \define@boolkey+{acmart.cls}[@ACM@]{authorversion}[true]{%
                          61 \if@ACM@authorversion
                                \PackageInfo{\@classname}{Using authorversion mode}%
                          62
                              \else
                          63
                                \PackageInfo{\@classname}{Not using authorversion mode}%
                          64
                              fi}{\PackageError{\Qclassname}}Option authorversion can be either true or
                          67 \ExecuteOptionsX{authorversion=false}
\if@ACM@natbib@override Whether to override the format decision about natbib
                          68 \newif\if@ACM@natbib@override
                          69 \@ACM@natbib@overridefalse
         \if@ACM@natbib Whether we use natbib mode
                          70 \define@boolkey+{acmart.cls}[@ACM@]{natbib}[true]{%
                          71 \@ACM@natbib@overridetrue
                          72 \if@ACM@natbib
                                \PackageInfo{\@classname}{Explicitly selecting natbib mode}%
```

```
74 \else
                                                              \PackageInfo{\@classname}{Explicitly deselecting natbib mode}%
                                                 75
                                                         \fi}{\PackageError{\@classname}{Option natbib can be either true or
                                                              false}}
    \if@ACM@anonymous Whether we use anonymous mode
                                                 78 \end{fine} Boolkey + {acmart.cls} [@ACM@] {anonymous} [true] {\% } Constant (a.s.) A constant (b.s.) A constant (b.s
                                                          \if@ACM@anonymous
                                                              \PackageInfo{\@classname}{Using anonymous mode}%
                                                 81
                                                              \PackageInfo{\@classname}{Not using anonymous mode}%
                                                 82
                                                         \fi}{\PackageError{\@classname}{Option anonymous can be either true or
                                                              false}}
                                                 85 \ExecuteOptionsX{anonymous=false}
             \ACM@fontsize The font size to pass to the base class
                                                 86 \def\ACM@fontsize{}
                                                 87 \DeclareOptionX{9pt}{\edef\ACM@fontsize{\CurrentOption}}
                                                 88 \DeclareOptionX{10pt}{\edef\ACM@fontsize{\CurrentOption}}
                                                 89 \DeclareOptionX{11pt}{\edef\ACM@fontsize{\CurrentOption}}
                                                 90 \DeclareOptionX{12pt}{\edef\ACM@fontsize{\CurrentOption}}
                                                 91 \DeclareOptionX{draft}{\PassOptionsToClass{\CurrentOption}{amsart}}
                                                 92 \DeclareOptionX{*}{\PassOptionsToClass{\CurrentOption}{amsart}}
                                                 93 \ProcessOptionsX
                                                 94 \ClassInfo(\Classname)\{Using format \ACM@format, number \ACM@format@nr\}
                                              3.3 Setting switches
 \if@ACM@manuscript Whether we use manuscript mode
                                                 95 \newif\if@ACM@manuscript
        \if@ACM@journal There are two kinds of publications: journals and books
                                                 96 \newif\if@ACM@journal
\if@ACM@sigchiamode The formatting of SIGCHI abstracts is quite unusual. We have a special switch for them.
                                                 97 \newif\if@ACM@sigchiamode
                                                      Setting up switches
                                                 98 \ifnum\ACM@format@nr=5\relax % siggraph
                                                         \ClassWarning{\@classname}{The format 'siggraph' is now obsolete.
                                                              I am switching to sigconf.}
                                                101 \setkeys{acmart.cls}{format=sigconf}
                                                102 \fi
                                                103 \ifnum\ACM@format@nr=0\relax
                                                104 \@ACM@manuscripttrue
                                                105 \else
                                                106 \@ACM@manuscriptfalse
```

```
107∖fi
108 \@ACM@sigchiamodefalse
109 \ifcase\ACM@format@nr
110 \relax % manuscript
111 \@ACM@journaltrue
112 \or % acmsmall
113 \@ACM@journaltrue
114 \or % acmlarge
115 \@ACM@journaltrue
116 \or % acmtog
117 \@ACM@journaltrue
118 \or % sigconf
119 \@ACM@journalfalse
120 \or % siggraph
121 \@ACM@journalfalse
_{\rm 122} \or % sigplan
123 \@ACM@journalfalse
124 \or % sigchi
125 \@ACM@journalfalse
126 \or % sigchi-a
    \@ACM@journalfalse
128 \@ACM@sigchiamodetrue
129 \fi
   A format sets up \if@ACM@natbib only if \@ACM@natbib@override is false (i.e. user
did not overrode format's selection):
130 \if@ACM@natbib@override\else
       \@ACM@natbibtrue
131
```

3.4 Loading base class and package

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

```
133 \ifx\ACM@fontsize\@empty
134 \ifcase\ACM@format@nr
    \relax % manuscript
      \def\ACM@fontsize{9pt}%
137 \or % acmsmall
      \def\ACM@fontsize{10pt}%
138
139 \or % acmlarge
      \def\ACM@fontsize{10pt}%
140
141 \or % acmtog
      \def\ACM@fontsize{9pt}%
143 \or % sigconf
      \def\ACM@fontsize{9pt}%
144
145 \or % siggraph
     \def\ACM@fontsize{9pt}%
146
     \or % sigplan
147
     \def\ACM@fontsize{9pt}%
     \or % sigchi
```

132\fi

```
\def\ACM@fontsize{10pt}%
 150
           \or % sigchi-a
 151
               \def\ACM@fontsize{10pt}%
 152
         \fi
 153
 154 \fi
 155 \ClassInfo{\@classname}{Using fontsize \ACM@fontsize}
 156 \LoadClass[\ACM@fontsize, reqno]{amsart}
 157 \RequirePackage{microtype}
       We need totpages package to calculate the number of pages
 158 \RequirePackage{totpages}
       The amsmath \collect@body is defined using \def. We load environ to access the
\long version of the command
 159 \RequirePackage{environ}
       We use setspace for doublespacing
 160 \if@ACM@manuscript
 161 \RequirePackage{setspace}
 162 \onehalfspacing
 163 \fi
       Citations. We patch \setcitestyle to allow, e.g., \setcitestyle{sort} and
\setcitestyle{nosort}. We patch \citestyle to warn about undefined citation
styles.
 164 \if@ACM@natbib
          \RequirePackage{natbib}
           \renewcommand{\bibsection}{%
 166
 167
                  \section*{\refname}%
                  \phantomsection\addcontentsline{toc}{section}{\refname}%
 168
 169
           }
           \renewcommand{\bibfont}{\bibliofont}
 170
           \renewcommand\setcitestyle[1]{
 171
           \@for\@tempa:=#1\do
 172
           {\def\@tempb{round}\ifx\@tempa\@tempb
 173
                 \renewcommand\NAT@open{(}\renewcommand\NAT@close{)}\fi
 174
             \def\@tempb{square}\ifx\@tempa\@tempb
 175
                  176
             \def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\en
 177
                 \renewcommand\NAT@open{$<$}\renewcommand\NAT@close{$>$}\fi
 178
 179
             \def\@tempb{curly}\ifx\@tempa\@tempb
                 180
             181
 182
                 \renewcommand\NAT@sep{;}\fi
             \def\@tempb{colon}\ifx\@tempa\@tempb
 183
                 \renewcommand\NAT@sep{;}\fi
 184
             \def\@tempb{comma}\ifx\@tempb
 185
                 \renewcommand\NAT@sep{,}\fi
 186
             \def\@tempb{authoryear}\ifx\@tempa\@tempb
 187
                 \NAT@numbersfalse\fi
 188
```

```
\NAT@numberstrue\NAT@superfalse\fi
190
                        \def\@tempb{super}\ifx\@tempa\@tempb
191
                                  \NAT@numberstrue\NAT@supertrue\fi
192
                        193
194
                                  \let\bibstyle=\@gobble\fi
195
                        \def\@tempb{bibstyle}\ifx\@tempa\@tempb
196
                                  \let\bibstyle=\@citestyle\fi
197
                        \def\@tempb{sort}\ifx\@tempa\@tempb
                                 \def\NAT@sort{\@ne}\fi
198
                        \def\@tempb{nosort}\ifx\@tempa\@tempb
199
                                 \def\NAT@sort{\z@}\fi
200
                        \def\@tempb{compress}\ifx\@tempa\@tempb
201
                                 \def\NAT@cmprs{\@ne}\fi
202
                        \def\@tempb{nocompress}\ifx\@tempa\@tempb
203
                                  \def\NAT@cmprs{\@z}\fi
204
                        205
                                 206
                        \def\@tempb{mcite}\ifx\@tempa\@tempb
207
                                 \let\NAT@merge\@ne\fi
208
209
                        \def\@tempb{merge}\ifx\@tempa\@tempb
                                  \ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\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
210
                        \def\@tempb{elide}\ifx\@tempa\@tempb
211
                                  \ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\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
212
                        \def\@tempb{longnamesfirst}\ifx\@tempa\@tempb
213
                                  \NAT@longnamestrue\fi
214
                        \def\@tempb{nonamebreak}\ifx\@tempa\@tempb
215
                                 \def\NAT@nmfmt#1{\mbox{\NAT@up#1}}\fi
216
                        \expandafter\NAT@find@eq\@tempa=\relax\@nil
217
                        \if\@tempc\relax\else
218
                                 \expandafter\NAT@rem@eq\@tempc
219
                                 \def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ensuremath{\def}\def\ef
220
                                     \xdef\NAT@open{\@tempc}\fi
221
222
                                 \def\@tempb{close}\ifx\@tempa\@tempb
223
                                     \xdef\NAT@close{\@tempc}\fi
                                 \def\@tempb{aysep}\ifx\@tempa\@tempb
224
                                     \xdef\NAT@aysep{\@tempc}\fi
225
                                 \def\@tempb{yysep}\ifx\@tempa\@tempb
226
                                     \xdef\NAT@yrsep{\@tempc}\fi
227
                                  \def\@tempb{notesep}\ifx\@tempa\@tempb
228
                                      \xdef\NAT@cmt{\@tempc}\fi
229
230
                                 \def\@tempb{citesep}\ifx\@tempa\@tempb
                                      \xdef\NAT@sep{\@tempc}\fi
231
                        \fi
232
233
                    }%
234
                    \NAT@@setcites
235
236
                    \renewcommand\citestyle[1]{%
237
                            \ifcsname bibstyle@#1\endcsname%
                            \csname bibstyle@#1\endcsname\let\bibstyle\@gobble%
238
                            \else%
239
```

```
\@latex@error{Undefined '#1' citestyle}%
                           240
                                  \fi
                           241
                           242
                              }%
                           243 \fi
                          The default author-year format:
\bibstyle@acmauthoryear
                           244 \newcommand{\bibstyle@acmauthoryear}{%
                           245 \setcitestyle{%
                                  authoryear,%
                           246
                                  open={(},close={)},citesep={;},%
                           247
                                  aysep={},yysep={,},%
                           248
                                  notesep={, }}}
   \bibstyle@acmnumeric
                          The default numeric format:
                           250 \newcommand{\bibstyle@acmnumeric}{%
                           251 \setcitestyle{%
                           252
                                  numbers, sort&compress, %
                           253
                                  open={[},close={]},citesep={,},%
                                  notesep={, }}}
                              The default is numeric:
                           255 \if@ACM@natbib
                           256 \citestyle{acmnumeric}
                           257 \fi
```

\@startsection

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

```
258 \def\@startsection#1#2#3#4#5#6{%
    \if@noskipsec \leavevmode \fi
259
260
    \par
261 \@tempskipa #4\relax
262
    \@afterindenttrue
    263
      \@tempskipa -\@tempskipa \@afterindentfalse
264
265
    \fi
    \if@nobreak
266
      \everypar{}%
267
268
    \else
      \addpenalty\@secpenalty\addvspace\@tempskipa
269
270
    \@ifstar
      {\@ssect{#3}{#4}{#5}{#6}}%
      {\d}^{\d}_{\d}^{\#3}^{\#4}^{\#5}^{\#6}}
274 \def\@sect#1#2#3#4#5#6[#7]#8{%
 \ensuremath{\tt 275} \ensuremath{\tt 0}else\number{\tt 2}fi}\
276 \ifnum #2>\c@secnumdepth
      \let\@svsec\@empty
278 \else
```

```
\refstepcounter{#1}%
279
       \protected@edef\@svsec{\@seccntformat{#1}\relax}%
280
     \fi
281
     \@tempskipa #5\relax
282
     \ifdim \@tempskipa>\z@
283
284
       \begingroup
285
         #6{%
           \@hangfrom{\hskip #3\relax\@svsec}%
286
             \interlinepenalty \@M #8\@@par}%
287
       \endgroup
288
       \verb|\csname| #1mark\endcsname{#7}%
289
290
       \ifnum #2>\c@secnumdepth \else
291
           \@tochangmeasure{\csname the#1\endcsname}%
292
       \addcontentsline{toc}{#1}{%
293
         \ifnum #2>\c@secnumdepth \else
294
           \protect\numberline{\csname the#1\endcsname}%
295
         \fi
296
297
         #7}%
298
     \else
       \def\@svsechd{%
299
         #6{\hskip #3\relax
300
         \@svsec #8}%
301
         \csname #1mark\endcsname{#7}%
302
303
         \ifnum #2>\c@secnumdepth \else
           \@tochangmeasure{\csname the#1\endcsname\space}%
304
305
         \addcontentsline{toc}{#1}{%
306
           \ifnum #2>\c@secnumdepth \else
307
             \protect\numberline{\csname the#1\endcsname}%
308
           \fi
309
310
           #7}}%
311
    \fi
    \@xsect{#5}}
312
313 \def\@xsect#1{%
     \@tempskipa #1\relax
314
     \left( \cdot \right) = \left( \cdot \right)
315
       \par \nobreak
316
317
       \vskip \@tempskipa
       \@afterheading
318
319
     \else
       \@nobreakfalse
320
       \global\@noskipsectrue
321
       \everypar{%
322
323
         \if@noskipsec
324
           \global\@noskipsecfalse
325
          {\setbox\z@\lastbox}%
326
           \clubpenalty\@M
           \begingroup \@svsechd \endgroup
327
           \unskip
328
```

```
\@tempskipa #1\relax
                                                                             329
                                                                                                                        \hskip -\@tempskipa
                                                                             330
                                                                                                                \else
                                                                            331
                                                                                                                        \clubpenalty \@clubpenalty
                                                                             332
                                                                                                                        \everypar{}%
                                                                             333
                                                                             334
                                                                                                                fi}%
                                                                             335
                                                                                               \fi
                                                                                               \ignorespaces}
                                                                            336
                                                                             337 \def\@seccntformat#1{\csname the#1\endcsname\quad}
                                                                            338 \def\@ssect#1#2#3#4#5{%
                                                                                               \@tempskipa #3\relax
                                                                                                \left( \cdot \right) = \left( \cdot \right)
                                                                                                       \begingroup
                                                                                                               #4{%
                                                                             342
                                                                                                                        \@hangfrom{\hskip #1}%
                                                                             343
                                                                                                                                \interlinepenalty \@M #5\@@par}%
                                                                             344
                                                                                                       \endgroup
                                                                             345
                                                                             346
                                                                                               \else
                                                                                                       \def\@svsechd{#4{\hskip #1\relax #5}}%
                                                                             348
                                                                                              \@xsect{#3}}
         \@startsection Amsart redefines \startsection. Here we redefine it again to make TOC working
                                                                            350 \def\@starttoc#1#2{\begingroup
                                                                                              \setTrue{#1}%
                                                                                              \par\removelastskip\vskip\z@skip
                                                                            352
                                                                                               \@startsection{section}\@M\z@{\linespacing\@plus\linespacing}%
                                                                                                       {.5\linespacing}{\centering\contentsnamefont}{#2}%
                                                                                              \@input{\jobname.#1}%
                                                                             355
                                                                                              \if@filesw
                                                                            356
                                                                                                        \@xp\newwrite\csname tf@#1\endcsname
                                                                            357
                                                                                                       358
                                                                             359
                                                                                                \global\@nobreakfalse \endgroup
                                                                                                \addvspace{32\p@\@plus14\p@}%
                                                                            362 }
            \l@subsection
                                                                         Amsart has too large spacing
                                                                            363 \ensuremath{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{\def}{
\l@subsubsection Amsart has too large spacing
                                                                            364 \end{0.0} 1964 \end{0.0} 364 \end{0.0}
                                                                                       And hyperref
                                                                            365 \let\@footnotemark@nolink\@footnotemark
                                                                             366 \let\@footnotetext@nolink\@footnotetext
                                                                             367 \RequirePackage[bookmarksnumbered,unicode]{hyperref}
                                                                             368 \pdfstringdefDisableCommands{%
                                                                             369 \def\unskip{}%
```

```
\def\textrightarrow{ -> }%
                      371
                           \def\footnotemark{}%
                      372
                      373 }
                      374 \urlstyle{rm}
                       375 \ifcase\ACM@format@nr
                       376 \relax % manuscript
                      377 \or % acmsmall
                      378 \or % acmlarge
                      379 \or % acmtog
                      380 \or % sigconf
                      381 \or % siggraph
                      382 \or % sigplan
                      383 \urlstyle{sf}
                      384 \or % sigchi
                      385 \or % sigchi-a
                      386 \urlstyle{sf}
                      387 \fi
                       388 \if@ACM@screen
                          \hypersetup{colorlinks,
                              linkcolor=ACMRed,
                      390
                              citecolor=ACMPurple,
                      391
                              urlcolor=ACMDarkBlue,
                      392
                              filecolor=ACMDarkBlue}
                      393
                       394 \else
                      395 \hypersetup{hidelinks}
                         Bibliography mangling.
                       397 \if@ACM@natbib
                      398 \let\citeN\cite
                      399 \let\cite\citep
                       400 \let\citeANP\citeauthor
                           \let\citeNN\citeyearpar
                           \let\citeyearNP\citeyear
                       402
                            \let\citeyear\citeyearpar
                            \let\citeNP\citealt
                       404
                            \DeclareRobustCommand\citeA
                       405
                               {\begingroup\NAT@swafalse
                       406
                                 \verb|\label{lem:lem:nate}| $$ \operatorname{NAT}\operatorname{Copen} \operatorname{NAT}\operatorname{Copen} \
                       407
                           \providecommand\newblock{}%
                       409 \else
                           \providecommand\citename[1]{#1}
                      {\tt 412 \ def\ shortcite\#1{\ if NAT@numbers\ cite{\#1}\ lse\ citeyear{\#1}\ fi}}
                     Amsart redefines \bibliographystyle since it prefers AMS bibliography. We turn it
\bibliographystyle
                      back to LaTeX definition:
                      413 \def\bibliographystyle#1{%
                      414 \ifx\@begindocumenthook\@undefined\else
```

\def\textbullet{- }%

```
\expandafter\AtBeginDocument
415
    \fi
416
      {\if@filesw
417
          \immediate\write\@auxout{\string\bibstyle{#1}}%
418
419
        \fi}}
  Graphics and color
420 \RequirePackage{graphicx, xcolor}
  We define ACM colors according to [7]:
421 \definecolor[named]{ACMBlue}{cmyk}{1,0.1,0,0.1}
422 \definecolor[named]{ACMYellow}{cmyk}{0,0.16,1,0}
423 \definecolor[named]{ACMOrange}{cmyk}{0,0.42,1,0.01}
424 \definecolor[named]{ACMRed}{cmyk}{0,0.90,0.86,0}
425 \definecolor[named]{ACMLightBlue}{cmyk}{0.49,0.01,0,0}
426 \definecolor[named]{ACMGreen}{cmyk}{0.20,0,1,0.19}
427 \definecolor[named]{ACMPurple}{cmyk}{0.55,1,0,0.15}
428 \definecolor[named]{ACMDarkBlue}{cmyk}{1,0.58,0,0.21}
```

3.5 Paper size and paragraphing

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

```
429 \RequirePackage{geometry}
430 \ifcase\ACM@format@nr
431 \relax % manuscript
     \geometry{letterpaper,head=13pt,
     marginparwidth=6pc}%
434 \or % acmsmall
     \geometry{twoside=true,
       includeheadfoot, head=13pt, foot=2pc,
       paperwidth=6.75in, paperheight=10in,
437
       top=58pt, bottom=44pt, inner=46pt, outer=46pt,
438
       marginparwidth=2pc
439
     }%
440
441\or % acmlarge
      \geometry{twoside=true, head=13pt, foot=2pc,
443
       paperwidth=8.5in, paperheight=11in,
444
       includeheadfoot,
       top=78pt, bottom=114pt, inner=81pt, outer=81pt,
445
       marginparwidth=4pc
446
       }%
447
448 \or % acmtog
     \geometry{twoside=true, head=13pt, foot=2pc,
450
       paperwidth=8.5in, paperheight=11in,
451
       includeheadfoot, columnsep=24pt,
452
       top=52pt, bottom=75pt, inner=52pt, outer=52pt,
       marginparwidth=2pc
453
```

```
455 \or % sigconf
                   \geometry{twoside=true, head=13pt,
                     paperwidth=8.5in, paperheight=11in,
             457
                     includeheadfoot, columnsep=2pc,
             458
             459
                     top=57pt, bottom=73pt, inner=54pt, outer=54pt,
             460
                     marginparwidth=2pc
                     }%
             461
             462\or % siggraph
                   \geometry{twoside=true, head=13pt,
             463
                     paperwidth=8.5in, paperheight=11in,
             464
                     includeheadfoot, columnsep=2pc,
                     top=57pt, bottom=73pt, inner=54pt, outer=54pt,
                     marginparwidth=2pc
             467
                     }%
             468
             469\or % sigplan
                   \geometry{twoside=true, head=13pt,
             470
                     paperwidth=8.5in, paperheight=11in,
             471
             472
                     includeheadfoot=false, columnsep=2pc,
             473
                     top=1in, bottom=1in, inner=0.75in, outer=0.75in,
                     marginparwidth=2pc
             474
                     }%
             475
             476 \or % sigchi
                   \geometry{twoside=true, head=13pt,
             477
             478
                     paperwidth=8.5in, paperheight=11in,
             479
                     includeheadfoot, columnsep=2pc,
                     top=66pt, bottom=73pt, inner=54pt, outer=54pt,
             480
                     marginparwidth=2pc
             481
                     }%
             482
             483 \or % sigchi-a
                   \geometry{twoside=false, head=13pt,
             484
             485
                     paperwidth=11in, paperheight=8.5in,
             486
                     includeheadfoot, marginparsep=72pt,
                     marginparwidth=170pt, columnsep=20pt,
             487
                     top=72pt, bottom=72pt, left=314pt, right=72pt
             488
             489
                     }%
                     \@mparswitchfalse
             490
             491
                     \reversemarginpar
             492∖fi
\parindent
            Paragraphing
  \parskip
             493 \setlength\parindent{10\p@}
             494 \setlength\parskip{\z@}
             495 \ifcase\ACM@format@nr
             496 \relax % manuscript
             497 \or % acmsmall
             498 \or % acmlarge
             499 \or % acmtog
             500 \setlength\parindent{9\p@}%
             501 \or % sigconf
```

}%

454

```
502\or % siggraph
503\or % sigplan
504\or % sigchi
505\or % sigchi-a
506\fi
```

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

We use *manyfoot* for layered footnotes instead.

\copyrightpermissionfootnoterule

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

```
507 \def\copyrightpermissionfootnoterule{\kern-3\p@
                     \hrule \@width \columnwidth \kern 2.6\p@}
                 509 \RequirePackage{manyfoot}
                 510 \SelectFootnoteRule[2]{copyrightpermission}
                 511 \DeclareNewFootnote{copyrightpermission}
\footnoterule Tschichold's rules:
                 512 \def\footnoterule{\kern-3\p@
                 513 \hrule \@width 4pc \kern 2.6\p@}
 \endminipage
                We do not use footnote rules in minipages
                 514 \def\endminipage{%
                 515
                        \par
                        \unskip
                 516
                        \ifvoid\@mpfootins\else
                 517
                          \vskip\skip\@mpfootins
                 518
                          \normalcolor
                          \unvbox\@mpfootins
                 521
                                          %% added 24 May 89
                 522
                        \@minipagefalse
                      \color@endgroup
                 523
                 524
                      \egroup
                      \expandafter\@iiiparbox\@mpargs{\unvbox\@tempboxa}}
 \@makefntext We do note use indentation for footnotes
                 526 \def\@makefntext{\noindent\@makefnmark}
\@footnotetext In sigchi-a mode our footnotes are on the margins!
                 527 \if@ACM@sigchiamode
                 528 \long\def\@footnotetext#1{\marginpar{%
                 529
                        \reset@font\small
                        \interlinepenalty\interfootnotelinepenalty
                 530
                 531
                        \protected@edef\@currentlabel{%
```

532

\csname p@footnote\endcsname\@thefnmark

```
533
                          }%
                          \color@begingroup
                   534
                            \@makefntext{%
                   535
                              \rule\z@\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
                   536
                   537
                          \color@endgroup}}%
                   538 \fi
\@mpfootnotetext
                  We want the footnotes in minipages centered:
                   539 \long\def\@mpfootnotetext#1{%
                        \global\setbox\@mpfootins\vbox{%
                   541
                          \unvbox\@mpfootins
                          \reset@font\footnotesize
                   542
                          \hsize\columnwidth
                   543
                   544
                          \@parboxrestore
                          \protected@edef\@currentlabel
                               {\csname p@mpfootnote\endcsname\@thefnmark}%
                   546
                   547
                          \color@begingroup\centering
                            \@makefntext{%
                   548
                              \rule\z@\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
                   549
                          \color@endgroup}}
                   550
    \@makefnmark AMS classes use a buggy definition of \makefnmark. We revert to the standard one.
                   551 \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}
    \@textbottom Added some stretch according to David Carlisle's advice at http://tex.stackexchange.com/a/62318/5522
                   552 \def\@textbottom{\vskip \z@ \@plus 1pt}
                   553 \let\@texttop\relax
                  3.6 Fonts
\if@ACM@newfonts Whether we load the new fonts
                   554 \newif\if@ACM@newfonts
                   555 \@ACM@newfontstrue
                   556 \IfFileExists{libertine.sty}{}{\ClassWarning{\@classname}{You do not
                          have libertine package installed. Please upgrade your
                          TeX}\@ACM@newfontsfalse}
                   559 \left[ \frac{2i4.sty}{}{\ClassWarning(\Classname)} \right] 
                         have zi4 package installed. Please upgrade your TeX}\@ACM@newfontsfalse}
                   561 \fileExists{newtxmath.sty}{}{\ClassWarning{\eclassname}{You do not }}
                          have newtxmath package installed. Please upgrade your
                          TeX}\@ACM@newfontsfalse}
                      We use Libertine throughout.
                   564 \if@ACM@newfonts
                   565 \RequirePackage[tt=false]{libertine}
                   566 \RequirePackage[varqu]{zi4}
                   567 \RequirePackage[libertine]{newtxmath}
                   568 \RequirePackage[T1]{fontenc}
                   569 \fi
```

```
The SIGCHI extended abstracts are sans serif:
```

```
570 \if@ACM@sigchiamode
571 \renewcommand{\familydefault}{\sfdefault}
572 \fi
```

3.7 Floats

sidebar

\@sidebar

```
We use caption package
               573 \RequirePackage{caption, float}
               574 \captionsetup[table]{position=top}
               575 \if@ACM@journal
               576 \captionsetup{labelfont={sf, small},
                      textfont={sf, small}, margin=\z@}
               577
               578 \captionsetup[figure]{name={Fig.}}
               579 \else
               580 \captionsetup{labelfont={bf},
                      textfont={bf}, labelsep=colon, margin=\z@}
               581
               582 \ifcase\ACM@format@nr
                   \relax % manuscript
                   \or % acmsmall
               584
                   \or % acmlarge
               585
               586 \or % acmtog
               587 \or % sigconf
               588 \or % siggraph
                     \captionsetup{textfont={it}}
               590 \or % sigplan
                      \captionsetup{labelfont={bf},
               591
                        textfont={normalfont}, labelsep=period, margin=\z@}
               592
                   \or % sigchi
               593
                     \captionsetup[figure]{labelfont={bf, small},
               594
                        textfont={bf, small}}
               595
                    \or % sigchi-a
               596
                      \captionsetup[figure]{labelfont={bf, small},
               597
                        textfont={bf, small}}
               598
               599
                   \fi
               600\fi
              The sidebar environment:
               601 \newfloat{sidebar}{}{sbar}
               602 \floatname{sidebar}{Sidebar}
               603 \renewenvironment{sidebar}{\Collect@Body\@sidebar}{}
              The processing of the saved text
               {\it 604 \long\def\@sidebar\#1{\bgroup\captionsetup{type=sidebar}\%}}
               605 \marginpar{\small#1}\egroup}
marginfigure The marginfigure environment:
```

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

```
\@marginfigure The processing of the saved text
                    607 \long\def\@marginfigure#1{\bgroup\captionsetup{type=figure}%
                        \marginpar{\centering\small#1}\egroup}
      margintable The margintable environment:
                    {\it 609 } \verb| newenvironment{margintable}{\Collect@Body\@margintable}{} \\
    \@margintable The processing of the saved text
                    610 \long\def\@margintable#1{\bgroup\captionsetup{type=table}%
                    611 \marginpar{\centering\small#1}\egroup}
                       SIGCHI extended abstract provides an interesting possibility to push into the margin.
                    Here we use figure* and table* for this.
   \fulltextwidth We define the width of the boxes as
                    612 \newdimen\fulltextwidth
                    613 \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)
                    614 \if@ACM@sigchiamode
                    615 \def\@dblfloat{\bgroup\columnwidth=\fulltextwidth
                    616 \let\@endfloatbox\@endwidefloatbox
                    617 \def\@fpsadddefault{\def\@fps{tp}}%
                    618 \@float}
                    619 \fi
    \end@dblfloat And the end. Just adding a \bgroup.
                    620 \if@ACM@sigchiamode
                    621 \def\end@dblfloat{%
                           \end@float\egroup}
                    623 \fi
\@endwidefloatbox
                   This is the end of a wide box - we basically move everything to the left
                    624 \def\@endwidefloatbox{%
                    625 \par\vskip\z@skip
                    626 \@minipagefalse
                    627 \outer@nobreak
                    628 \egroup
                    629 \color@endbox
                    630 \global\setbox\@currbox=\vbox{\moveleft
                           \dimexpr(\fulltextwidth-\textwidth)\box\@currbox}%
                    632 \wd\@currbox=\textwidth
                    633 }
```

3.8 Lists

```
634 \ifcase\ACM@format@nr
                     635 \relax % manuscript
                     636 \or % acmsmall
                     637 \or % acmlarge
                     638 \or % acmtog
                     639 \or % sigconf
                     640 \or % siggraph
                     641 \ \text{or} \ \text{\%} \ \text{sigplan}
                     642 \def\labelenumi{\theenumi.}
                     643 \def\labelenumii{\theenumii.}
                     644 \def\labelenumiii{\theenumiii.}
                     645 \def\labelenumiv{\theenumiv.}
                     646 \or % sigchi
                     647 \or % sigchi-a
                     648\fi
\descriptionlabel We do not use default colon as \amsart does:
                     649 \renewcommand{\descriptionlabel}[1]{\hspace\labelsep \upshape\bfseries #1}
     \description AMS uses additional indent of 6pt. Frank recommends dropping it.
                     650 \renewenvironment{description}{\list{}{%
                            \time 12\p@
                            \labelwidth\z@ \let\makelabel\descriptionlabel}%
                     652
                     653 }{
                     654 \endlist
                     655 }
                     656 \let\enddescription=\endlist % for efficiency
```

3.9 Top matter data

We use keyval interface to define journal title and relevant information

```
\label{lem:condition} $$657 \end{cond} $$ 
 658
                                CIE,%
                                     CSUR,%
 659
 660 IMWUT,%
                                      JACM,%
661
                                   JDIQ,%
662
 663 JEA,%
 664 JERIC,%
 665 JETC,%
 666 JOCCH, %
667 PACMPL,%
668 POMACS,%
669 TAAS,%
670 TACCESS,%
671 TACO,%
672 TALG,%
673 TALLIP,%
```

```
TAP,%
674
    TCPS,%
675
    TEAC,%
676
    TECS,%
677
    TIIS,%
678
    TISSEC,%
680
    TIST,%
    TKDD,%
681
    TMIS,%
682
    TOCE,%
683
    TOCHI,%
684
685
    TOCL,%
686
    TOCS,%
    TOCT,%
687
    TODAES,%
688
    TODS,%
689
    TOG,%
690
    TOIS,%
691
    TOIT,%
693
    TOMACS,%
    TOMM,%
694
    TOMPECS,%
695
    TOMS,%
696
    TOPC,%
697
    TOPS,%
698
    TOPLAS,%
699
    TOS,%
700
    TOSEM,%
701
    TOSN,%
702
    TRETS,%
703
    TSAS,%
704
705
    TSC,%
706
    TSLP,%
    TWEB%
707
708 }{%
709 \ifcase\@journalCode@nr
710 \relax % CIE
    \def\@journalName{ACM Computers in Entertainment}%
     \def\@journalNameShort{ACM Comput. Entertain.}%
    \def\@permissionCodeOne{1544-3574}%
713
714 \or % CSUR
    \def\@journalName{ACM Computing Surveys}%
715
     \def\@journalNameShort{ACM Comput. Surv.}%
    \def\@permissionCodeOne{0360-0300}%
718 \or % IMWUT
    \def\@journalName{Proceedings of the ACM on Interactive, Mobile,
720
       Wearable and Ubiquitous Technologies}%
    \def\@journalNameShort{Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.}%
    \def\@permissionCodeOne{2474-9567}%
```

723 \or % JACM

```
724 \def\@journalName{Journal of the ACM}%
    \def\@journalNameShort{J. ACM}%
726 \def\@permissionCodeOne{0004-5411}%
727\or % JDIQ
728 \def\@journalName{ACM Journal of Data and Information Quality}%
729 \def\@journalNameShort{ACM J. Data Inform. Quality}%
730 \def\@permissionCodeOne{1936-1955}%
731 \or % JEA
732 \def\@journalName{ACM Journal of Experimental Algorithmics}%
733 \def\@journalNameShort{ACM J. Exp. Algor.}%
^{734} \ \ensuremath{\mbox{def}\permissionCodeOne\{1084-6654\}\%}
735 \or % JERIC
736 \def\@journalName{ACM Journal of Educational Resources in Computing}%
    \def\@journalNameShort{ACM J. Edu. Resources in Comput.}%
    \def\@permissionCodeOne{1073-0516}%
739 \or % JFTC
740 \def\@journalName{ACM Journal on Emerging Technologies in Computing Systems}%
741 \def\@journalNameShort{ACM J. Emerg. Technol. Comput. Syst.}%
742 \def\@permissionCodeOne{1550-4832}%
743 \or % JOCCH
744 \def\@journalName{ACM Journal on Computing and Cultural Heritage}%
745 \def\@journalName{ACM J. Comput. Cult. Herit.}%
746 \or % PACMPL
747 \def\@journalName{Proceedings of the ACM on Programming Languages}%
    \def\@journalName{Proc. ACM Program. Lang.}%
^{749} \ \ensuremath{\mbox{def}\permissionCodeOne\{2475-1421\}\%}
750 \or % POMACS
751 \def\@journalName{Proceedings of the ACM on Measurement and Analysis of Computing Systems}%
752 \def\@journalName{Proc. ACM Meas. Anal. Comput. Syst.}%
753 \def\@permissionCodeOne{2476-1249}%
754 \or % TAAS
755 \def\@journalName{ACM Transactions on Autonomous and Adaptive Systems}%
756 \def\@journalNameShort{ACM Trans. Autonom. Adapt. Syst.}%
757 \def\@permissionCodeOne{1556-4665}%
758 \or % TACCESS
759 \def\@journalName{ACM Transactions on Accessible Computing}%
    \def\@journalNameShort{ACM Trans. Access. Comput.}%
    \def\@permissionCodeOne{1936-7228}%
762 \or % TACO
763 \def\@journalName{ACM Transactions on Architecture and Code Optimization}%
764 \or % TALG
765 \def\@journalName{ACM Transactions on Algorithms}%
766 \def\@journalNameShort{ACM Trans. Algor.}%
^{767} \def\@permissionCodeOne{1549-6325}%
768 \or % TALLIP
769 \def\@journalName{ACM Transactions on Asian and Low-Resource Language Information Processing}%
770 \def\@journalNameShort{ACM Trans. Asian Low-Resour. Lang. Inf. Process.}%
771 \def\@permissionCodeOne{2375-4699}%
```

773 \def\@journalName{ACM Transactions on Applied Perception}%

772 \or % TAP

```
774 \or % TCPS
775 \def\@journalName{ACM Transactions on Cyber-Physical Systems}%
776 \or % TEAC
777 \def\@journalName{ACM Transactions on Economics and Computation}%
778 \or % TECS
779 \def\@journalName{ACM Transactions on Embedded Computing Systems}%
780 \def\@journalNameShort{ACM Trans. Embedd. Comput. Syst.}%
781 \def\@permissionCodeOne{1539-9087}%
782 \or % TIIS
783 \def\@journalName{ACM Transactions on Interactive Intelligent Systems}%
784 \def\@journalNameShort{ACM Trans. Interact. Intell. Syst.}%
    \def\@permissionCodeOne{2160-6455}%
786 \or % TISSEC
   \def\@journalName{ACM Transactions on Information and System Security}%
    \def\@journalNameShort{ACM Trans. Info. Syst. Sec.}%
789 \def\@permissionCodeOne{1094-9224}%
790 \or % TIST
791 \def\@journalName{ACM Transactions on Intelligent Systems and Technology}%
792 \def\@journalNameShort{ACM Trans. Intell. Syst. Technol.}%
793 \def\@permissionCodeOne{2157-6904}%
794 \or % TKDD
795 \def\@journalName{ACM Transactions on Knowledge Discovery from Data}%
796 \def\@journalNameShort{ACM Trans. Knowl. Discov. Data.}%
797 \def\@permissionCodeOne{1556-4681}%
798 \or % TMIS
799 \def\@journalName{ACM Transactions on Management Information Systems}%
    \def\@journalNameShort{ACM Trans. Manag. Inform. Syst.}%
    \def\@permissionCodeOne{2158-656X}%
802 \or % TOCE
803 \def\@journalName{ACM Transactions on Computing Education}%
804 \def\@journalNameShort{ACM Trans. Comput. Educ.}%
805 \def\@permissionCodeOne{1946-6226}%
806 \or % TOCHI
    \def\@journalName{ACM Transactions on Computer-Human Interaction}%
808 \def\@journalNameShort{ACM Trans. Comput.-Hum. Interact.}%
809 \def\@permissionCodeOne{1073-0516}%
810 \or % TOCL
811 \def\@journalName{ACM Transactions on Computational Logic}%
    \def\@journalNameShort{ACM Trans. Comput. Logic}%
    \def\@permissionCodeOne{1529-3785}%
814 \or % TOCS
815 \def\@journalName{ACM Transactions on Computer Systems}%
816 \def\@journalNameShort{ACM Trans. Comput. Syst.}%
817 \def\@permissionCodeOne{0734-2071}%
818 \or % TOCT
\ensuremath{\texttt{819}} \def\@journalName{ACM Transactions on Computation Theory}%
820 \def\@journalNameShort{ACM Trans. Comput. Theory}%
821 \def\@permissionCodeOne{1942-3454}%
822 \or % TODAES
```

823 \def\@journalName{ACM Transactions on Design Automation of Electronic Systems}%

```
\def\@journalNameShort{ACM Trans. Des. Autom. Electron. Syst.}%
    \def\@permissionCodeOne{1084-4309}%
826 \or % TODS
827 \def\@journalName{ACM Transactions on Database Systems}%
    \def\@journalNameShort{ACM Trans. Datab. Syst.}%
829 \def\@permissionCodeOne{0362-5915}%
830 \or % TOG
    \def\@journalName{ACM Transactions on Graphics}%
    \def\@journalNameShort{ACM Trans. Graph.}%
    \def\@permissionCodeOne{0730-0301}
834 \or % TOIS
    \def\@journalName{ACM Transactions on Information Systems}%
    \def\@journalName{ACM Transactions on Information Systems}%
    \def\@permissionCodeOne{1046-8188}%
838 \or % TOIT
    \def\@journalName{ACM Transactions on Internet Technology}%
840 \def\@journalNameShort{ACM Trans. Internet Technol.}%
841 \def\@permissionCodeOne{1533-5399}%
842 \or % TOMACS
843 \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
844 \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
845 \def\@journalNameShort{ACM Trans. Model. Comput. Simul.}%
846 \or % TOMM
847 \def\@journalName{ACM Transactions on Multimedia Computing, Communications and Applications}%
    \def\@journalNameShort{ACM Trans. Multimedia Comput. Commun. Appl.}%
    \def\@permissionCodeOne{1551-6857}%
    \def\@permissionCodeTwo{0100}%
851 \or % TOMPECS
852 \def\@journalName{ACM Transactions on Modeling and Performance Evaluation of Computing Systems}%
    \def\@journalNameShort{ACM Trans. Model. Perform. Eval. Comput. Syst.}%
854 \def\@permissionCodeOne{2376-3639}%
855 \or % TOMS
    \def\@journalName{ACM Transactions on Mathematical Software}%
    \def\@journalNameShort{ACM Trans. Math. Softw.}%
857
    \def\@permissionCodeOne{0098-3500}%
859 \or % TOPC
    \def\@journalName{ACM Transactions on Parallel Computing}%
    \def\@journalNameShort{ACM Trans. Parallel Comput.}%
    \def\@permissionCodeOne{1539-9087}%
863 \or % TOPS
    \def\@journalName{ACM Transactions on Privacy and Security}%
865 \def\@journalNameShort{ACM Trans. Priv. Sec.}%
866 \def\@permissionCodeOne{2471-2566}%
867\or % TOPLAS
868 \def\@journalName{ACM Transactions on Programming Languages and Systems}%
869 \def\@journalNameShort{ACM Trans. Program. Lang. Syst.}%
870 \def\@permissionCodeOne{0164-0925}%
871 \or % TOS
872 \def\@journalName{ACM Transactions on Storage}%
```

873 \def\@journalNameShort{ACM Trans. Storage}%

```
875 \or % TOSEM
                 876 \def\@journalName{ACM Transactions on Software Engineering and Methodology}%
                 877 \def\@journalNameShort{ACM Trans. Softw. Eng. Methodol.}%
                878 \def\@permissionCodeOne{1049-331X}%
                 879 \or % TOSN
                     \def\@journalName{ACM Transactions on Sensor Networks}%
                     \def\@journalNameShort{ACM Trans. Sensor Netw.}%
                882 \def\@permissionCodeOne{1550-4859}%
                883 \or % TRETS
                 884 \def\@journalName{ACM Transactions on Reconfigurable Technology and Systems}%
                     \def\@journalNameShort{ACM Trans. Reconfig. Technol. Syst.}%
                     \def\@permissionCodeOne{1936-7406}%
                 887 \or % TSAS
                     \def\@journalName{ACM Transactions on Spatial Algorithms and Systems}%
                     \def\@journalNameShort{ACM Trans. Spatial Algorithms Syst.}%
                 890 \def\@permissionCodeOne{2374-0353}%
                 891 \or % TSC
                 892 \def\@journalName{ACM Transactions on Social Computing}%
                893 \def\@journalNameShort{ACM Trans. Soc. Comput.}%
                894 \def\@permissionCodeOne{2469-7818}%
                895 \or % TSLP
                896 \def\@journalName{ACM Transactions on Speech and Language Processing}%
                     \def\@journalNameShort{ACM Trans. Speech Lang. Process.}%
                     \def\@permissionCodeOne{1550-4875}%
                 899 \or % TWEB
                 900 \def\@journalName{ACM Transactions on the Web}%
                     \def\@journalNameShort{ACM Trans. Web}%
                     \def\@permissionCodeOne{1559-1131}%
                903\fi
                 904 \ClassInfo{\@classname}{Using journal code \@journalCode}%
                 906 \ClassError{\@classname}{Incorrect journal #1}%
                 907 }%
  \acmJournal
               And the syntactic sugar around it
                908 \def\acmJournal#1{\setkeys{ACM}{acmJournal=#1}}
                   The defaults:
                 909 \def\@journalCode@nr{0}
                 910 \def\@journalName{}%
                 911 \def\@journalNameShort{\@journalName}%
                 912 \def\@permissionCodeOne{XXXX-XXXX}%
                913 \def\@permissionCodeTwo{}%
\acmConference This is the conference command
                914 \newcommand\acmConference[4][]{%
                915 \gdef\acmConference@shortname{#1}%
                916 \gdef\acmConference@name{#2}%
```

874 \def\@permissionCodeOne{1553-3077}%

```
\gdef\acmConference@date{#3}%
                              \gdef\acmConference@venue{#4}%
                         918
                              \ifx\acmConference@shortname\@empty
                                \gdef\acmConference@shortname{#2}%
                         920
                         921
                             \fi}
                         922 \acmConference[Conference'17]{ACM Conference}{July 2017}{Washington,
             \subtitle The subtitle macro
                         924 \def\subtitle#1{\def\@subtitle{#1}}
                         925 \subtitle{}
                        The total number of "groups". Each group is several authors with the same affiliations(s)
    \num@authorgroups
                         926 \newcount\num@authorgroups
                         927 \num@authorgroups=0\relax
                        Whether we are continuing an author group @insideauthorgroup insideauthorgroup-
\if@insideauthorgroup
                        Adding an author to the list of authors and addresses
                         928 \renewcommand\author[2][]{%
                              \if@insideauthorgroup\else
                         929
                                \global\advance\num@authorgroups by 1\relax
                         930
                                \global\@insideauthorgrouptrue
                         931
                         932
                         933
                              \ifx\addresses\@empty
                                \if@ACM@anonymous
                         934
                                   \gdef\addresses{\@author{Anonymous Author(s)}}%
                         935
                                   \gdef\authors{Anonymous Author(s)}%
                         936
                         937
                                   \gdef\addresses{\@author{#2}}%
                                   \gdef\authors{#2}%
                         939
                                \fi
                         940
                              \else
                         941
                                \if@ACM@anonymous\else
                         942
                                   \g@addto@macro\addresses{\and\@author{#2}}%
                         943
                                   \g@addto@macro\authors{\and#2}%
                         944
                                \fi
                         945
                              \fi
                         946
                              \if@ACM@anonymous
                         947
                                \ifx\shortauthors\@empty
                         948
                                   \gdef\shortauthors{Anon.}%
                         949
                                \fi
                         950
                         951
                              \else
                                \def\ensuremath{\def}\
                         952
                         953
                                \ifx\@tempa\@empty
                                   \ifx\shortauthors\@empty
                         954
                                     \gdef\shortauthors{#2}%
                         955
                                   \else
                         956
```

```
\g@addto@macro\shortauthors{\and#2}%
                          957
                                   \fi
                          958
                                 \else
                          959
                                   \ifx\shortauthors\@empty
                          960
                                     \gdef\shortauthors{#1}%
                          961
                          962
                                   \else
                          963
                                     \g@addto@macro\shortauthors{\and#1}%
                                   \fi
                          964
                                 \fi
                          965
                               \fi}
                          966
                         The macro \affiliation mimics \address from amsart. Note that it has an optional
           \affiliation
                         argument we do not currently need, but keep for the possible future use.
                          967 \newcommand{\affiliation}[2][]{%
                               \global\@insideauthorgroupfalse
                               \if@ACM@anonymous\else
                                 \g@addto@macro\addresses{\affiliation{#1}{#2}}%
                          970
                          971
                               \fi}
 \additionalaffiliation Additional affiliations go to footnotes
                          972 \def\additionalaffiliation#1{\authornote{\eadditionalaffiliation{#1}}}
\@additionalaffiliation Process additionalaffiliation inside \authornote
                          973 \def\@additionalaffiliation#1{\bgroup
                              \def\position##1{\ignorespaces}%
                               \def\institution##1{##1\ignorespaces}%
                          976 \def\department{\@ifnextchar[{\@department}]}}%
                          977 \def\@department[##1]##2{\unskip, ##2\ignorespaces}%
                          978 \let\streetaddress\position
                          979 \let\city\position
                          980 \let\state\position
                          981 \let\postcode\position
                          982 \let\country\position
                          983 Also with #1\unskip.\egroup}
                 \email
                         The macro \email mimics \email from amsart. Agian it has an optional argument we
                         do not currently need, but keep for the possible future use.
                          984 \renewcommand{\email}[2][]{%
                               \if@ACM@anonymous\else
                                 \g@addto@macro\addresses{\email{#1}{\#2}}\%
                          986
                          987
                 \orcid Right now we do not typeset orcids gobble
           \@titlenotes The titlenotes
                          988 \def\@titlenotes{}
             \titlenote Adding note to the title
                          989 \def\titlenote#1{%
```

```
\g@addto@macro\@title{\footnotemark}%
                                               990
                                                          \if@ACM@anonymous
                                               991
                                                                \g@addto@macro\@titlenotes{%
                                               992
                                                                     \stepcounter{footnote}\footnotetext{Title note}}%
                                               993
                                               994
                                               995
                                                               \label{lem:lemotes} $$ \end{title} \end{title} $$ \end{title} $$$ \end{title} $$ \end{title} $$$ \end{title} $$$ \end{title}
                                               996
                                                          \fi}
\@subtitlenotes
                                           The subtitlenotes
                                              997 \def\@subtitlenotes{}
     \subtitlenote Adding note to the subtitle
                                              998 \def\subtitlenote#1{%
                                                          \g@addto@macro\@subtitle{\footnotemark}%
                                              999
                                            1000
                                                          \if@ACM@anonymous
                                                                \g@addto@macro\@subtitlenotes{%
                                            1001
                                            1002
                                                                     \stepcounter{footnote}\footnotetext{Subtitle note}}%
                                            1003
                                                          \else
                                                                \g@addto@macro\@subtitlenotes{%
                                            1004
                                            1005
                                                                     \stepcounter{footnote}\footnotetext{#1}}%
                                            1006
                                                         \fi}
     \@authornotes The authornotes
                                            1007 \def\@authornotes{}
          \authornote Adding note to the author
                                            1008 \def\authornote#1{%
                                                         \if@ACM@anonymous\else
                                            1009
                                                                \g@addto@macro\addresses{\@authornotemark}
                                            1010
                                                                \g@addto@macro\@authornotes{%
                                            1011
                                                                     \stepcounter{footnote}\footnotetext{#1}}%
                                            1012
                                            1013 \fi}
             \acmVolume The current volume
                                            1014 \def\acmVolume#1{\def\@acmVolume{#1}}
                                            1015 \acmVolume{1}
             \acmNumber
                                            The current number
                                            1016 \def\acmNumber#1{\def\@acmNumber{#1}}
                                            1017 \acmNumber{1}
          \acmArticle The current article
                                            1018 \def\acmArticle#1{\def\@acmArticle{#1}}
                                            1019 \acmArticle{1}
   \acmArticleSeq The sequence number
                                            1020 \def\acmArticleSeg#1{\def\@acmArticleSeg{#1}}
                                            1021 \acmArticleSeq{\@acmArticle}
```

\acmYear The current year 1022 \def\acmYear#1{\def\@acmYear{#1}} 1023 \acmYear{\the\year} \acmMonth The current month ${\tt 1024 \def\acmMonth\#1{\def\@acmMonth{\#1}}}$ 1025 \acmMonth{\the\month} \@acmPubDate The publication date 1026 \def\@acmPubDate{\ifcase\@acmMonth\or January\or February\or March\or April\or May\or June\or July\or August\or September\or October\or November\or 1029 December\fi~\@acmYear} \acmPrice The price 1030 \def\acmPrice#1{\def\@acmPrice{#1}} 1031 \acmPrice{15.00} \acmISBN The book isbn 1032 \def\acmISBN#1{\def\@acmISBN{#1}} 1033 \acmISBN{978-x-xxxx-xxxx-x/YY/MM} \acmDOI The paper doi 1034 \def\acmDOI#1{\def\@acmDOI{#1}} 1035 \acmDOI{10.1145/nnnnnnn.nnnnnnn} \if@ACM@badge Whether to print badge. Note that either left or right badge triggers it: 1036 \newif\if@ACM@badge 1037 \@ACM@badgefalse \@ACM@badge@width The width of the badge 1038 \newlength\@ACM@badge@width 1039 \setlength\@ACM@badge@width{5pc} \@ACM@title@width The width of the badge 1040 \newlength\@ACM@title@width \@ACM@badge@skip The space between the badge and the title 1041 \newlength\@ACM@badge@skip 1042 \setlength\@ACM@badge@skip{1pc} Setting the right badge \acmBadgeR 1043 \newcommand\acmBadgeR[2][]{\@ACM@badgetrue 1044 \def\@acmBadgeR@url{#1}%

1045 \def\@acmBadgeR@image{#2}}
1046 \def\@acmBadgeR@url{}
1047 \def\@acmBadgeR@image{}

```
\acmBadgeL Setting the left badge
                     1048 \newcommand\acmBadgeL[2][]{\@ACM@badgetrue
                     1049 \def\@acmBadgeL@url{#1}%
                     1050 \def\@acmBadgeL@image{#2}}
                     1051 \def\@acmBadgeL@url{}
                     1052 \def\@acmBadgeL@image{}
                     The start page of the paper
         \startPage
                     1053 \def\startPage#1{\def\@startPage{#1}}
                     1054 \startPage{}
                     Terms are mostly obsolete, we use CCS now. Still it makes sense to keep them for com-
             \terms
                     patibility.
                     1055 \def\terms#1{\def\@terms{#1}}
                     1056 \terms{}
          \keywords
                     Keywords are mostly obsolete, we use CCS now. Still it makes sense to keep them for
                     compatibility.
                     1057 \def\keywords#1{\def\@keywords{#1}}
                     1058 \keywords{}
           abstract Amsart puts abstract in the box. Since we do not know whether we will use two
                     column mode, we prefer to save the text
                     1059 \renewenvironment{abstract}{\Collect@Body\@saveabstract}{}
     \@saveabstract And saving the abstract
                     1060 \long\def\@saveabstract#1{\long\gdef\@abstract{#1}}
                     1061 \@saveabstract{}
           \@lempty The long version of \@empty (to compare with \@abstract)
                     1062 \long\def\@lempty{}
  \if@ACM@printccs Whether to print CCS
                     1063 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printccs}[true]{%
                     1064 \if@ACM@printccs
                             \ClassInfo{\@classname}{Printing CCS}%
                     1065
                     1066 \else
                             \ClassInfo{\@classname}{Suppressing CCS}%
                     1067
                          \fi}{\ClassError{\@classname}{printccs must be true or false}}
\if@ACM@printacmref
                     Whether to print ACM bib
                     1069 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printacmref}[true]{%
                     1070 \if@ACM@printacmref
                     1071
                             \ClassInfo{\@classname}{Printing bibformat}%
                     1072 \else
                             \ClassInfo{\@classname}{Suppressing bibformat}%
                     1073
                     1074 \fi){\ClassError{\@classname}{printacmref must be true or false}}
```

```
\if@ACM@printfolios Whether to print folios
                     1075 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printfolios}[true]{%
                          \if@ACM@printfolios
                             \ClassInfo{\@classname}{Printing folios}%
                     1077
                     1078 \else
                             \ClassInfo{\@classname}{Suppressing folios}%
                     1079
                           \fi}{\ClassError{\@classname}{printfolios must be true or false}}
                     The usual syntactic sugar
      \settopmatter
                     1081 \def\settopmatter#1{\setkeys{@ACM@topmatter@}{#1}}
                         Now the settings
                     1082 \settopmatter{printccs=true, printacmref=true}
                     1083 \if@ACM@manuscript
                     1084 \settopmatter{printfolios=true}
                     1085 \else
                     1086 \if@ACM@journal
                             \settopmatter{printfolios=true}
                     1087
                     1088
                           \else
                     1089
                             \settopmatter{printfolios=false}
                     1090 \fi
                     1091\fi
         \@received The container for the paper history
                     1092 \def\@received{}
          \received The \received command
                     1093 \newcommand\received[2][]{\def\@tempa{#1}%
                     1094
                          \ifx\@tempa\@empty
                     1095
                             \ifx\@received\@empty
                               \gdef\@received{Received #2}%
                     1096
                             \else
                     1097
                     1098
                               \g@addto@macro{\@received}{; revised #2}%
                     1099
                             \fi
                     1100 \else
                     1101
                             \ifx\@received\@empty
                     1102
                               \gdef\@received{#1 #2}%
                     1103
                     1104
                               \g@addto@macro{\@received}{; #1 #2}%
                             \fi
                     1105
                     1106 \fi}
                     1107 \AtEndDocument{%
                          \ifx\@received\@empty\else
                             \par\bigskip\noindent\small\normalfont\@received\par
                     1109
                     1110 \fi}
```

3.10 Concepts system

We exclude CCSXML stuff generated by the ACM system:

```
1111 \RequirePackage{comment}
                      1112 \excludecomment{CCSXML}
         \@concepts This is the storage macro for concepts
                      1113 \let\@concepts\@empty
           \ccsdesc The first argument is the significance, the second is the concept(s)
                      1114 \newcommand\ccsdesc[2][100]{%
                      1115 \ccsdesc@parse#1~#2~}
                     The parser of the expression Significance General Specific (we need textcomp for
     \ccsdesc@parse
                      \\textrightarrow:
                      1116 \RequirePackage{textcomp}
                      1117 \def\ccsdesc@parse#1~#2~#3~{%
                           \expandafter\ifx\csname CCS@#2\endcsname\relax
                            \label{lem:condition} $$\operatorname{CCS@#2\endcsname} \operatorname{ltextbullet} \text{$$\end{#2} \operatorname{ltextrightarrow} $$
                           \g@addto@macro{\@concepts}{\csname CCS@#2\endcsname}\fi
                      1120
                           \label{lem:ccsname} $$\operatorname{CCS@\#2\endcsname}_{\%} $$ \operatorname{CCS@\#2\endcsname}_{\%} $$
                      1121
                             1122
                      1123
                             #3; \fi\fi}}
                      1124
                             Copyright system
                      3.11
                      This is from acmcopyright.sty
 \if@printcopyright A flag whether to print copyright symbol
                      1125 \newif\if@printcopyright
                      1126 \@printcopyrighttrue
\if@printpermission Whether to print permission block
                      1127 \newif\if@printpermission
                      1128 \@printpermissiontrue
       \if@acmowned Whether ACM ownes the rights to the paper
                      1129 \newif\if@acmowned
                      1130 \@acmownedtrue
                         Keys:
                      1131 \define@choicekey*{ACM@}{acmcopyrightmode}[%
                           \acm@copyrightinput\acm@copyrightmode]{none,acmcopyright,acmlicensed,%
                           rightsretained, usgov, usgovmixed, cagov, cagovmixed, %
                           licensedusgovmixed, licensedcagovmixed, othergov, licensedothergov) {%
                      1134
                           \@printpermissiontrue
                      1135
                           \@printcopyrighttrue
                      1136
                           \@acmownedtrue
                      1137
                           \ifnum\acm@copyrightmode=0\relax % none
                      1138
                            \@printpermissionfalse
                      1139
```

```
\@acmownedfalse
                   1141
                        \fi
                   1142
                        \ifnum\acm@copyrightmode=2\relax % acmlicensed
                   1143
                        \@acmownedfalse
                   1144
                        \ifnum\acm@copyrightmode=3\relax % rightsretained
                   1146
                         \@acmownedfalse
                   1147
                        \fi
                   1148
                        \ifnum\acm@copyrightmode=4\relax % usgov
                   1149
                         \@printpermissiontrue
                   1150
                         \@printcopyrightfalse
                         \@acmownedfalse
                   1153
                        \ifnum\acm@copyrightmode=6\relax % cagov
                   1154
                         \@acmownedfalse
                   1155
                   1156
                        \ifnum\acm@copyrightmode=8\relax % licensedusgovmixed
                   1157
                        \@acmownedfalse
                   1159
                        \ifnum\acm@copyrightmode=9\relax % licensedcagovmixed
                   1160
                         \@acmownedfalse
                   1161
                   1162
                        \ifnum\acm@copyrightmode=10\relax % othergov
                   1163
                         \@acmownedtrue
                   1164
                        \ifnum\acm@copyrightmode=11\relax % licensedothergov
                   1166
                         \@acmownedfalse
                   1167
                   1168 \fi}
   \setcopyright This is the syntactic sugar around setting keys.
                   1169 \def\setcopyright#1{\setkeys{ACM@}{acmcopyrightmode=#1}}
                   1170 \setcopyright{acmcopyright}
\@copyrightowner
                  Here is the owner of the copyright
                   1171 \def\@copyrightowner{%
                       \ifcase\acm@copyrightmode\relax % none
                        \or % acmcopyright
                   1173
                   1174 ACM\@.
                        \or % acmlicensed
                   1175
                   1176 Copyright held by the owner/author(s). Publication rights licensed to
                   1177 ACM\@.
                   1178 \or % rightsretained
                       Copyright held by the owner/author(s).
                   1179
                       \or % usgov
                   1180
                   1181 \or % usgovmixed
                   1182 ACM\@.
                        \or % cagov
                   1183
                        Crown in Right of Canada.
                   1185 \or %cagovmixed
```

\@printcopyrightfalse

```
ACM\@.
                        1186
                             \or %licensedusgovmixed
                        1187
                             Copyright held by the owner/author(s). Publication rights licensed to
                        1188
                        1189
                             \or %licensedcagovmixed
                        1190
                             Copyright held by the owner/author(s). Publication rights licensed to
                        1192
                        1193
                             \or % othergov
                             ACM\@.
                        1194
                             \or % licensedothergov
                        1195
                             Copyright held by the owner/author(s). Publication rights licensed to
                             ACM\@.
                        1197
                             \fi}
                        1198
          \@formatdoi Print a clickable doi
                        1199 \def\@formatdoi#1{\url{https://doi.org/#1}}
\@copyrightpermission
                       The canned permission block.
                        1200 \def\@copyrightpermission{%
                             \ifcase\acm@copyrightmode\relax % none
                        1201
                             \or % acmcopyright
                        1202
                              Permission to make digital or hard copies of all or part of this
                        1203
                              work for personal or classroom use is granted without fee provided
                        1204
                        1205
                              that copies are not made or distributed for profit or commercial
                              advantage and that copies bear this notice and the full citation on
                        1206
                              the first page. Copyrights for components of this work owned by
                        1207
                              others than ACM must be honored. Abstracting with credit is
                        1208
                              permitted. To copy otherwise, or republish, to post on servers or to
                        1209
                        1210
                              redistribute to lists, requires prior specific permission
                              and\hspace*{.5pt}/or a fee. Request permissions from
                        1211
                        1212
                              permissions@acm.org.
                             \or % acmlicensed
                        1213
                              Permission to make digital or hard copies of all or part of this
                        1214
                              work for personal or classroom use is granted without fee provided
                        1215
                              that copies are not made or distributed for profit or commercial
                        1216
                              advantage and that copies bear this notice and the full citation on
                        1217
                              the first page. Copyrights for components of this work owned by
                              others than the author(s) must be honored. Abstracting with credit
                        1219
                              is permitted. To copy otherwise, or republish, to post on servers
                        1220
                              or to redistribute to lists, requires prior specific permission
                        1221
                              and\hspace*{.5pt}/or a fee. Request permissions from
                        1222
                              permissions@acm.org.
                        1223
                             \or % rightsretained
                        1224
                              Permission to make digital or hard copies of part or all of this work
                        1225
                              for personal or classroom use is granted without fee provided that
                        1226
                              copies are not made or distributed for profit or commercial advantage
                        1227
                              and that copies bear this notice and the full citation on the first
                        1228
```

page. Copyrights for third-party components of this work must be

honored. For all other uses, contact the

owner\hspace*{.5pt}/author(s).

1229

- \or % usgov 1232
- This paper is authored by an employee(s) of the United States 1233
- Government and is in the public domain. Non-exclusive copying or 1234
- redistribution is allowed, provided that the article citation is 1235
- given and the authors and agency are clearly identified as its 1236
- 1237 source.
- \or % usgovmixed 1238
- 1239 ACM acknowledges that this contribution was authored or co-authored
- by an employee, or contractor of the national government. As such, 1240
- the Government retains a nonexclusive, royalty-free right to 1241
- publish or reproduce this article, or to allow others to do so, for 1242
- Government purposes only. Permission to make digital or hard copies 1243
- for personal or classroom use is granted. Copies must bear this 1244
- notice and the full citation on the first page. Copyrights for 1245
- components of this work owned by others than ACM must be 1246
- honored. To copy otherwise, distribute, republish, or post, 1247
- requires prior specific permission and\hspace*{.5pt}/or a 1248
- fee. Request permissions from permissions@acm.org. 1249
- \or % cagov 1250
- This article was authored by employees of the Government of Canada. 1251
- 1252 As such, the Canadian government retains all interest in the
- copyright to this work and grants to ACM a nonexclusive, 1253
- royalty-free right to publish or reproduce this article, or to allow 1254
- others to do so, provided that clear attribution is given both to 1255
- the authors and the Canadian government agency employing them. 1256
- Permission to make digital or hard copies for personal or classroom 1257
- use is granted. Copies must bear this notice and the full citation 1258
- on the first page. Copyrights for components of this work owned by 1259
- others than the Canadain Government must be honored. To copy 1260
- otherwise, distribute, republish, or post, requires prior specific 1261
- permission and\hspace*{.5pt}/or a fee. Request permissions from 1262
- permissions@acm.org. 1263
- 1264 \or % cagovmixed

- 1265 ACM acknowledges that this contribution was co-authored by an
- affiliate of the national government of Canada. As such, the Crown 1266
- in Right of Canada retains an equal interest in the copyright. 1267
- Reprints must include clear attribution to ACM and the author's 1268
- government agency affiliation. Permission to make digital or hard 1269
- copies for personal or classroom use is granted. Copies must bear 1270
- this notice and the full citation on the first page. Copyrights for 1272 components of this work owned by others than ACM must be honored.
- To copy otherwise, distribute, republish, or post, requires prior 1273
- specific permission and\hspace*{.5pt}/or a fee. Request permissions 1274
- from permissions@acm.org. 1275
- \or % licensedusgovmixed 1276
- 1277 Publication rights licensed to ACM\@. ACM acknowledges that this
- 1278 contribution was authored or co-authored by an employee, contractor
- 1279 or affiliate of the United States government. As such, the
- Government retains a nonexclusive, royalty-free right to publish or 1280
- reproduce this article, or to allow others to do so, for Government 1281

```
purposes only.
                 1282
                       \or % licensedcagovmixed
                 1283
                        Publication rights licensed to ACM\@. ACM acknowledges that this
                 1284
                        contribution was authored or co-authored by an employee, contractor
                 1285
                        or affiliate of the national government of Canada. As such, the
                 1286
                        Government retains a nonexclusive, royalty-free right to publish or
                  1287
                 1288
                        reproduce this article, or to allow others to do so, for Government
                 1289
                        purposes only.
                       \or % othergov
                 1290
                        ACM acknowledges that this contribution was authored or co-authored
                 1291
                        by an employee, contractor or affiliate of a national government. As
                 1292
                        such, the Government retains a nonexclusive, royalty-free right to
                  1293
                        publish or reproduce this article, or to allow others to do so, for
                        Government purposes only.
                 1295
                       \or % licensedothergov
                 1296
                        Publication rights licensed to ACM\@. ACM acknowledges that this
                 1297
                        contribution was authored or co-authored by an employee, contractor
                 1298
                        or affiliate of a national government. As such, the Government
                 1299
                        retains a nonexclusive, royalty-free right to publish or reproduce
                  1301
                        this article, or to allow others to do so, for Government purposes
                 1302
                        only.
                      \fi}
                 1303
                 By default, the copyright year is the same as \acmYear, but one can override this:
 \copyrightyear
                 1304 \def\copyrightyear#1{\def\@copyrightyear{#1}}
                 1305 \copyrightyear{\@acmYear}
                 The teaser figures container
\@teaserfigures
                 1306 \def\@teaserfigures{}
   teaserfigure The teaser figure
                 1307 \newenvironment{teaserfigure}{\Collect@Body\@saveteaser}{}
   \@saveteaser
                 Saving the teaser
                 1308 \long\def\@saveteaser#1{\g@addto@macro\@teaserfigures{\@teaser{#1}}}
                 We redefine amsart \thanks, so the anonymous key works
                 1309 \renewcommand{\thanks}[1]{%
                       \@ifnotempty{#1}{%
                 1310
                         \if@ACM@anonymous
                 1311
                           \g@addto@macro\thankses{\thanks{A note}}%
                 1312
                 1313
                         \g@addto@macro\thankses{\thanks{#1}}%
                 1314
                 1315
```

3.12 Typesetting top matter

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

\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

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

```
1317 \def\maketitle{%
    \if@ACM@anonymous
1318
1319
      % Anonymize omission of \author-s
      \ifnum\num@authorgroups=0\author{}\fi
1320
    \fi
1321
1322
    \begingroup
1323
     \let\@footnotemark\@footnotemark@nolink
     \let\@footnotetext\@footnotetext@nolink
1324
     \renewcommand\thefootnote{\@fnsymbol\c@footnote}%
1325
     \@topnum\z@ % this prevents figures from falling at the top of page
1326
1327
    \hsize=\textwidth
1328
     \def\@makefnmark{\hbox{\@textsuperscript{\@thefnmark}}}%
1329
     \@mktitle\if@ACM@sigchiamode\else\@mkauthors\fi\@mkteasers
     \@printtopmatter
1331
    \if@ACM@sigchiamode\@mkauthors\fi
1332
     \setcounter{footnote}{0}%
1333
     1334
1335
    \@titlenotes
1336
     \@subtitlenotes
     \@authornotes
     \let\@makefnmark\relax \let\@thefnmark\relax
1338
     \let\@makefntext\noindent
1339
     \ifx\@empty\thankses\else
1340
      1341
        1342
    \fi
1343
    \footnotetextcopyrightpermission{\parindent\z@\parskip0.1\baselineskip
1344
     \if@ACM@authorversion\else
1345
      \if@printpermission\@copyrightpermission\par\fi
1346
    \fi
1347
1348
     \if@ACM@manuscript\else
1349
      \if@ACM@journal\else % Print the conference short name
1350
        {\itshape \acmConference@shortname, \acmConference@venue}\par
1351
      \fi
     \fi
1352
     \if@printcopyright
1353
      \copyright\ \@copyrightyear\ \@copyrightowner\
1354
1355
     \else
1356
      \@copyrightyear.\
1357
    \if@ACM@manuscript
1358
      Manuscript submitted to ACM\\
1359
```

```
\else
1360
                   \if@ACM@authorversion
1361
                               This is the author's version of the work. It is posted here for
1362
                               your personal use. Not for redistribution. The definitive Version
1363
                               of Record was published in
1364
1365
                               \if@ACM@journal
                                    \emph{\@journalName}%
1366
1367
                                    \emph{Proceedings of \acmConference@name, \acmConference@date}%
1368
                               \fi
1369
                               \ifx\@acmDOI\@empty
1370
1371
1372
                               \else
                                     , \@formatdoi{\@acmDOI}.
1373
                               \fi\\
1374
                         \else
1375
                               \if@ACM@journal
1376
                                    \verb|\end{ART} \end{ART} $$ \end
1377
1378
                                    \$\@acmPrice\\
1379
                                    DOI: \nolinkurl{\@acmDOI}%
                               \else % Conference
1380
                                       \@acmISBN
1381
                                       \ifx\@acmPrice\@empty.\else\dots\$\@acmPrice\fi\\
1382
                                      DOI: \nolinkurl{\@acmDOI}%
1383
                               \fi
1384
                         \fi
1385
                   \fi}%
1386
1387
              \endgroup
              \setcounter{footnote}{0}%
1388
              \@mkabstract
1389
              \if@ACM@printccs
1390
1391
                   \ifx\@concepts\@empty\else\bgroup
1392
                         {\@specialsection{CCS Concepts}%
                                  \@concepts\par}\egroup
1393
                      \fi
1394
                 \fi
1395
                 \if\@terms\@empty\else\bgroup
1396
                         {\@specialsection{General Terms}%
1397
1398
                                 \@terms\par}\egroup
1399
1400
                 \ifx\@keywords\@empty\else\bgroup
                         {\if@ACM@journal
1401
                                 \@specialsection{Additional Key Words and Phrases}%
1402
1403
1404
                                  \@specialsection{Keywords}%
1405
                            \fi
1406
                                 \@keywords}\par\egroup
                 \fi
1407
              \andify\authors
1408
              \andify\shortauthors
1409
```

```
\global\let\authors=\authors
                   1410
                         \global\let\shortauthors=\shortauthors
                   1411
                         \if@ACM@printacmref
                   1412
                            \@mkbibcitation
                   1413
                        \fi
                   1414
                   1415
                        \hypersetup{pdfauthor={\authors},
                   1416
                           pdftitle={\@title}, pdfkeywords={\@concepts}}%
                         \@printendtopmatter
                   1417
                        \@afterindentfalse
                   1418
                         \@afterheading
                   1419
                   1420 }
\@specialsection
                   This macro starts section for proceedings and uses small for journals
                   1421 \def\@specialsection#1{%
                        \ifcase\ACM@format@nr
                        \relax % manuscript
                   1423
                           \par\medskip\small\noindent#1: %
                   1424
                        \or % acmsmall
                   1425
                          \par\medskip\small\noindent#1: %
                   1426
                   1427
                         \or % acmlarge
                          \par\medskip\small\noindent#1: %
                   1428
                         \or % acmtog
                   1429
                           \par\medskip\small\noindent#1: %
                   1430
                         \or % sigconf
                   1431
                          \section*{#1}%
                   1432
                   1433
                        \or % siggraph
                           \section*{#1}%
                   1434
                   1435
                        \or % sigplan
                   1436
                           \paragraph*{#1}%
                        \or % sigchi
                   1437
                           \section*{#1}%
                   1438
                         \or % sigchi-a
                   1439
                           \section*{#1}%
                   1440
                   The printing of top matter starts the new page, and uses the given title box. Note that
\@printtopmatter
                   for sigchi-a we print badges here rather than in \mktitle since we want them on the
                   margins.
                   1442 \def\@printtopmatter{%
                   1443
                        \ifx\@startPage\@empty
                            \gdef\@startPage{1}%
                   1444
                   1445
                         \else
                            \setcounter{page}{\@startPage}%
                   1446
                        \fi
```

1447

1448 1449

1450

1451

1452

\noindent

\thispagestyle{firstpagestyle}%

\ifcase\ACM@format@nr

\box\mktitle@bx\par

\relax % manuscript

```
\or % acmsmall
           1454
                  \box\mktitle@bx\par
           1455
                  \noindent\hrulefill\par
           1456
           1457
                \or % acmlarge
           1458
                  \box\mktitle@bx\par
           1459
                  \noindent\hrulefill\par
           1460
                \or % acmtog
                  \twocolumn[\box\mktitle@bx]%
           1461
                \or % sigconf
           1462
                  \twocolumn[\box\mktitle@bx]%
           1463
           1464
                \or % siggraph
                  \twocolumn[\box\mktitle@bx]%
           1465
                \or % sigplan
           1466
                  \twocolumn[\box\mktitle@bx]%
           1467
                \or % sigchi
           1468
                  \twocolumn[\box\mktitle@bx]%
           1469
           1470
                \or % sigchi-a
           1471
                  \par\box\mktitle@bx\par\bigskip
           1472
                  \if@ACM@badge
                      \marginpar{\noindent
           1473
                        \ifx\@acmBadgeL@image\@empty\else
           1474
                          \href{\@acmBadgeL@url}{%
           1475
                            1476
                           \hskip\ensuremath{@ACM@badge@skip}
           1477
           1478
                         \fi
                        \ifx\@acmBadgeR@image\@empty\else
           1479
                          \href{\@acmBadgeR@url}{%
           1480
                            \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}%
           1481
                         \fi}%
           1482
                  \fi
           1483
           1484
                \fi
           1485 }
\@mktitle The title of the article
           1486 \def\@mktitle{%
           1487
                \ifcase\ACM@format@nr
                \relax % manuscript
           1488
                  \@mktitle@i
           1489
                \or % acmsmall
           1490
                  \@mktitle@i
           1491
           1492
                \or % acmlarge
           1493
                  \@mktitle@i
                \or % acmtog
           1494
                  \@mktitle@i
           1495
                \or % sigconf
           1496
                  \@mktitle@iii
           1497
                \or % siggraph
           1498
           1499
                  \@mktitle@iii
                \or % sigplan
```

\noindent\hrulefill\par

```
\@mktitle@iii
                 1501
                       \or % sigchi
                 1502
                         \@mktitle@iii
                 1503
                       \or % sigchi-a
                 1504
                         \@mktitle@iv
                 1505
                 1506
                       \fi
                 1507 }
   \ensuremath{\verb|Vetitlefont|} The font to typeset title
                 1508 \def\@titlefont{%
                 1509 \ifcase\ACM@format@nr
                 1510
                       \relax % manuscript
                         \LARGE\bfseries\sffamily
                 1511
                       \or % acmsmall
                 1512
                         \LARGE\bfseries\sffamily
                 1513
                       \or % acmlarge
                 1514
                         \LARGE\bfseries\sffamily
                 1515
                 1516
                       \or % acmtog
                         \Huge\sffamily
                 1517
                 1518
                       \or % sigconf
                         \Huge\sffamily\bfseries
                 1519
                       \or % siggraph
                 1520
                         \Huge\sffamily\bfseries
                 1521
                       \or % sigplan
                 1522
                 1523
                         \Huge\bfseries
                       \or % sigchi
                 1524
                         \Huge\sffamily\bfseries
                 1525
                       \or % sigchi-a
                 1526
                           \Huge\bfseries
                 1527
                       \fi}
                 1528
                 The font to typeset title
\@subtitlefont
                 1529 \def\@subtitlefont{%
                      \ifcase\ACM@format@nr
                 1530
                       \relax % manuscript
                 1531
                 1532
                         \mdseries
                 1533
                       \or % acmsmall
                         \mdseries
                 1534
                       \or % acmlarge
                 1535
                         \mdseries
                 1536
                       \or % acmtog
                 1537
                          \LARGE
                 1538
                       \or % sigconf
                 1539
                           \LARGE\mdseries
                 1540
                       \or % siggraph
                 1541
                           \LARGE\mdseries
                 1542
                       \or % sigplan
                 1543
                           \LARGE\mdseries
                 1544
                 1545
                       \or % sigchi
                           \LARGE\mdseries
                 1546
```

```
\or % sigchi-a
                                                1547
                                                                           \mdseries
                                                1548
                                                                 \fi}
                                                1549
      \@mktitle@i
                                                The version of \mktitle for most journals
                                                1550 \def\@mktitle@i{\hsize=\textwidth
                                                                 \@ACM@title@width=\hsize
                                                1551
                                                                 \ifx\@acmBadgeL@image\@empty\else
                                                1552
                                                                        \advance\@ACM@title@width by -\@ACM@badge@width
                                                1553
                                                                        \advance\@ACM@title@width by -\@ACM@badge@skip
                                                 1554
                                                1555
                                                                 \ifx\@acmBadgeR@image\@empty\else
                                                1556
                                                                       \verb|\advance|@ACM@title@width| by - \verb|\adcM@badge@width| |
                                                1557
                                                                       \verb|\advance|@ACM@title@width| by - \verb|\advance|@ACM@badge@skip||
                                                1558
                                                1559
                                                                 \setbox\mktitle@bx=\vbox{\noindent\@titlefont
                                                1560
                                                                       \ifx\@acmBadgeL@image\@empty\else
                                                1561
                                                                              1562
                                                                                           \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
                                                1563
                                                                              \hskip\@ACM@badge@skip
                                                1564
                                                1565
                                                                        \parbox[t]{\@ACM@title@width}{\raggedright
                                                1566
                                                                              \@titlefont\noindent
                                                1567
                                                1568
                                                                              \@title
                                                                 \ifx\@subtitle\@empty\else
                                                1569
                                                                        \par\noindent{\@subtitlefont\@subtitle}
                                                1570
                                                1571
                                                                 \fi}%
                                                                 \footnote{Manage} \end{mage} \e
                                                1572
                                                1573
                                                                        \hskip\@ACM@badge@skip
                                                                        1574
                                                                                     \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
                                                1575
                                                1576
                                                                 \fi
                                                                 \par\bigskip}}%
                                                1577
                                                The version of \mktitle for TOG. Since v1.06 is subsumed by the \mktitle@i macro
  \@mktitle@ii
                                                The version of \@mktitle for sigproc. Note that since the title is centered, we leave the
\@mktitle@iii
                                                space for the left badge even if only the right badge is defined.
                                                1578 \def\@mktitle@iii{\hsize=\textwidth
                                                                       \setbox\mktitle@bx=\vbox{\@titlefont\centering
                                                1579
                                                                              \@ACM@title@width=\hsize
                                                1580
                                                                              \if@ACM@badge
                                                1581
                                                                                     \advance\earrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowearrowe
                                                 1582
                                                                                     \advance\@ACM@title@width by -2\@ACM@badge@skip
                                                1583
                                                                                     \parbox[b]{\@ACM@badge@width}{\strut
                                                1584
                                                                                           \ifx\@acmBadgeL@image\@empty\else
                                                1585
                                                                                                  1586
                                                                                                   \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
                                                1587
                                                                                           \fi}%
                                                 1588
                                                 1589
                                                                                     \hskip\@ACM@badge@skip
```

```
1590
                       \parbox[t]{\@ACM@title@width}{\centering\@titlefont
             1591
                         \@title
             1592
                         \ifx\@subtitle\@empty\else
             1593
                           \par\noindent{\@subtitlefont\@subtitle}
             1594
                         \fi
              1595
                       }%
             1596
                       \if@ACM@badge
             1597
                         \hskip\@ACM@badge@skip
             1598
                         \parbox[b]{\@ACM@badge@width}{\strut
             1599
                           \ifx\@acmBadgeR@image\@empty\else
              1600
                             1601
                             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
              1602
                           \fi}%
              1603
                       \fi
             1604
                       \par\bigskip}}%
             1605
             The version of \@mktitle for sigchi-a
\@mktitle@iv
             1606 \def\@mktitle@iv{\hsize=\textwidth
                     \setbox\mktitle@bx=\vbox{\raggedright\leftskip5pc\@titlefont
             1607
                       \noindent\leavevmode\leaders\hrule height 2pt\hfill\kern0pt\par
             1608
                       \noindent\@title
             1609
                      \ifx\@subtitle\@empty\else
             1610
                        \par\noindent\@subtitlefont\@subtitle
             1611
                      \fi
             1612
                      \par\bigskip}}%
             1613
```

\@ACM@addtoaddress

The macro adds an item to address using the following rules:

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

```
1614 \newbox\@ACM@commabox
1615 \def\@ACM@addtoaddress#1{%
1616 \ifvmode\else
1617 \setbox\@ACM@commabox=\hbox{, }%
1618 \unskip\cleaders\copy\@ACM@commabox\hskip\wd\@ACM@commabox
1619 \fi
1620 #1}
```

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

We follow the strange American tradtion of no comma before zip code.

```
\city 1621\if@ACM@journal \state 1622 \let\position\@gobble \postcode \country
```

```
\newcommand\department[2][0]{}%
                    1624
                          \let\streetaddress\@gobble
                    1625
                          \let\city\@gobble
                    1626
                          \left| \cdot \right| 
                    1627
                          \let\postcode\@gobble
                    1629
                          \let\country\@gobble
                    1630 \else
                          \def\position#1{#1\par}%
                    1631
                          \def\institution#1{#1\par}%
                    1632
                          \newcommand\department[2][0]{#2\par}%
                    1633
                          \def\streetaddress#1{#1\par}%
                    1634
                          \let\city\@ACM@addtoaddress
                          \let\state\@ACM@addtoaddress
                    1636
                          \def\postcode#1{\unskip\space#1}%
                    1637
                         \let\country\@ACM@addtoaddress
                    1638
                    1639\fi
      \@mkauthors
                    Typesetting authors
                    1640 \def\@mkauthors{\begingroup
                    1641
                          \hsize=\textwidth
                    1642
                          \ifcase\ACM@format@nr
                          \relax % manuscript
                    1643
                            \@mkauthors@i
                    1644
                          \or % acmsmall
                    1645
                            \@mkauthors@i
                    1646
                          \or % acmlarge
                    1647
                    1648
                            \@mkauthors@i
                          \or % acmtog
                    1649
                            \@mkauthors@i
                    1650
                          \or % sigconf
                    1651
                            \@mkauthors@iii
                    1652
                          \or % siggraph
                    1653
                            \@mkauthors@iii
                    1654
                          \or % sigplan
                    1655
                            \@mkauthors@iii
                    1656
                          \or % sigchi
                    1657
                            \@mkauthors@iii
                    1658
                          \or % sigchi-a
                    1659
                            \@mkauthors@iv
                    1660
                    1661
                          \fi
                          \endgroup
                    1662
                    1663 }
     \@authorfont
                    Somehow different conferences use different fonts for author names. Why?
                    1664 \def\@authorfont{\Large\sffamily}
\@affiliationfont Font for affiliations
                    1665 \def\@affiliationfont{\normalsize\normalfont}
```

\def\institution#1{#1\ignorespaces}%

```
Adjusting fonts for different formats
```

```
1666 \ifcase\ACM@format@nr
1667 \relax % manuscript
1668 \or % acmsmall
1669 \def\@authorfont{\large\sffamily}
1670 \def\@affiliationfont{\small\normalfont}
1671 \or % acmlarge
1672 \or % acmtog
1673 \def\@authorfont{\LARGE\sffamily}
1674 \def\@affiliationfont{\large}
1675 \or % sigconf
1676 \def\@authorfont{\LARGE}
1677 \def\@affiliationfont{\large}
1678 \or % siggraph
1679 \def\@authorfont{\normalsize\normalfont}
1680 \def\@affiliationfont{\normalsize\normalfont}
1681 \or % sigplan
1682 \def\@authorfont{\Large\normalfont}
     \def\@affiliationfont{\normalsize\normalfont}
1684 \or % sigchi
1685 \def\@authorfont{\bfseries}
1686 \def\@affiliationfont{\mdseries}
1687 \or % sigchi-a
1688 \def\@authorfont{\bfseries}
1689 \def\@affiliationfont{\mdseries}
1690 \fi
```

\@typeset@author@line

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

```
1691 \def\@typeset@author@line{%
1692 \andify\@currentauthors\par\noindent
1693 \@currentauthors\def\@currentauthors{}%
1694 \ifx\@currentaffiliations\@empty\else
1695 \andify\@currentaffiliations
1696 \unskip, {\@currentaffiliations}\par
1697 \fi
1698 \def\@currentaffiliations{}}
```

\@mkauthors@i

This is version used in most formats. Note that \and between authors with the same affiliation becomes _and_:

```
1699 \def\@mkauthors@i{%
1700 \def\@currentauthors{}%
1701 \def\@currentaffiliations{}%
1702 \global\let\and\@typeset@author@line
1703 \def\@author##1{%
1704 \ifx\@currentauthors\@empty
1705 \gdef\@currentauthors{\@authorfont\MakeUppercase{##1}}%
1706 \else
1707 \g@addto@macro{\@currentauthors}{\and\MakeUppercase{##1}}%
```

```
\fi
                     1708
                            1709
                          \def\email##1##2{}%
                     1710
                          \def\affiliation##1##2{%
                     1711
                            \def\@tempa{\##2}\ifx\@tempa\@empty\else
                     1712
                               \ifx\@currentaffiliations\@empty
                     1713
                     1714
                                  \gdef\@currentaffiliations{\@affiliationfont##2}%
                     1715
                                 \g@addto@macro{\@currentaffiliations}{\and##2}%
                     1716
                              \fi
                     1717
                            \fi
                     1718
                             \global\let\and\@typeset@author@line}%
                     1719
                          \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par\medskip
                     1720
                            \noindent\addresses\@typeset@author@line
                     1721
                           \par\medskip}%
                     1722
                     1723 }
     \@mkauthors@ii
                     \@mkauthors@iI was version used in acmtog. No longer necessary
                     The box to put individual author to
         \author@bx
                     1724 \newbox\author@bx
     \author@bx@wd
                    The width of the author box
                     1725 \newdimen\author@bx@wd
     \author@bx@sep
                    The separation between the author boxes
                     1726 \newskip\author@bx@sep
                     1727 \author@bx@sep=1pc\relax
                     Typesetting the box with authors. Note that in SIGCHI-A the box is not centered.
\@typeset@author@bx
                     \global\setbox\author@bx=\vtop{\if@ACM@sigchiamode\else\centering\fi
                     1729
                            \@authorfont\@currentauthors\par\@affiliationfont
                     1730
                            \@currentaffiliation}\egroup
                     1731
                          \box\author@bx\hspace{\author@bx@sep}%
                          \gdef\@currentauthors{}%
                     1733
                          \gdef\@currentaffiliation{}}
   \@mkauthors@iii
                    The sigconf version. Here we use centered design with each author in a separate box.
                     1735 \def\@mkauthors@iii{%
                     First, we need to determine the design of the author strip. The boxes are separated by
                     \author@bx@sep plus two \author@bx@sep margins. This means that each box must
                     be of width (\text{textwidth} - \text{author@bx@sep})/N - \text{author@bx@sep}, where N is the
                     number of boxes per row.
                          \author@bx@wd=\textwidth\relax
                     1737
                          \advance\author@bx@wd by -\author@bx@sep\relax
                     1738
                          \ifcase\num@authorgroups
                          \relax % 0?
                     1739
```

```
\or % 1=one author per row
1740
     \or % 2=two authors per row
1741
       \divide\author@bx@wd by \num@authorgroups\relax
1742
     \or % 3=three authors per row
1743
       \divide\author@bx@wd by \num@authorgroups\relax
1744
     \or % 4=two authors per row (!)
1745
       \divide\author@bx@wd by 2\relax
1746
1747
     \else % three authors per row
       \divide\author@bx@wd by 3\relax
1748
1749
     \advance\author@bx@wd by -\author@bx@sep\relax
1750
Now, parsing of \addresses:
     \gdef\@currentauthors{}%
1751
     \gdef\@currentaffiliation{}%
1752
     \def\@author##1{\ifx\@currentauthors\@empty
1753
       \gdef\@currentauthors{\par##1}%
1754
     \else
1755
       \g@addto@macro\@currentauthors{\par##1}%
1756
     \fi
1757
1758
     \def\email##1##2{\ifx\@currentaffiliation\@empty
1759
      \gdef\@currentaffiliation{\nolinkurl{##2}}%
1760
     \else
1761
      1762
1763
     1764
      \gdef\@currentaffiliation{##2}%
1765
1766
       \g@addto@macro\@currentaffiliation{\par##2}%
1767
1768
    \global\let\and\etypeset@author@bx
1769
1770 }%
Actual typesetting is done by \and macro:
    \hsize=\textwidth
1771
     \global\setbox\mktitle@bx=\vbox{\noindent
1772
      \box\mktitle@bx\par\medskip\leavevmode
1773
      \lineskip=1pc\relax\centering\hspace*{-1em}%
1774
      \addresses\let\and\@typeset@author@bx\and\par\bigskip}}
```

\@mkauthors@iv

The sigchia version. Now we put authors in the main text, and no more than 2 authors per line.

```
1776 \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 ($\author@bx@sep$)/N — $\author@bx@sep$, where N is the number of boxes per row.

1777 \author@bx@wd=\columnwidth\relax

```
\ifcase\num@authorgroups
                   1779
                         \relax % 0?
                   1780
                         \or \% 1=one author per row
                   1781
                         \else % 2=two authors per row
                   1782
                            \divide\author@bx@wd by 2\relax
                   1783
                   1784
                         \fi
                         \advance\author@bx@wd by -\author@bx@sep\relax
                   1785
                   Now, parsing of \addresses:
                         \gdef\@currentauthors{}%
                   1786
                         \gdef\@currentaffiliation{}%
                   1787
                         \def\@author##1{\ifx\@currentauthors\@empty
                   1788
                           \gdef\@currentauthors{\par##1}%
                   1789
                         \else
                   1790
                           \g@addto@macro\@currentauthors{\par##1}%
                   1791
                         \fi
                   1792
                   1793
                         \def\email##1##2{\ifx\@currentaffiliation\@empty
                   1794
                           \gdef\@currentaffiliation{\nolinkurl{##2}}%
                   1795
                         \else
                   1796
                           \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
                   1797
                   1798
                         \fi}%
                         \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
                   1799
                           \gdef\@currentaffiliation{##2}%
                   1800
                   1801
                         \else
                   1802
                           \g@addto@macro\@currentaffiliation{\par##2}%
                         \fi
                   1803
                         \global\let\and\@typeset@author@bx}%
                   1804
                   1805 %
                   Actual typesetting is done by \and macro
                           \bgroup\hsize=\columnwidth
                   1806
                           \par\raggedright\leftskip=\z@
                   1807
                           \lineskip=1pc\noindent
                   1808
                           \addresses\let\and\@typeset@author@bx\and\par\bigskip\egroup}
                   1809
                   Adding footnotemark to authors
\@authornotemark
                   {\tt 1810 \setminus def \setminus @authornotemark \{ \setminus g@addto@macro \setminus @currentauthors \{ \setminus footnotemark \} \}}
     \@mkteasers
                   Typesetting teasers
                   1811 \def\@mkteasers{%
                         \ifx\@teaserfigures\@empty\else
                   1812
                   1813
                           \def\@teaser##1{\par\bigskip\bgroup
                             \captionsetup{type=figure}##1\egroup\par}
                   1814
                           \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par
                   1815
                           \noindent\@teaserfigures\par\medskip}%
                   1816
                   1817
                         \fi}
  \@setaddresses This is an amsart macro, which we do not need.
                   1818 \def\@setaddresses{}
```

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

```
\@mkabstract Typesetting abstract
                      {\tt 1819 \setminus def \setminus @mkabstract \{ \setminus bgroup }
                           \ifx\@abstract\@lempty\else
                            {\phantomsection\addcontentsline{toc}{section}{Abstract}%
                      1821
                      1822
                              \if@ACM@journal
                      1823
                                 \small\noindent
                              \else
                      1824
                                \section*{Abstract}%
                      1825
                              \fi
                      1826
                             \ignorespaces\@abstract\par}%
                      1827
                      1828
                            \fi\egroup}
    \@mkbibcitation Print bibcitation format
                      1829 \def\@mkbibcitation{\bgroup
                            \def\footnotemark{}%
                      1830
                            \def\\{\unskip{} \ignorespaces}%
                      1831
                            \def\footnote{\ClassError{\@classname}{Please do note use footnotes
                      1832
                                inside \string\title{} or \string\author{} command! Use
                      1833
                      1834
                                \string\titlenote{} or \string\authornote{} instead!}}%
                            \par\medskip\small\noindent{\bfseries ACM Reference format:}\par\nobreak
                      1835
                            \noindent\authors. \@acmYear. \@title.
                      1836
                      1837
                            \if@ACM@journal
                               \textit{\@journalNameShort}
                      1838
                               \@acmVolume, \@acmNumber, Article \ (\@acmPubDate),
                      1839
                      1840
                               \ref{TotPages}~pages.
                      1841
                            \else
                               In \textit{Proceedings of \acmConference@name, \acmConference@venue,
                      1842
                      1843
                                 \acmConference@date
                                 \ifx\acmConference@name\acmConference@shortname\else
                      1844
                                   \ (\acmConference@shortname)\fi
                      1845
                                    ,} \ref{TotPages} pages.
                      1846
                           \fi\par
                      1847
                           \noindent DOI: \nolinkurl{\@acmDOI}
                      1849 \par\egroup}
\@printendtopmatter
                      End the top matter
                      1850 \def\@printendtopmatter{\par\medskip
                           \ifcase\ACM@format@nr
                      1851
                            \relax % manuscript
                      1852
                              \noindent\hrulefill\par\medskip
                      1853
                            \or % acmsmall
                      1854
                              \noindent\hrulefill\par\medskip
                      1855
                           \or % acmlarge
                      1856
                              \noindent\hrulefill\par\medskip
                      1857
                           \or % acmtog
                      1858
                      1859
                              \par\bigskip
                      1860
                            \or % sigconf
                              \par\bigskip
                           \or % siggraph
                      1862
```

```
\par\bigskip
                  1863
                       \or % sigplan
                  1864
                         \par\bigskip
                  1865
                       \or % sigchi
                  1866
                         \par\bigskip
                  1867
                       \or % sigchi-a
                  1869
                      \fi
                  1870 }
     \@setthanks
                 We redefine \setthanks using \long
                  1871 \def\@setthanks{\long\def\thanks##1{\par##1\@addpunct.}\thankses}
                       Headers and Footers
                  3.13
                  We use fancyhdr for our headers and footers:
                  1872 \RequirePackage{fancyhdr}
                 This is the box displayed in the review mode
\ACM@linecount@bx
                  1873 \if@ACM@review
                  1874 \newsavebox{\ACM@linecount@bx}
                       1875
                         \@tempcnta\@ne\relax
                  1877
                           \loop{\color{ACMRed}\scriptsize\the\@tempcnta}\\
                  1878
                           \advance\@tempcnta by \@ne
                  1879
                           \addtolength{\ACM@linecount@bxht}{\baselineskip}
                  1880
                           \ifdim\ACM@linecount@bxht<\textheight\repeat}}</pre>
                  1881
                  1882 \fi
  \ACM@linecount How to display the box
                  1883 \def\ACM@linecount{%
                      \if@ACM@review
                  1885
                       \begin{picture}(0,0)%
                         \t(-26,-22){\t(-26,-22)}\t(-26,-22){\t(-26,-22)}
                  1886
                  1887
                       \end{picture}%
                      \fi}
                  1888
   \@shortauthors Even if the author redefined \shortauthors, we do not print them in the anonymous
                  mode in the headers:
                  1889 \def\@shortauthors{\if@ACM@anonymous Anon.\else\shortauthors\fi}
   \@headfootfont The font to typeset header and footer text.
                  1890 \def\@headfootfont{%
                  1891 \ifcase\ACM@format@nr
                  1892
                      \relax % manuscript
                  1893
                         \sffamily
                  1894
                      \or % acmsmall
                         \sffamily
                  1895
```

```
\sffamily
                                      1897
                                                 \or % acmtog
                                      1898
                                                    \sffamily
                                      1899
                                      1900
                                                 \or % sigconf
                                                    \sffamily
                                      1901
                                      1902
                                                 \or % siggraph
                                      1903
                                                    \sffamily
                                      1904
                                                 \or % sigplan
                                                    \sffamily
                                      1905
                                      1906
                                                 \or % sigchi
                                                    \sffamily
                                      1907
                                                 \or % sigchi-a
                                                    \sffamily
                                      1909
                                                \fi}
                                      1910
                                     The pagestyle for all pages but the first one
standardpagestyle
                                      1911 \fancypagestyle{standardpagestyle}{%
                                                \fancyhf{}%
                                                 \renewcommand{\headrulewidth}{\z@}%
                                      1913
                                                 \renewcommand{\footrulewidth}{\z@}%
                                      1914
                                                 \ifcase\ACM@format@nr
                                      1915
                                                 \relax % manuscript
                                      1916
                                      1917
                                                    \fancyhead[LE]{\ACM@linecount\if@ACM@printfolios\thepage\fi}%
                                                    \fancyhead[RO]{\if@ACM@printfolios\thepage\fi}%
                                      1918
                                                    \fancyhead[RE]{\@shortauthors}%
                                      1919
                                                    \fancyhead[LO]{\ACM@linecount\shorttitle}%
                                      1920
                                                    \fancyfoot[RO,LE]{\footnotesize Manuscript submitted to ACM}%
                                      1921
                                                 \or % acmsmall
                                      1922
                                                  \fancyhead[LE]{\ACM@linecount\@headfootfont\@acmArticle\if@ACM@printfolios:\thepage\fi}%
                                      1923
                                                  \fancyhead[RO]{\@headfootfont\@acmArticle\if@ACM@printfolios:\thepage\fi}%
                                      1924
                                                    \fancyhead[RE]{\@headfootfont\@shortauthors}%
                                      1925
                                                    \fancyhead[L0]{\ACM@linecount\@headfootfont\shorttitle}%
                                      1926
                                                    \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
                                      1927
                                                     \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
                                      1928
                                                 \or % acmlarge
                                      1929
                                      1930
                                                     \fancyhead[LE]{\ACM@linecount\@headfootfont
                                                     \@acmArticle\if@ACM@printfolios:\thepage\fi\quad\textbullet\quad\@shortauthors}%
                                      1931
                                                    \fancyhead[L0]{\ACM@linecount}%
                                      1932
                                                    \footnotemark
                                      1933
                                                     \verb|\colored| \colored| \c
                                      1934
                                                    \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
                                      1935
                                                     \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
                                      1936
                                      1937
                                                     \fancyhead[LE]{\ACM@linecount\@headfootfont
                                      1938
                                                     1939
                                                    \fancyhead[LO]{\ACM@linecount}%
                                      1940
                                                    \footnotemark
                                      1941
                                                     \shorttitle\quad\textbullet\quad\@acmArticle\if@ACM@printfolios:\thepage\fi}%
                                      1942
                                      1943
                                                     \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
```

\or % acmlarge

```
\@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
                                      1944
                                                  \else % Proceedings
                                      1945
                                                       \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
                                      1946
                                                       \label{local} $$ \acmelline count \end{footfont} \acmelline count \end{footfont} % $$ \acmelline count \end{footfont} $$ \acmelline count} $$ \acmelline count \end{footfont} $$ \acmelline count} $$ \acmelline count \end{footfont} $$ \acmelline count} $$$ \acmelline count} $$ \acm
                                      1947
                                                       \fancyhead[RE]{\@headfootfont\@shortauthors}%
                                      1948
                                      1949
                                                       1950
                                                           \acmConference@date, \acmConference@venue}%
                                      1951
                                                       \fancyhead[RO]{\@headfootfont\acmConference@shortname,
                                                           \acmConference@date, \acmConference@venue}%
                                      1952
                                      1953
                                                  \if@ACM@sigchiamode
                                      1954
                                       1955
                                                          \fancyheadoffset[L]{\dimexpr(\marginparsep+\marginparwidth)}%
                                      1956
                                      1957 }
                                      1958 \pagestyle{standardpagestyle}
           \@folio@wd Folio blob width, height, offsets and max number
           \@folio@ht
                                      1959 \newdimen\@folio@wd
\@folio@voffset
                                      1960 \@folio@wd=\z@
         \@folio@max 1961 \newdimen\@folio@ht
                                      1962 \@folio@ht=\z@
                                      1963 \newdimen\@folio@voffset
                                      1964 \@folio@voffset=\z@
                                      1965 \def\@folio@max{1}
                                      1966 \ifcase\ACM@format@nr
                                      1967 \relax % manuscript
                                      1968 \or % acmsmall
                                                  \@folio@wd=45.75pt\relax
                                      1969
                                                  \@folio@ht=1.25in\relax
                                      1970
                                                  \@folio@voffset=.2in\relax
                                       1972 \def\@folio@max{8}
                                      1973 \or % acmlarge
                                                 \@folio@wd=43.25pt\relax
                                      1974
                                                  \@folio@ht=79pt\relax
                                      1975
                                                  \@folio@voffset=.55in\relax
                                      1976
                                      1977 \def\@folio@max{10}
                                      1978 \fi
         \@folioblob
                                     The macro to typeset the folio blob.
                                      1979 \def\@folioblob{\@tempcnta=\@acmArticleSeq\relax
                                      First, we calculate \@acmArticleSeg modulo \@folio@max
                                      1980
                                                  \loop
                                                          \ifnum\@tempcnta>\@folio@max\relax
                                      1981
                                                           \advance\ensuremath{\mbox{\tt @folio@max}}
                                      1982
                                      1983
                                                     \repeat
                                                       \advance\@tempcnta by -1\relax
                                      1984
                                                       \@tempdima=\@folio@ht\relax
                                      1985
                                       1986
                                                       \multiply\@tempdima by \the\@tempcnta\relax
                                                       \advance\@tempdima by -\@folio@voffset\relax
                                       1987
```

```
\begin{picture}(0,0)
                                                                           1988
                                                                                                              1989
                                                                                                                                 \rlap{%
                                                                           1990
                                                                                                                                          \label{localize} $$ \align{center} $$ \operatorname{o.45\efolio@ht}[\z@][\z@]_{\%} $$
                                                                           1991
                                                                                                                                                    \left( \frac{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath
                                                                           1992
                                                                                                                                 \parbox{\@folio@wd}{%
                                                                            1993
                                                                           1994
                                                                                                                                          \centering
                                                                                                                                          \textcolor{white}{\LARGE\bfseries\sffamily\@acmArticle}}}
                                                                           1995
                                                                           1996
                                                                                                    \end{picture}}
                                                                           1997
                                                                          The pagestyle for the first page only.
firstpagestyle
                                                                           1998 \fancypagestyle{firstpagestyle}{%
                                                                                                    \fancyhf{}%
                                                                           2000
                                                                                                    \renewcommand{\headrulewidth}{\z@}%
                                                                                                    \renewcommand{\footrulewidth}{\z@}%
                                                                           2001
                                                                                                    \ifcase\ACM@format@nr
                                                                           2002
                                                                                                    \relax % manuscript
                                                                           2003
                                                                                                             \fancyhead[L]{\ACM@linecount}%
                                                                           2004
                                                                                                             \fancyfoot[RO,LE]{\if@ACM@printfolios\small\thepage\fi}%
                                                                           2005
                                                                                                             \fancyfoot[RE,LO]{\footnotesize Manuscript submitted to ACM}%
                                                                           2006
                                                                                                    \or % acmsmall
                                                                           2007
                                                                                                             \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
                                                                           2008
                                                                                                              \@acmNumber, Article \@acmArticle. Publication date:
                                                                           2009
                                                                                                             \@acmPubDate.}%
                                                                           2010
                                                                                                             \fancyhead[LE]{\ACM@linecount\@folioblob}%
                                                                           2011
                                                                                                             \fancyhead[LO]{\ACM@linecount}%
                                                                           2012
                                                                           2013
                                                                                                             \fancyhead[RO]{\@folioblob}%
                                                                                                             \footnote{Months} \footnote{
                                                                           2014
                                                                                                    \or % acmlarge
                                                                           2015
                                                                                                             \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
                                                                           2016
                                                                                                             \@acmNumber, Article \@acmArticle. Publication date:
                                                                           2017
                                                                           2018
                                                                                                              \@acmPubDate.}%
                                                                                                              \fancyhead[RO]{\@folioblob}%
                                                                                                              \fancyhead[LE]{\ACM@linecount\@folioblob}%
                                                                           2020
                                                                                                             \fancyhead[L0]{\ACM@linecount}%
                                                                           2021
                                                                                                             \footnote{Months} \footnote{
                                                                           2022
                                                                                                    \or % acmtog
                                                                           2023
                                                                                                             \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
                                                                           2024
                                                                           2025
                                                                                                             \@acmNumber, Article \@acmArticle. Publication date:
                                                                           2026
                                                                                                             \@acmPubDate.}%
                                                                                                             \fancyhead[L]{\ACM@linecount}%
                                                                           2027
                                                                                                    \else % Conference proceedings
                                                                           2028
                                                                                                             \fancyhead[L]{\ACM@linecount}%
                                                                           2029
                                                                                                             2030
                                                                                                    \fi
                                                                           2031
                                                                           2032 }
```

3.14 Sectioning

Sectioning is different for different levels

```
2033 \renewcommand\section{\@startsection{section}{1}{\z@}%
                     2034 {-.75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
                     2035 {.25\baselineskip}%
                     2036 {\@secfont}}
                     2037 \renewcommand\subsection{\@startsection{subsection}{2}{\z@}%
                     2038 \quad \{-.75\baselineskip \eqlus -2\p@ \eqlus -.2\p@}%
                     2039 {.25\baselineskip}%
                     2040 {\@subsecfont}}
                     2041 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{10pt}%}
                     2042 {-.5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
                     2043 {-3.5\p@}%
                     2044 {\@subsubsecfont\@adddotafter}}
                     2045 \renewcommand\paragraph{\@startsection{paragraph}{4}{\parindent}%
                     2046 \quad \{-.5\baselineskip \eqrup -2\p@ \eqrup -.2\p@}%
                     2047 {-3.5\p@}%
                     2048 \{\ensuremath{\texttt{Qadddotafter}}\}
                     2049 \renewcommand\part{\@startsection{part}{9}{\z@}%
                     2050 {-10\p@ \@plus -4\p@ \@minus -2\p@}%
                     2051 {4\p@}%
                     2052 {\@parfont}}
\section@raggedright
                    Special version of \raggedright compatible with \MakeUppercase
                     2053 \def\section@raggedright{\@rightskip\@flushglue
                     2054 \rightskip\@rightskip
                         \leftskip\z@skip
                     2055
                     2056 \parindent\z@}
          \@secfont Fonts for sections etc. are different for different formats.
       \@subsubsecfont 2058 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
          \@parfont 2059 \def\@subsubsecfont{\sffamily\itshape}
                     2060 \def\@parfont{\itshape}
                     2061 \setcounter{secnumdepth}{3}
                     2062 \ifcase\ACM@format@nr
                     2063 \relax % manuscript
                     2064 \or % acmsmall
                     2065 \or % acmlarge
                     2067 \def\@subsecfont{\sffamily\large\section@raggedright}
                     2068 \or % acmtog
                     2069 \def\@secfont{\sffamily\large\section@raggedright\MakeUppercase}
                     2070 \def\@subsecfont{\sffamily\large\section@raggedright}
                     2071 \or % sigconf
                     2072 \def\@secfont{\bfseries\Large\section@raggedright\MakeUppercase}
                     2073 \def\@subsecfont{\bfseries\Large\section@raggedright}
                     2074 \or % siggraph
                     2075 \def\@secfont{\bfseries\sffamily\Large\section@raggedright\MakeUppercase}
```

```
2076 \def\@subsecfont{\bfseries\sffamily\Large\section@raggedright}
                 2077 \or % sigplan
                 2078 \def\@secfont{\bfseries\Large\section@raggedright}
                 2079 \def\@subsecfont{\bfseries\section@raggedright}
                     \renewcommand\subsubsection{\@startsection{subsubsection}{3}{\z@}%
                        {-.75\baselineskip \eqnus -2\p@ \eqnus -.2\p@}%
                        {.25\baselineskip}%
                 2082
                 2083
                        {\@subsubsecfont}}
                 2084 \def\@subsubsecfont{\bfseries\section@raggedright}
                     \renewcommand\paragraph{\@startsection{paragraph}{4}{\z@}%
                 2085
                        {-.5\baselineskip \eqnus -2\p@ \eqnus -.2\p@}%
                 2086
                        \{-3.5\p@\}\%
                        {\@parfont\@addspaceafter}}
                 2089 \def\@parfont{\bfseries\itshape}
                 2090 \renewcommand\subparagraph{\@startsection{subparagraph}{5}{\z@}%
                        {-.5\baselineskip \eqnus -2\p@ \eqnus -.2\p@}%
                 2091
                       \{-3.5\p@\}\%
                 2092
                        {\@subparfont\@addspaceafter}}
                 2093
                 2094 \def\@subparfont{\itshape}
                 2095 \or % sigchi
                 2096 \setcounter{secnumdepth}{1}
                 2097 \def\@secfont{\bfseries\sffamily\section@raggedright\MakeUppercase}
                 2098 \def\@subsecfont{\bfseries\sffamily\section@raggedright}
                 2099 \or % sigchi-a
                 2100 \setcounter{secnumdepth}{0}
                 2101 \def\@secfont{\bfseries\sffamily\section@raggedright\MakeUppercase}
                 2102 \def\@subsecfont{\bfseries\sffamily\section@raggedright}
                 2103 \fi
  \@adddotafter Add punctuation after the command
                 2104 \def\@adddotafter#1{#1\@addpunct{.}}
\@addspaceafter
                 Add space after the command
                 2105 \def\@addspaceafter#1{#1\@addpunct{\enspace}}
```

3.15 **TOC Lists**

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

2106 \providecommand*\@dotsep{4.5}

3.16 **Theorems**

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

2107 \def\@acmplainbodyfont{\itshape}

```
\@acmplainindent The amount to indent the acmplain theorem style.
                          2108 \def\@acmplainindent{\parindent}
     \@acmplainheadfont
                         The font to typeset the acmplain theorem style head.
                          2109 \def\@acmplainheadfont{\scshape}
     \@acmplainnotefont The font to typeset the acmplain theorem style note.
                          2110 \def\@acmplainnotefont{\@empty}
                             Customization of acmplain theorem style:
                          2111 \ifcase\ACM@format@nr
                          2112 \relax % manuscript
                         2113 \or % acmsmall
                         2114 \or % acmlarge
                         2115 \or % acmtog
                         2116 \or % sigconf
                          2117 \or % siggraph
                         2118 \or % sigplan
                          2119 \def\@acmplainbodyfont{\itshape}
                          2120 \def\@acmplainindent{\z@}
                          2121 \def\@acmplainheadfont{\bfseries}
                          2122 \def\@acmplainnotefont{\normalfont}
                          2123 \or % sigchi
                          2124 \or % sigchi-a
                         2125 \fi
               acmplain The acmplain theorem style
                          2126 \newtheoremstyle{acmplain}%
                          2127 {.5\baselineskip\@plus.2\baselineskip
                                 \@minus.2\baselineskip}% space above
                          2128
                          2129 {.5\baselineskip\@plus.2\baselineskip
                          2130
                                 \@minus.2\baselineskip}% space below
                          2131 {\@acmplainbodyfont}% body font
                          2132 {\@acmplainindent}% indent amount
                          2133 {\@acmplainheadfont}% head font
                          2134 {.}% punctuation after head
                          2135 {.5em}% spacing after head
                          2136 {\thmname{#1}\thmnumber{ #2}\thmnote{ (\@acmplainnotefont(#3))}}% head spec
\@acmdefinitionbodyfont
                         The font to typeset the acmdefinition theorem style body.
                          2137 \def\@acmdefinitionbodyfont{\normalfont}
                         The amount to indent the acmdefinition theorem style.
  \@acmdefinitionindent
                          2138 \def\@acmdefinitionindent{\parindent}
\@acmdefinitionheadfont The font to typeset the acmdefinition theorem style head.
```

2139 \def\@acmdefinitionheadfont{\itshape}

```
\@acmdefinitionnotefont The font to typeset the acmdefinition theorem style note.
                          2140 \def\@acmdefinitionnotefont{\@empty}
                             Customization of acmdefinition theorem style:
                          2141 \ifcase\ACM@format@nr
                          2142 \relax % manuscript
                          2143 \or % acmsmall
                          2144 \or % acmlarge
                          2145 \or % acmtog
                          2146 \or % sigconf
                          2147 \or % siggraph
                          2148 \or % sigplan
                          2149 \def\@acmdefinitionbodyfont{\normalfont}
                          2150 \def\@acmdefinitionindent{\z@}
                          2151 \def\@acmdefinitionheadfont{\bfseries}
                          2152 \def\@acmdefinitionnotefont{\normalfont}
                          2153 \or % sigchi
                          2154 \or % sigchi-a
                          2155 \fi
          acmdefinition The acmdefinition theorem style
                          2156 \newtheoremstyle{acmdefinition}%
                               {.5\baselineskip\@plus.2\baselineskip
                          2157
                          2158
                                 \@minus.2\baselineskip}% space above
                               {.5\baselineskip\@plus.2\baselineskip
                          2159
                                 \@minus.2\baselineskip}% space below
                          2160
                          2161 {\@acmdefinitionbodyfont}% body font
                          2162 {\@acmdefinitionindent}% indent amount
                          2163 {\@acmdefinitionheadfont}% head font
                          2164 {.}% punctuation after head
                          2165 {.5em}% spacing after head
                          2166 {\thmname{#1}\thmnumber{ #2}\thmnote{ {\@acmdefinitionnotefont(#3)}}}% head spec
                             The definitions for theorems:
                          2167 \theoremstyle{acmplain}
                          2168 \newtheorem{theorem}{Theorem}[section]
                          2169 \newtheorem{conjecture}[theorem]{Conjecture}
                          2170 \newtheorem{proposition}[theorem]{Proposition}
                          2171 \newtheorem{lemma}[theorem]{Lemma}
                          2172 \newtheorem{corollary}[theorem]{Corollary}
                          2173 \theoremstyle{acmdefinition}
                          2174 \newtheorem{example}[theorem]{Example}
                          2175 \newtheorem{definition}[theorem]{Definition}
                          2176 \theoremstyle{acmplain}
        \@proofnamefont The font to typeset the proof name.
                          2177 \def\@proofnamefont{\scshape}
          \@proofindent Whether or not to indent proofs.
                          2178 \def\@proofindent{\indent}
```

```
2179 \ifcase\ACM@format@nr
                                          2180 \relax % manuscript
                                          2181 \or % acmsmall
                                          2182 \or % acmlarge
                                          2183 \or % acmtog
                                          2184 \or % sigconf
                                          2185 \or % siggraph
                                          2186 \or % sigplan
                                          2187 \def\@proofnamefont{\itshape}
                                          2188 \def\@proofindent{\noindent}
                                           2189 \or % sigchi
                                          2190 \or % sigchi-a
                                          2191 \fi
                      proof We want some customization of proof environment.
                                           2192 \renewenvironment{proof}[1][\proofname]{\par
                                          2193 \pushQED{\qed}%
                                          2194 \normalfont \topsep6\p@\@plus6\p@\relax
                                           2195 \trivlist
                                          2196 \item[\@proofindent\hskip\labelsep
                                          2197
                                                                           {\@proofnamefont #1\@addpunct{.}}]\ignorespaces
                                           2198 }{%
                                           2199 \popQED\endtrivlist\@endpefalse
                                           2200 }
                                           3.17
                                                                Acknowledgments
                      \acks This is a comment-like structure
                                           2201 \specialcomment{acks}{%
                                          2202 \begingroup
                                           2203 \section*{Acknowledgments}
                                           2204 \phantomsection\addcontentsline{toc}{section}{Acknowledgments}
                                           2205 }{%
                                           2206 \endgroup
                                           2207 }
\grantsponsor
                                          We just typeset the name of the sponsor
                                           2208 \def\grantsponsor#1#2#3{#2}
            \grantnum
                                           2209 \newcommand\grantnum[3][]{#3%
                                           2210 \def\ensuremath{\$1}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\ensuremath{\$1}}\ifx\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\ensuremath{\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
                                                                Conditional typesetting
                                           We use the comment package for conditional typesetting:
```

2211 \if@ACM@screen

Customization of proof environment.

```
2212 \includecomment{screenonly}
2213 \excludecomment{printonly}
2214 \else
2215 \excludecomment{screenonly}
2216 \includecomment{printonly}
2217 \fi
2218 \if@ACM@anonymous
2219 \excludecomment{anonsuppress}
2220 \excludecomment{acks}
2221 \else
2222 \includecomment{anonsuppress}
2223 \fi
```

3.19 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/.

```
2224 \newcommand\showeprint[2][arxiv]{%
2225 \def\@tempa{#1}%
2226 \ifx\@tempa\@empty\def\@tempa{arxiv}\fi
2227 \def\@tempb{arxiv}%
2228 \ifx\@tempa\@tempb
2229 arXiv:\href{http://arxiv.org/abs/#2}{#2}\else arXiv:#2%
2230 \fi}
```

3.20 End of Class

```
2231 \normalsize\normalfont\frenchspacing 2232 \langle /class \rangle
```

References

- [1] UK TeX Users Group. UK list of TeX frequently asked questions. http://www.tex.ac.uk, 2016.
- [2] Michael Downes and Barbara Beeton. *The amsart, amsproc, and amsbook document classes.* American Mathematical Society, August 2004. http://www.ctan.org/pkg/amslatex.
- [3] Cristophe Fiorio. algorithm2e.sty—package for algorithms, October 2015.
- [4] Rogério Brito. The algorithms bundle, August 2009.
- [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.
- [8] Axel Sommerfeldt. *The subcaption package*, April 2013. http://www.ctan.org/pkg/subcaption.
- [9] Boris Veytsman, Bern Schandl, Lee Netherton, and CV Radhakrishnan. *A package to create a nomenclature*, September 2005. http://www.ctan.org/pkg/nomencl.
- [10] Nicola L. C. Talbot. *User Manual for glossaries.sty v4.25*, June 2016. http://www.ctan.org/pkg/subcaption.

Change History

v1.00	v1.05
General: First released version 24	General: Added processing doi
v1.01	numbers for acmsiggraph and doi
General: Changed hyperref colors in	numbers for sigproc.bib 24
screen mode (closes https:	Patched \setcitestyle command;
//github.com/borisveytsman/	closes https:
acmart/issues/1) 24	//github.com/borisveytsman/
Defined ACM colors 24	acmart/issues/19 24
Explicitly put draft option (closes	v1.06
https:	\@ACM@badge@skip: Added macro 49
//github.com/borisveytsman/	\@ACM@badge@width: Added macro . 49
acmart/issues/4) 26	\@ACM@title@width: Added macro . 49
Set headheight to 1pc for all	\@mktitle@i: Added processing
formats (closes https:	badges
//github.com/borisveytsman/	Made generic
acmart/issues/5) 24	\@mktitle@ii: Now this macro is
v1.02	obsolete
General: Added TOPS and TSC (closes	\@mktitle@iii: Added processing
https:	badges
//github.com/borisveytsman/	Made more generic 62
acmart/issues/12) 24	\@mktitle@iv: Made more generic . 63
Documentation changes (closes	\@printtopmatter: Added processing
https:	badges
//github.com/borisveytsman/	\@subtitlefont: Added macro 61
acmart/issues/13) 24	\@titlefont: Added macro 61
v1.03	\acmBadgeL: Added macro 50
\@formatdoi: Added macro 54	\acmBadgeR: Added macro 49
\if@ACM@authorversion: Added	\if@ACM@badge: Added macro 49
macro	v1.07
\maketitle: Added special case of	\maketitle: Corrected a bug with
authorversion 57	abstract footnotes 57
General: Added anonsuppress	Corrected a bug with permssion
environment 24	and footnotes order 57
Added authorversion option (closes	v1.08
https:	General: SIGPLAN reformatting by
//github.com/borisveytsman/	Matthew Fluet 24
acmart/issues/9) 24	Typos corrected (Tobias Pape) 24
v1.04	v1.09
\acmArticleSeq: Name change by	General: Revert SIGPLAN caption
Matthew Fluet 48	rules
\acmDOI: Name change by Matthew	v1.10
Fluet	\maketitle: Corrected a bug with doi
\acmISBN: Name change by Matthew	in manuscript and author vertsion,
Fluet 49	https:
General: Updated bibliography for	//github.com/borisveytsman/
siggraph 24	acmart/issues/36 57

General: Changes of	v1.14	
'licensedothergov' wording 52	\bibstyle@acmauthoryear: Moved	
standardpagestyle: Reversed folios	<pre>def of \bibstyle@acmauthoryear</pre>	
location	before use	30
v1.11	\bibstyle@acmnumeric: Moved def of	
General: Customization of ACM	\bibstyle@numeric before use	30
theorem styles and proof	General: \citestyle updates	
environment by Matthew Fluet 24	(Matthew Fluet)	24
v1.12	Patched \citestyle	28
\@marginfigure: Now centering by	v1.15	
default 39	\@ACM@addtoaddress: Added macro	63
\@margintable: Now centering by	\@mkauthors@iii: New authors	
default	system	66
\@parfont: Moved to	\@shortauthors: Introduced macro .	70
\section@raggedright 74	\@typeset@author@bx: Moved to	
\copyrightpermissionfootnoterule:	separate macro	66
Added macro	\acks: Added macro	78
\descriptionlabel: Redefined 40	\affiliation: Added code for author	
\footnoterule: Made shorter 36	groups	47
\if@ACM@natbib@override: Added	\author: Added code for author	4.0
macro	groups	
\if@ACM@newfonts: Added macro 37	\city: Added macro	63
\maketitle: Moved thankses to	\country: Added macro \department: Added macro	63
copyrightpermission box 57	\grantnum: Added macro	63 78
\section@raggedright: Introduced	\grantsponsor: Added macro	78
macro	\if@insideauthorgroup: Introduced	70
General: Added graceful behavior	macro	46
when libertine fonts are absent 37	\institution: Added macro	63
Documentation updates 24	\num@authorgroups: Renamed	46
	\orcid: Introduced macro	47
v1.13	\position: Added macro	63
\@mpfootnotetext: Made minipage footnotes centered 37	\postcode: Added macro	63
	\state: Added macro	63
\bibliographystyle: Redefined macro	\streetaddress: Added macro	63
	standardpagestyle: Better handling	
\bibstyle@acmauthoryear: Added macro	of anonymous mode	71
	v1.16	
\bibstyle@acmnumeric: Added	\@headfootfont: Added macro	70
macro	General: Formatting header/footer	
\if@ACM@printfolios: Added macro 51	(Matthew Fluet)	24
General: Font adjustments for	standardpagestyle: Customize	
acmsmall	header/footer text font	71
Increased font size for ACM Large 27	v1.17	
Print bibliographic information by	\@makefnmark: Redefined	37
default for the proceedings 51	\@mkauthors: TOG now uses the same	
standardpagestyle: Added headers	authors block as other journals	64
for sigs	\@mkauthors@ii: Deleted	66
Expanded headers for sigchi-a 71	\@mkbibcitation: Added \nobreak	69
Suppressed folios if sig 71	Changed format for sigs	69

\acmArticle: The default is now	v1.25	
numerical		40
\acmMonth: The default must be	v1.26	40
numerical. Closes #50 49		24
\acmNumber: The default is now	Documentation typos fixed (thanks	
numerical 48		24
\acmVolume: The default is now	v1.27	
numerical		50
\acmYear: The default is now	v1.28	
numerical 49	\ccsdesc@parse: Change from \to to	
\description: Decreased indent 40	\textrightarrow (Matteo	
\grantnum: Added url 78	D: 1.	52
\grantsponsor: Renamed 78	0 10 (10 (11	
\if@ACM@printacmref: Renamed		30
from \if@ACM@printbib 50	Got rid of warnings in pdf keywords	32
General: Slightly decreased margins	v1.29	
for sigs	\@mkabstract: Removed spurious	
standardpagestyle: Added paper	indentation (John Wickerson)	69
title to sigs	\ccsdesc@parse: Add spacing after	
v1.18	bullet and around rightarrow;	
\@mkauthors@i: Now we andify	semicolon separators no longer in	
affiliations 65	,	52
\@typeset@author@line: Added	1	34
macro	standardpagestyle: Corrected	
General: Natbib is now the default for	printfolios (Matthew Fluet)	71
all formats 24	v1.30	
v1.19	\department: Added optional	
\@mkabstract: Include 'Abstract' in	1	63
PDF bookmarks (Matthew Fluet) . 69		79
\acks: Include 'Acknowledgements' in	Bibtex style now recognizes https://	
PDF bookmarks (Matthew Fluet) . 78		24
General: Include 'Abstract',	Switched to T1: looks like libertine	27
'Acknowledgements', and	*	37 40
'References' in PDF bookmarks	v1.31	40
(Matthew Fluet) 24	\@additionalaffiliation: Added	
Include 'References' in PDF		47
bookmarks (Matthew Fluet) 28		41 69
v1.20	\@startsection: Added	0)
\@mkabstract: Deleted spurious space 69		30
General: Bug fixes for bst 24	Rededined macro	
v1.21		37
\showeprint: Added macro 79		
v1.22		49
General: More bibliography changes	\acmYear: The default now is the	
for Aptara 24		49
v1.23	\additionalaffiliation: Added	
General: Add PACMPL journal option 24	macro	47
v1.24	\1@subsection: Rededined macro :	32
General: Add IMWUT journal option 40	\1@subsubsection: Rededined macro	32

General: Documentation changes	24	General: Added POMACS journal	
v1.32		option	24
\@formatdoi: New doi format	54	Format siggraph is now obsolete .	24

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
                               \@DeclareACMFormat .
                                                              \@acmdefinitionheadfont
\$ ..... 1378, 1382
                                       . . . 33, 34, 35, 36,
                                                                      . . . 2139, 2151, 2163
\@ 1174, 1177, 1182, 1186,
                                       37, 38, 39, 40, 41, 42
                                                              \@acmdefinitionindent
       1189, 1192, 1194,
                               \@M . . . . . 287, 326, 344, 353
                                                                      . . . 2138, 2150, 2162
       1197, 1277, 1284, 1297
                                                              \@acmdefinitionnotefont
                               \@abstract 1060, 1820, 1827
\@@par .... 287, 344
                                                                      . . . 2140, 2152, 2166
                               \@acmArticle ... 1018,
\@ACM@addtoaddress .
                                                              \@acmownedfalse . 1141,
                                       1021, 1377, 1839,
                                                                      1144, 1147, 1152,
        1614, 1635, 1636, 1638
                                       1923, 1924, 1928,
\@ACM@badge@skip ...
                                                                      1155, 1158, 1161, 1167
                                       1931, 1934, 1936,
       .... <u>1041</u>, 1477,
                                       1939, 1942, 1944,
                                                              \@acmownedtrue ....
       1554, 1558, 1564,
                                       1995, 2009, 2017, 2025
                                                                      . . . 1130, 1137, 1164
       1573, 1583, 1589, 1598
                                                              \@acmplainbodyfont .
                               \@acmArticleSeq 1020, 1979
\@ACM@badge@width ..
                                                                      ... 2107, 2119, 2131
                               \@acmBadgeL@image ..
        .... 1038, 1476,
                                                              \@acmplainheadfont .
                                       . . . . 1050, 1052,
       1481, 1553, 1557,
                                                                      ... <u>2109</u>, 2121, 2133
                                       1474, 1476, 1552,
       1563, 1575, 1582,
                                                              \@acmplainindent ...
                                       1561, 1563, 1585, 1587
       1584, 1587, 1599, 1602
                                                                      ... <u>2108</u>, 2120, 2132
                               \@acmBadgeL@url . 1049,
\@ACM@badgefalse ... 1037
                                                              \@acmplainnotefont .
                                       1051, 1475, 1562, 1586
\@ACM@badgetrue 1043, 1048
                                                                      . . . 2110, 2122, 2136
                               \@acmBadgeR@image ..
\@ACM@commabox ....
                                                              \@adddotafter ....
                                       . . . . 1045, 1047,
        . . . 1614, 1617, 1618
                                                                      . . . 2044, 2048, 2104
                                       1479, 1481, 1556,
\@ACM@journalfalse .
                                                              \@additionalaffiliation
                                       1572, 1575, 1600, 1602
        119, 121, 123, 125, 127
                                                                      . . . . . . . . . . 972, 973
                               \@acmBadgeR@url . 1044,
\@ACM@journaltrue ..
                                                               \@addpunct ......
                                       1046, 1480, 1574, 1601
        . . . 111, 113, 115, 117
                                                                       1871, 2104, 2105, 2197
                               \@acmDOI . . 1034, 1370,
\@ACM@manuscriptfalse 106
                                                              \@addspaceafter . . . .
                                       1373, 1379, 1383, 1848
\@ACM@manuscripttrue 104
                                                                      . . . 2088, 2093, 2105
                               \@acmISBN . . . . . 1032, 1381
\@ACM@natbib@overridefalse
                                                              \@affiliationfont ..
                               \@acmMonth 1024, 1026, 1377
        . . . . . . . . . . . . . 69
                                                                        1665, 1670, 1674,
                               \@acmNumber . . . . 1016,
\@ACM@natbib@overridetrue
                                                                      1677, 1680, 1683,
                                       1839, 1928, 1936,
                                                                      1686, 1689, 1714, 1730
       . . . . . . . . . . . . . . . 71
                                       1944, 2009, 2017, 2025
\@ACM@natbibtrue ... 131
                                                              \@afterheading . 318, 1419
                               \@acmPrice 1030, 1378, 1382
\@ACM@newfontsfalse
                                                              \@afterindentfalse .
                               \@acmPubDate ... 1026,
       . . . . . . 558, 560, 563
                                                                      . . . . . . . . 264, 1418
                                       1839, 1928, 1936,
\@ACM@newfontstrue . 555
                                                              \@afterindenttrue .. 262
                                       1944, 2010, 2018, 2026
\@ACM@sigchiamodefalse
                                                              \@author ... 935, 938,
                               \@acmVolume ... 1014,
                                                                      943, 1703, 1753, 1788
       . . . . . . . . . . . . . . 108
                                       1839, 1927, 1935,
\@ACM@sigchiamodetrue 128
                                                              \@authorfont .....
                                       1943, 2008, 2016, 2024
                                                                       1664, 1669, 1673,
\@ACM@title@width ..
       . . . . . . . . 1040,
                               \@acmYear . . . . . 1022,
                                                                      1676, 1679, 1682,
       1551, 1553, 1554,
                                       1029, 1305, 1377, 1836
                                                                      1685, 1688, 1705, 1730
       1557, 1558, 1566,
                               \@acmdefinitionbodyfont
                                                              \@authornotemark ...
       1580, 1582, 1583, 1591
                                       . . . 2137, 2149, 2161
                                                                      . . . . . . . . 1010, 1810
```

\@authornotes	1382, 1391, 1396,	\@input 355
1007, 1011, 1337	1400, 1443, 1474,	\@insideauthorgroupfalse
\@auxout 418	1479, 1552, 1556,	
\@begindocumenthook 414	1561, 1569, 1572,	\@insideauthorgrouptrue
\@citestyle 196	1585, 1593, 1600,	
\@classname 25, 30,	1610, 1694, 1704,	\@journalCode 657, 904
46, 48, 49, 54, 56,	1712, 1713, 1753,	\@journalCode@nr
57, 62, 64, 65, 73,	1759, 1764, 1788,	657, 709, 909
75, 76, 80, 82, 83,	1794, 1799, 1812,	\@journalName 711,
94, 99, 155, 556,	2110, 2140, 2210, 2226	715, 719, 724, 728,
559, 561, 904, 906,	\@endfloatbox 616	732, 736, 740, 744,
1065, 1067, 1068,	\@endpefalse 2199	745, 747, 748, 751,
1071, 1073, 1074,	\@endwidefloatbox 616, 624	752, 755, 759, 763,
1077, 1079, 1080, 1832	\@finalstrut 536, 549	765, 769, 773, 775,
\@clubpenalty 332	\@float 618	777, 779, 783, 787,
\@concepts <u>1113</u> ,	\@flushglue 2053	791, 795, 799, 803,
1120, 1391, 1393, 1416	\@fnsymbol 1325	807, 811, 815, 819,
\@copyrightowner	\@folio@ht	823, 827, 831, 835,
1171, 1354	1959, 1985, 1991, 1992	836, 839, 843, 844,
\@copyrightpermission	\@folio@max 1959, 1981, 1982	847, 852, 856, 860,
1200, 1346	\@folio@voffset <u>1959</u> , 1987	864, 868, 872, 876,
\@copyrightyear	\@folio@wd 1959,	880, 884, 888, 892,
1304, 1354, 1356	1992, 1993, 2014, 2022	896, 900, 910, 911,
\@currbox 630, 631, 632	\@folioblob 1979,	1366, 1927, 1935,
\@currentaffiliation	2011, 2013, 2019, 2020	1943, 2008, 2016, 2024
	\@footnotemark . 365, 1323	\@journalNameShort .
1731, 1734, 1752, 1759, 1760, 1762,	\@footnotemark@nolink	712, 716, 721,
1764, 1765, 1767,		725, 729, 733, 737,
1787, 1794, 1795,	\@footnotetext	741, 756, 760, 766,
1797, 1794, 1793, 1797, 1799, 1800, 1802		741, 730, 760, 760, 770, 780, 784, 788,
\@currentaffiliations	366, <u>527</u> , 1324 \@footnotetext@nolink	770, 780, 784, 788, 792, 796, 800, 804,
		808, 812, 816, 820,
1605 1606 1609	366, 1324	
1695, 1696, 1698,	\@for 172	824, 828, 832, 840,
1701, 1713, 1714, 1716	\@formatdoi <u>1199</u> , 1373	845, 848, 853, 857,
\@currentauthors 1692,	\@fps 617	861, 865, 869, 873,
1693, 1700, 1704,	\@fpsadddefault 617	877, 881, 885, 889,
1705, 1707, 1730,	\@gobble 194,	893, 897, 901, 911, 1838
1733, 1751, 1753,	238, 1622, 1625,	\@keywords 1057, 1400, 1406
1754, 1756, 1786,	1626, 1627, 1628, 1629	\@latex@error 240
1788, 1789, 1791, 1810	\@hangfrom 286, 343	\@lempty <u>1062</u> , 1820
\@currentlabel . 531,545		\@m
\@dblarg 273	<u>1890,</u> 1923, 1924,	\@makefnmark 526,
\@dblfloat <u>614</u>	1925, 1926, 1930,	<u>551</u> , 1329, 1334, 1338
\@department 976, 977	1933, 1938, 1941,	\@makefntext
\@dotsep	1947, 1948, 1949, 1951	<u>526</u> , 535, 548, 1339
\@empty 133, 277,	\@ifnextchar 976	\@marginfigure . 606, 607
919, 933, 948, 953,	\@ifnotempty 1310	\@margintable 609, 610
954, 960, 1094,	\@ifnum 210, 212	\@minipagefalse . 522,626
1095, 1101, 1108,		
1113, 1340, 1370,	\@ifstar 271 \@iiiparbox 525	\@minus 2034, 2038, 2042, 2046, 2050,

2081, 2086, 2091,	2046, 2050, 2081,	\@subtitle 924,
2128, 2130, 2158, 2160	2086, 2091, 2127,	999, 1569, 1570,
\@mkabstract 1389, 1819	2129, 2157, 2159, 2194	1593, 1594, 1610, 1611
\@mkauthors 1330, 1332, 1640	\@printcopyrightfalse	\@subtitlefont
\@mkauthors@i 1644,	1140, 1151	1529, 1570, 1594, 1611
1646, 1648, 1650, 1699	·	\@subtitlenotes
	\@printcopyrighttrue	
\@mkauthors@ii 1724	1126, 1136	997, 1001, 1004, 1336
\@mkauthors@iii . 1652,	\@printendtopmatter	\@svsec . 277, 280, 286, 301
1654, 1656, 1658, <u>1735</u>	1417, <u>1850</u>	\@svsechd 299, 327, 347
\@mkauthors@iv 1660, <u>1776</u>	\@printpermissionfalse	\@teaser 1308, 1813
\@mkbibcitation 1413, <u>1829</u>		\@teaserfigures
\@mkteasers 1330, <u>1811</u>	\@printpermissiontrue	<u>1306</u> , 1308, 1812, 1816
\@mktitle 1330, <u>1486</u>	1128, 1135, 1150	\@tempa
\@mktitle@i 1489,	\@printtopmatter	172, 173, 175, 177,
1491, 1493, 1495, <u>1550</u>		179, 181, 183, 185,
\@mktitle@ii <u>1578</u>	\@proofindent	187, 189, 191, 193,
\@mktitle@iii 1497,	2178, 2188, 2196	195, 197, 199, 201,
1499, 1501, 1503, <u>1578</u>	\@proofnamefont	203, 205, 207, 209,
\@mktitle@iv 1505, <u>1606</u>	2177, 2187, 2197	211, 213, 215, 217,
\@mpargs 525		220, 222, 224, 226,
\@mparswitchfalse 490	\@received . <u>1092</u> , 1095,	228, 230, 952, 953,
\@mpfootins	1096, 1098, 1101,	1093, 1094, 1712,
517, 518, 520, 540, 541	1102, 1104, 1108, 1109	2210, 2225, 2226, 2228
\@mpfootnotetext <u>539</u>	\@rightskip 2053, 2054	\@tempb 173, 175,
\@ne 198, 202, 206,	\@saveabstract 1059, <u>1060</u>	177, 179, 181, 183,
208, 407, 1877, 1879	\@saveteaser 1307, <u>1308</u>	185, 187, 189, 191,
\@nil 217	\@seccntformat . 280,337	193, 195, 197, 199,
\@nobreakfalse . 320,360	\@secfont 2036, <u>2057</u>	201, 203, 205, 207,
\@noskipsecfalse 324	\@secpenalty 269	209, 211, 213, 215,
\@noskipsectrue 321	\@sect 273, 274	220, 222, 224, 226,
\@par 1342	\@setaddresses 1818	228, 230, 2227, 2228
\@parboxrestore 544	\@setthanks 1342, <u>1871</u>	\@tempboxa 525
\@parfont . 2048, 2052, 2057	\@shortauthors	\@tempc . 218, 219, 221,
\@permissionCodeOne		223, 225, 227, 229, 231
713,	<u>1889</u> , 1919,	\@tempcnta 1877,
717, 722, 726, 730,	1925, 1931, 1939, 1948	1878, 1879, 1979,
734, 738, 742, 749,	\@sidebar 603, <u>604</u>	1981, 1982, 1984, 1986
753, 757, 761, 767,	\@specialsection 1392,	\@tempdima
771, 781, 785, 789,	1397, 1402, 1404, <u>1421</u>	1985, 1986, 1987, 1989
793, 797, 801, 805,	\@ssect 272, 338	\@tempskipa
809, 813, 817, 821,	\@startPage	261, 263, 264, 269,
825, 829, 833, 837,	1053, 1443, 1444, 1446	282, 283, 314, 315,
841, 849, 854, 858,	\@startsection	317, 329, 330, 339, 340
862, 866, 870, 874,	<u>258</u> , <u>350</u> , 2033,	\@terms 1055, 1396, 1398
878, 882, 886, 890,	2037, 2041, 2045,	\@textbottom 552
	2049, 2080, 2085, 2090	\@textsuperscript
894, 898, 902, 912, 1377 \@permissionCodeTwo	\@starttoc 350	·
•	\@subparfont 2093, 2094	551, 1329, 1334 \@texttop 553
	\@subsecfont 2040, 2057	
\@plus 353, 361, 552,	· · · · · · · · · · · · · · · · · · ·	\@thefnmark . 532, 546,
2034, 2038, 2042,	\@subsubsecfont <u>2044</u> , <u>2057</u>	551, 1329, 1334, 1338

\@title <mark>990</mark> , 1416,	1509, 1530, 1642,	\addtolength 1880
1568, 1592, 1609, 1836	1666, 1851, 1891,	\addvspace 269, 361
\@titlefont <u>1508</u> , 1560,	1915, 1966, 2002,	\advance 930, 1553,
1567, 1579, 1591, 1607	2062, 2111, 2141, 2179	1554, 1557, 1558,
\@titlenotes	\ACM@linecount	1582, 1583, 1737,
<u>988</u> , 992, 995, 1335	<u>1883</u> , 1917,	1750, 1778, 1785,
\@tochangmeasure 291, 304	1920, 1923, 1926,	1879, 1982, 1984, 1987
\@toclevel 275	1930, 1932, 1938,	\affiliation 9,
\@tocline 363, 364	1940, 1947, 1949,	967, 1711, 1764, 1799
\@topnum 1326	2004, 2011, 2012,	\and 943, 944, 957,
\@typeset@author@bx	2020, 2021, 2027, 2029	963, 1702, 1707,
	\ACM@linecount@bx	1709, 1716, 1719,
1769, 1775, 1804, 1809	1873, 1886	1728, 1758, 1769,
\@typeset@author@line	\ACM@linecount@bxht	1775, 1793, 1804, 1809
1691, 1702, 1719, 1721	1876, 1880, 1881	\andify
\@undefined 414	\acmArticle 12, 1018	1408, 1409, 1692, 1695
\@width 508, 513	\acmArticleSeq . 12, 1020	anonsuppress (environ-
\@xp 357, 358	\acmBadgeL 13, <u>1048</u>	ment)
\@xsect 312, 313, 349	\acmBadgeR 13, <u>1010</u>	\AtBeginDocument 415
\@z 204	\acmConference 7, 914	\AtEndDocument 1107
	\acmConference@date	\author 9,
\\ 1359, 1374,	917,	· · · · · · · · · · · · · · · · · · ·
1378, 1382, 1831, 1878	1368, 1843, 1950, 1952	928, 1319, 1320, 1833
\{	\acmConference@name	\author@bx <u>1724</u> , 1729, 1732
\} 180		\author@bx@sep
	916, 1368, 1842, 1844	<u>1726,</u> 1732,
	\acmConference@shortname	1737, 1750, 1778, 1785
\ 1119, 1354,	915,	\author@bx@wd
1356, 1377, 1839, 1845	919, 920, 1350,	<u>1725,</u> 1728, 1736,
4	1844, 1845, 1949, 1951	1737, 1742, 1744,
A 1050	\acmConference@venue	1746, 1748, 1750,
\abstract <u>1059</u>		1777, 1778, 1783, 1785
abstract (environment) 15	1350, 1842, 1950, 1952	\authornote
\acks <u>2201</u>	\acmdefinition $\underline{2156}$	12, 972, <u>1008</u> , 1834
acks (environment) 19	\acmDOI 13, <u>1034</u>	\authors 936, 939, 944,
\acm@copyrightinput 1132	\acmISBN 13, <u>1032</u>	1408, 1410, 1415, 1836
\acm@copyrightmode .	\acmJournal 7, <u>908</u>	
1132, 1138,	\acmMonth 12, <u>1024</u>	В
1143, 1146, 1149,	\acmNumber 12, <u>1016</u>	\baselineskip
1154, 1157, 1160,	\acmplain <u>2126</u>	1344, 1562, 1574,
1163, 1166, 1172, 1201	\acmPrice 12, <u>1030</u>	1586, 1601, 1876,
\ACM@fontsize	\acmVolume 12, <u>1014</u>	1880, 2034, 2035,
<u>86,</u> 133, 136, 138,	\acmYear <i>12</i> , <u>1022</u>	2038, 2039, 2042,
140, 142, 144, 146,	\addcontentsline 168,	2046, 2081, 2082,
148, 150, 152, 155, 156	293, 306, 1821, 2204	2086, 2091, 2127,
\ACM@format 27,94	\additionalaffiliation	2128, 2129, 2130,
\ACM@format@nr	10, <u>972</u>	2157, 2158, 2159, 2160
27, 94, 98,	\addpenalty 269	\begin 20, 1885, 1988
103, 109, 134, 375,	\addresses 933, 935,	\begingroup
430, 495, 582, 634,		
130, 173, 304, 031,	938, 943, 970, 986,	284, 327, 341, 350,
1422, 1450, 1487,	938, 943, 970, 986, 1010, 1721, 1775, 1809	

```
\bfseries . . . . . 649,
                               \citeauthor .....
                                                       400
                                                             \def
                                                                    25, 33, 86, 136, 138,
       1511, 1513, 1515,
                                                                     140, 142, 144, 146,
                               \citeN ......
                                                       398
       1519, 1521, 1523,
                                                                     148, 150, 152, 173,
                               \citename .....
                                                       410
       1525, 1527, 1685,
                               \citeNN ......
                                                                     175, 177, 179, 181,
       1688, 1835, 1995,
                               \citeNP .... 404
                                                                     183, 185, 187, 189,
       2057, 2058, 2072,
                                                                     191, 193, 195, 197,
                               \citep ..... 399
       2073, 2075, 2076,
                               \citestyle . . . 20, 236, 256
                                                                     198, 199, 200, 201,
       2078, 2079, 2084,
                               \citeyear . . . 402, 403, 412
                                                                     202, 203, 204, 205,
       2089, 2097, 2098,
                               \citeyearNP ..... 402
                                                                     206, 207, 209, 211,
       2101, 2102, 2121, 2151
                                                                     213, 215, 216, 220,
                              \citeyearpar ... 401, 403
                               \city ..... 10, 979, 1621
                                                                     222, 224, 226, 228,
\bgroup . 604, 607, 610,
       615, 973, 1391,
                               \ClassError . . 30, 906,
                                                                     230, 258, 274, 299,
       1396, 1400, 1728,
                                      1068, 1074, 1080, 1832
                                                                     313, 337, 338, 347,
       1806, 1813, 1819, 1829
                              \ClassInfo ... 94, 155,
                                                                     350, 363, 364, 369,
                                      904, 1065, 1067,
                                                                     370, 371, 372, 412,
\bibfont ..... 170
                                                                     413, 507, 512, 514,
\bibliofont ..... 170
                                      1071, 1073, 1077, 1079
                                                                     526, 528, 539, 551,
\bibliographystyle . 413
                               \ClassWarning .....
                                                                     552, 604, 607, 610,
\bibsection ..... 166
                                      . . . 99, 556, 559, 561
\bibstyle 194, 196, 238, 418
                                                                     615, 617, 621, 624,
                              \cleaders . . . . . . . . 1618
\bibstyle@acmauthoryear
                               \clubpenalty ... 326, 332
                                                                     642, 643, 644, 645,
        . . . . . . . . . . . . . . . <u>244</u>
                              \CodelineIndex .... 17
                                                                     711, 712, 713, 715,
                                                                     716, 717, 719, 721,
\bibstyle@acmnumeric
                        250
                               \Collect@Body .. 603,
                                                                     722, 724, 725, 726,
\bigskip .....
                                      606, 609, 1059, 1307
                                                                     728, 729, 730, 732,
        1109, 1471, 1577,
                               \color ..... 1878
                                                                     733, 734, 736, 737,
       1605, 1613, 1775,
                               \color@begingroup 534,547
                                                                     738, 740, 741, 742,
       1809, 1813, 1859,
                               \color@endbox .... 629
                                                                     744, 745, 747, 748,
       1861, 1863, 1865, 1867
                              \color@endgroup ....
                                                                     749, 751, 752, 753,
\box 631, 1452, 1455, 1458,
                                      . . . . . . 523, 537, 550
                                                                     755, 756, 757, 759,
       1461, 1463, 1465,
                               \columnwidth ... 508,
                                                                     760, 761, 763, 765,
       1467, 1469, 1471,
                                      543, 615, 1777, 1806
       1720, 1732, 1773, 1815
                              \contentsnamefont .. 354
                                                                     766, 767, 769, 770,
                                                                     771, 773, 775, 777,
                               \copy ..... 1618
                                                                     779, 780, 781, 783,
                               \copyright .... 1354
\c@footnote .... 1325
                                                                     784, 785, 787, 788,
                              \copyrightpermissionfootnoterule
\c@secnumdepth ....
                                                                     789, 791, 792, 793,
                                      . . . . . . . . . . . . . . . <u>507</u>
        276, 290, 294, 303, 307
                                                                     795, 796, 797, 799,
                               \copyrightyear . 14, 1304
                               \country ... 10, 982, 1621
                                                                     800, 801, 803, 804,
\captionsetup ....
        . . . 574, 576, 578,
                                                                     805, 807, 808, 809,
                               \csname .....
                                                                     811, 812, 813, 815,
       580, 589, 591, 594,
                                      238, 289, 291, 295,
                                                                     816, 817, 819, 820,
       597, 604, 607, 610, 1814
                                      302, 304, 308, 337,
                                                                     821, 823, 824, 825,
\ccsdesc . . . . . . . 13, <u>1114</u>
                                      357, 358, 532, 546,
                                                                     827, 828, 829, 831,
\ccsdesc@parse 1115, 1116
                                      1118, 1119, 1120, 1121
                                                                     832, 833, 835, 836,
CCSXML (environment) . . 13
                               \CurrentOption ....
                                                                     837, 839, 840, 841,
\centering .. 354, 547,
                                      . 87, 88, 89, 90, 91, 92
       608, 611, 1579,
                                                                     843, 844, 845, 847,
       1591, 1729, 1774, 1994
                                                                     848, 849, 850, 852,
\cite ..... 398, 399, 412
                               \DeclareNewFootnote
                                                                     853, 854, 856, 857,
\citeA ..... 405
                               \DeclareOptionX . . 33,
                                                                     858, 860, 861, 862,
                                                                     864, 865, 866, 868,
\citealt .....
                                      87, 88, 89, 90, 91, 92
                                                                     869, 870, 872, 873,
\citeANP .... 400
                              \DeclareRobustCommand 405
```

```
874, 876, 877, 878,
                               2076, 2078, 2079,
                                                              1100, 1103, 1108,
880, 881, 882, 884,
                               2084, 2089, 2094,
                                                              1122, 1123, 1313,
885, 886, 888, 889,
                               2097, 2098, 2101,
                                                              1330, 1340, 1345,
890, 892, 893, 894,
                               2102, 2104, 2105,
                                                              1348, 1349, 1355,
896, 897, 898, 900,
                               2107, 2108, 2109,
                                                              1360, 1367, 1372,
901, 902, 908, 909,
                               2110, 2119, 2120,
                                                              1375, 1380, 1382,
910, 911, 912, 913,
                               2121, 2122, 2137,
                                                              1391, 1396, 1400,
924, 952, 972, 973,
                               2138, 2139, 2140,
                                                              1403, 1445, 1474,
974, 975, 976, 977,
                               2149, 2150, 2151,
                                                              1479, 1552, 1556,
                               2152, 2177, 2178,
                                                              1561, 1569, 1572,
988, 989, 997, 998,
1007, 1008, 1014,
                               2187, 2188, 2208,
                                                              1585, 1593, 1600,
1016, 1018, 1020,
                               2210, 2225, 2226, 2227
                                                              1610, 1616, 1630,
1022, 1024, 1026,
                       \define@boolkey ....
                                                              1694, 1706, 1712,
1030, 1032, 1034,
                                                              1715, 1729, 1747,
                               . . . . . 44, 52, 60,
1044, 1045, 1046,
                               70, 78, 1063, 1069, 1075
                                                              1755, 1761, 1766,
1047, 1049, 1050,
                       \define@choicekey ..
                                                              1782, 1790, 1796,
1051, 1052, 1053,
                               . . . . . . 27, 657, 1131
                                                              1801, 1812, 1820,
1055, 1057, 1060,
                                                              1824, 1841, 1844,
                       \definecolor .....
1062, 1081, 1092,
                               . . . 421, 422, 423,
                                                              1889, 1945, 2028,
1093, 1117, 1169,
                               424, 425, 426, 427, 428
                                                              2210, 2214, 2221, 2229
1171, 1199, 1200,
                                                       \email 9,984,1710,1759,1794
                       \department . 10, 976, 1621
1304, 1306, 1308,
                                                       \emph ..... 1366, 1368
                       \description \dots 650
1317, 1329, 1334,
                                                       \EnableCrossrefs .... 19
                       \descriptionlabel 649,652
1342, 1421, 1442,
                                                       \end . . . . . 22, 1887, 1996
                       \dimexpr .. 613, 631, 1955
1486, 1508, 1529,
                                                       \end@dblfloat .... 620
                       \divide ..... 1742,
1550, 1578, 1606,
                                                       \end@float .....
                               1744, 1746, 1748, 1783
1615, 1623, 1631,
                                                       \endcsname . . . . . 237,
                       \do . . . . . . . . . . . . . 172
1632, 1634, 1637,
                                                              238, 289, 291, 295,
                       \DocInput . . . . . . . . . 21
1640, 1664, 1665,
                                                              302, 304, 308, 337,
                       \documentclass ..... 9
1669, 1670, 1673,
                       \dots ..... 1382
                                                              357, 358, 532, 546,
1674, 1676, 1677,
                                                              1118, 1119, 1120, 1121
1679, 1680, 1682,
                                     E
                                                       \enddescription .... 656
1683, 1685, 1686,
                       \edef ... 87, 88, 89, 90, 275
                                                       \endgroup 288, 327, 345,
1688, 1689, 1691,
                       \egroup ..... <u>524</u>,
                                                              360, 1387, 1662, 2206
1693, 1698, 1699,
                               605, 608, 611, 622,
                                                       \endlist ..... 654,656
1700, 1701, 1703,
                               628, 983, 1393,
                                                       \endminipage ..... 514
1710, 1711, 1712,
                               1398, 1406, 1731,
                                                       \endtrivlist ..... 2199
1728, 1735, 1753,
                                                       \enspace ..... 2105
                               1809, 1814, 1828, 1849
1759, 1764, 1776,
                       \else ... 47, 55, 63, 74,
                                                       environments:
1788, 1794, 1799,
                               81, 105, 130, 218,
                                                          abstract . . . . . . . . . . . . . . . 15
1810, 1811, 1813,
                               239, 268, 275, 278,
                                                          acks . . . . . . . . . . . 19
1818, 1819, 1829,
                                                          anonsuppress .... 18
                               290, 294, 298, 303,
1830, 1831, 1832,
                               307, 319, 331, 346,
                                                          CCSXML ..... 13
1850, 1871, 1883,
                               394, 409, 412, 414,
                                                          marginfigure .... 17
1889, 1890, 1965,
                               517, 579, 929, 937,
                                                          margintable .... 17
1972, 1977, 1979,
                               941, 942, 951, 956,
                                                          printonly . . . . . . . . 18
2053, 2057, 2058,
                               959, 962, 969, 985,
                                                          screenonly ..... 18
2059, 2060, 2066,
                               994, 1003, 1009,
                                                          sidebar ......
2067, 2069, 2070,
                               1066, 1072, 1078,
                                                           teaserfigure .... 15
2072, 2073, 2075,
                               1085, 1088, 1097,
                                                       \everypar . . . 267, 322, 333
```

```
1013, 1029, 1068,
                                                               \footnotetext .. 993,
\excludecomment . 1112,
        2213, 2215, 2219, 2220
                                       1074, 1080, 1090,
                                                                       995, 1002, 1005, 1012
                                       1091, 1099, 1105,
\ExecuteOptionsX ...
                                                               \footnotetextcopyrightpermission
        . . . 43, 51, 59, 67, 85
                                       1106, 1110, 1120,
                                                                       . . . . . . . 1341, 1344
\expandafter .....
                                       1124, 1142, 1145,
                                                               \footrulewidth 1914, 2001
        . . . 217, 219, 415,
                                       1148, 1153, 1156,
                                                               \format ..... <u>27</u>
        525, 1118, 1119, 1121
                                       1159, 1162, 1165,
                                                               \frenchspacing .... 2231
                                       1168, 1198, 1303,
                                                               \fulltextwidth ....
             F
                                       1315, 1320, 1321,
                                                                       ..... <u>612</u>, 615, 631
\familydefault .... 571
                                       1330, 1332, 1343,
                                                                             G
\fancyfoot . . . . 1921,
                                       1346, 1347, 1351,
        1927, 1935, 1943,
                                       1352, 1357, 1369,
                                                               \g@addto@macro . 943,
        1946, 2005, 2006,
                                       1374, 1382, 1384,
                                                                       944, 957, 963, 970,
        2008, 2016, 2024, 2030
                                       1385, 1386, 1394,
                                                                       986, 990, 992,
                                                                       995, 999, 1001,
\fancyhead . 1917, 1918,
                                       1395, 1399, 1405,
        1919, 1920, 1923,
                                       1407, 1414, 1441,
                                                                       1004, 1010, 1011,
        1924, 1925, 1926,
                                       1447, 1478, 1482,
                                                                       1098, 1104, 1120,
        1930, 1932, 1933,
                                       1483, 1484, 1506,
                                                                       1121, 1308, 1312,
        1938, 1940, 1941,
                                       1528, 1549, 1555,
                                                                       1314, 1707, 1716,
        1947, 1948, 1949,
                                       1559, 1565, 1571,
                                                                       1756, 1762, 1767,
                                       1576, 1588, 1590,
                                                                       1791, 1797, 1802, 1810
        1951, 2004, 2011,
        2012, 2013, 2019,
                                       1595, 1603, 1604,
                                                               \gdef 915, 916, 917, 918,
                                       1612, 1619, 1639,
       2020, 2021, 2027, 2029
                                                                       920, 935, 936, 938,
                                       1661, 1690, 1697,
                                                                       939, 949, 955, 961,
\fancyheadoffset ...
        . . . 1955, 2014, 2022
                                       1708, 1717, 1718,
                                                                       1060, 1096, 1102,
\fancyhf .... 1912, 1999
                                       1729, 1749, 1757,
                                                                       1119, 1444, 1705,
                                       1763, 1768, 1784,
\fancypagestyle 1911, 1998
                                                                       1709, 1714, 1733,
                                       1792, 1798, 1803,
                                                                       1734, 1751, 1752,
\fi .... 49, 57, 65,
                                       1817, 1826, 1828,
                                                                       1754, 1758, 1760,
       76, 83, 102, 107,
                                       1845, 1847, 1869,
                                                                       1765, 1786, 1787,
        129, 132, 153, 154,
                                       1882, 1888, 1889,
        163, 174, 176, 178,
                                                                       1789, 1793, 1795, 1800
                                       1910, 1917, 1918,
        180, 182, 184, 186,
                                                               \geometry . . . . . . . .
        188, 190, 192, 194,
                                       1923, 1924, 1931,
                                                                       432, 435, 442, 449,
                                       1934, 1939, 1942,
        196, 198, 200, 202,
                                                                       456, 463, 470, 477, 484
                                       1946, 1953, 1956,
        204, 206, 208, 210,
                                                               \global .....
                                       1978, 2005, 2030,
        212, 214, 216, 221,
                                                                       321, 324, 360, 540,
                                       2031, 2103, 2125,
        223, 225, 227, 229,
                                                                       630, 930, 931, 968,
        231, 232, 241, 243,
                                       2155, 2191, 2210,
                                                                       1410, 1411, 1702,
                                       2217, 2223, 2226, 2230
        257, 259, 265, 270,
                                                                       1719, 1720, 1729,
        275, 281, 292, 296,
                               \firstpagestyle . . . . 1998
                                                                       1769, 1772, 1804, 1815
                               \floatname .... 602
        305, 309, 311, 334,
                                                               \grantnum . . . . . . 19, <u>2209</u>
                               \footnote . . . . . . . . . 1832
        335, 348, 359, 387,
                                                               \grantsponsor . . 19, 2208
                               \footnotemark .. 372,
        396, 411, 412, 416,
        419, 492, 506, 521,
                                       990, 999, 1810, 1830
                                                                            Н
                               \footnoterule .... 512
                                                               \hbox . 551, 1329, 1334, 1617
        538, 569, 572, 599,
        600, 619, 623, 648,
                               \footnotesep ... 536, 549
                                                               \headrulewidth 1913, 2000
        903, 921, 932, 940,
                               \footnotesize .. 542,
                                                               \hfill ..... 1608
        945, 946, 950, 958,
                                       1921, 1927, 1935,
                                                               \href . 1475, 1480, 1562,
        964, 965, 966, 971,
                                       1943, 1946, 2006,
                                                                       1574, 1586, 1601, 2229
        987, 996, 1006,
                                       2008, 2016, 2024, 2030
                                                               \hrule .... 508, 513, 1608
```

\hrulefill . 1453, 1456,	\if@ACM@screen 44,388,2211	1552, 1556, 1561,
1459, 1853, 1855, 1857	\if@ACM@sigchiamode	1569, 1572, 1585,
\hsize 543,		1593, 1600, 1610,
1328, 1550, 1551,	527, 570, 614, 620,	1694, 1704, 1712,
1578, 1580, 1606,	1330, 1332, 1729, 1954	1713, 1753, 1759,
1641, 1728, 1771, 1806	\if@acmowned <u>1129</u>	1764, 1788, 1794,
\hskip 286,	\if@filesw 356, 417	1799, 1812, 1820,
300, 330, 343, 347,	\if@insideauthorgroup	1844, 2210, 2226, 2228
1477, 1564, 1573,	<u>928,</u> 929	\ignorespaces 336, 536,
1589, 1598, 1618, 2196	\if@nobreak 266	549, 974, 975, 977,
\hspace 649, 1211,	\if@noskipsec 259, 323	1623, 1827, 1831, 2197
1222, 1231, 1248,	\if@printcopyright .	\immediate 358, 418
1262, 1274, 1732, 1774	1125, 1353	\includecomment
\Huge 1517, 1519,	\if@printpermission	2212, 2216, 2222
1521, 1523, 1525, 1527	1127, 1346	\includegraphics
\hypersetup 389, 395, 1415	\ifcase . 109, 134, 375,	
(hyper setup 309, 393, 1413		1476, 1481,
τ.	430, 495, 582, 634,	1563, 1575, 1587, 1602
I 010 1000	709, 1026, 1172,	\indent 2178
\if 218, 1396	1201, 1422, 1450,	\institution 10, 975, <u>1621</u>
\if@ACM@anonymous	1487, 1509, 1530,	\interfootnotelinepenalty
	1642, 1666, 1738,	530
942, 947, 969, 985,	1779, 1851, 1891,	\interlinepenalty
991, 1000, 1009,	1915, 1966, 2002,	287, 344, 530
1311, 1318, 1889, 2218	2062, 2111, 2141, 2179	\item 207, 311, 330
\if@ACM@authorversion	\ifcsname 237	
(0.1245.12(1	\ifdim 262 202 21E 240 1001	\itemindent 651
00, 1343, 1301	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	
<u>60</u> , 1345, 1361	\ifdim 263, 283, 315, 340, 1881 \IfFileExists 556, 559, 561	\itshape 1350, 2059,
\if@ACM@badge	\IfFileExists 556, 559, 561	2060, 2089, 2094,
\if@ACM@badge 1036, 1472, 1581, 1597	\IfFileExists 556, 559, 561 \ifNAT@numbers 412	
\if@ACM@badge 1036, 1472, 1581, 1597 \if@ACM@journal	\IfFileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276,	2060, 2089, 2094,
\if@ACM@badge 1036, 1472, 1581, 1597 \if@ACM@journal 96, 575, 1086,	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276, 290, 294, 303, 307,	2060, 2089, 2094, 2107, 2119, 2139, 2187
\ifeACMebadge 1036, 1472, 1581, 1597 \ifeACMejournal 96, 575, 1086, 1349, 1365, 1376,	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276, 290, 294, 303, 307, 1122, 1123, 1138,	2060, 2089, 2094, 2107, 2119, 2139, 2187
\ifeACMebadge 1036, 1472, 1581, 1597 \ifeACMejournal 96, 575, 1086, 1349, 1365, 1376, 1401, 1621, 1822, 1837	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276, 290, 294, 303, 307, 1122, 1123, 1138, 1143, 1146, 1149,	2060, 2089, 2094, 2107, 2119, 2139, 2187
\ifeACMebadge 1036, 1472, 1581, 1597 \ifeACMejournal 96, 575, 1086, 1349, 1365, 1376, 1401, 1621, 1822, 1837 \ifeACMemanuscript 95,	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276, 290, 294, 303, 307, 1122, 1123, 1138, 1143, 1146, 1149, 1154, 1157, 1160,	2060, 2089, 2094, 2107, 2119, 2139, 2187 J \mathref{J} \mathref{J} \mathref{J} \mathref{J} \mathref{S} \mathref{J} \mathref{S} \mathre
\ifeACMebadge \frac{1036}{1472}, 1581, 1597 \ifeACMejournal \frac{96}{575}, 1086, \frac{1349}{1365}, 1376, \frac{1401}{1621}, 1822, 1837 \ifeACMemanuscript \frac{95}{5}, \frac{160}{1083}, 1348, 1358	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276, 290, 294, 303, 307, 1122, 1123, 1138, 1143, 1146, 1149, 1154, 1157, 1160, 1163, 1166, 1320, 1981	2060, 2089, 2094, 2107, 2119, 2139, 2187
\ifeACMebadge 1036, 1472, 1581, 1597 \ifeACMejournal 96, 575, 1086, 1349, 1365, 1376, 1401, 1621, 1822, 1837 \ifeACMemanuscript 95, 160, 1083, 1348, 1358 \ifeACMenatbib	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276, 290, 294, 303, 307, 1122, 1123, 1138, 1143, 1146, 1149, 1154, 1157, 1160, 1163, 1166, 1320, 1981 \ifvmode 1616	2060, 2089, 2094, 2107, 2119, 2139, 2187
\ifeACMebadge \frac{1036}{1472}, 1581, 1597 \ifeACMejournal \frac{96}{575}, 1086, \frac{1349}{1365}, 1376, \frac{1401}{1621}, 1822, 1837 \ifeACMemanuscript \frac{95}{5}, \frac{160}{1083}, 1348, 1358	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276, 290, 294, 303, 307, 1122, 1123, 1138, 1143, 1146, 1149, 1154, 1157, 1160, 1163, 1166, 1320, 1981	2060, 2089, 2094, 2107, 2119, 2139, 2187
\ifeACMebadge 1036, 1472, 1581, 1597 \ifeACMejournal 96, 575, 1086, 1349, 1365, 1376, 1401, 1621, 1822, 1837 \ifeACMemanuscript 95, 160, 1083, 1348, 1358 \ifeACMenatbib	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276, 290, 294, 303, 307, 1122, 1123, 1138, 1143, 1146, 1149, 1154, 1157, 1160, 1163, 1166, 1320, 1981 \ifvmode 1616	2060, 2089, 2094, 2107, 2119, 2139, 2187
\ifeACMebadge 1036, 1472, 1581, 1597 \ifeACMejournal 96, 575, 1086, 1349, 1365, 1376, 1401, 1621, 1822, 1837 \ifeACMemanuscript 95, 160, 1083, 1348, 1358 \ifeACMenatbib 70, 164, 255, 397	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276, 290, 294, 303, 307, 1122, 1123, 1138, 1143, 1146, 1149, 1154, 1157, 1160, 1163, 1166, 1320, 1981 \ifvmode 1616 \ifvoid 517	2060, 2089, 2094, 2107, 2119, 2139, 2187 J \jobname 355, 358 K \kern 507, 508, 512, 513, 1608 \keywords 13, 1057 L
\ifeACMebadge 1036, 1472, 1581, 1597 \ifeACMejournal 96, 575, 1086, 1349, 1365, 1376, 1401, 1621, 1822, 1837 \ifeACMemanuscript 95, 160, 1083, 1348, 1358 \ifeACMenatbib 70, 164, 255, 397 \ifeACMenatbib@override	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276, 290, 294, 303, 307, 1122, 1123, 1138, 1143, 1146, 1149, 1154, 1157, 1160, 1163, 1166, 1320, 1981 \ifvmode 1616 \ifvoid 517 \ifx 133, 173,	2060, 2089, 2094, 2107, 2119, 2139, 2187 J \jobname 355, 358 K \kern 507, 508, 512, 513, 1608 \keywords 13, 1057 L \l@subsection 363
\ifeACMebadge \frac{1036}{1472}, 1581, 1597 \ifeACMejournal \frac{96}{575}, 1086, \frac{1349}{1365}, 1376, \frac{1401}{1621}, 1822, 1837 \ifeACMemanuscript 95, \frac{160}{1083}, 1348, 1358 \ifeACMenatbib \frac{70}{164}, 255, 397 \ifeACMenatbibeoverride \frac{68}{130} \ifeACMenewfonts \frac{554}{554}, 564	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276, 290, 294, 303, 307, 1122, 1123, 1138, 1143, 1146, 1149, 1154, 1157, 1160, 1163, 1166, 1320, 1981 \ifvmode 1616 \ifvoid 517 \ifx 133, 173, 175, 177, 179, 181, 183, 185, 187, 189,	2060, 2089, 2094, 2107, 2119, 2139, 2187 J \jobname 355, 358 K \kern 507, 508, 512, 513, 1608 \keywords 13, 1057 L
\ifeACMebadge \frac{1036}{1472}, 1581, 1597 \ifeACMejournal \frac{96}{575}, 1086, \frac{1349}{1365}, 1376, \frac{1401}{1621}, 1822, 1837 \ifeACMemanuscript \frac{95}{55}, \frac{160}{1083}, 1348, 1358 \ifeACMenatbib \frac{70}{164}, 255, 397 \ifeACMenatbibeoverride \frac{100}{1083}, 1348, 1368 \ifeACMenatbibeoverride \frac{100}{1083}, 1364, 255, 397 \ifeACMenatbibeoverride \frac{100}{1083}, 1364, 255, 364 \ifeACMenewfonts \frac{554}{554}, 564 \ifeACMeprintacmref	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276, 290, 294, 303, 307, 1122, 1123, 1138, 1143, 1146, 1149, 1154, 1157, 1160, 1163, 1166, 1320, 1981 \ifvmode 1616 \ifvoid 517 \ifx 133, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197,	2060, 2089, 2094, 2107, 2119, 2139, 2187 J \jobname 355, 358 K \kern 507, 508, 512, 513, 1608 \keywords 13, 1057 L \l@subsection 363
\if@ACM@badge \\ \frac{1036}{1472}, 1581, 1597 \if@ACM@journal \\ \cdot \frac{96}{575}, 1086, \\ \text{1349}, 1365, 1376, \\ \text{1401}, 1621, 1822, 1837 \if@ACM@manuscript \(\frac{95}{95}, \) \\ \text{160}, 1083, 1348, 1358 \\ \if@ACM@natbib \cdot \\ \cdot \frac{70}{164}, 255, 397 \\ \if@ACM@natbib@override \\ \cdot \\ \\ \frac{68}{64}, 130 \\ \if@ACM@printacmref \\ \cdot \\ \\ \text{1069}, 1412	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276,	2060, 2089, 2094, 2107, 2119, 2139, 2187 J \jobname 355, 358 K \kern 507, 508, 512, 513, 1608 \keywords 13, 1057 L \l@subsection 363 \l@subsubsection 364 \labelenumi 642
\ifeACMebadge \frac{1036}{1472}, 1581, 1597 \ifeACMejournal \frac{96}{575}, 1086, \frac{1349}{1365}, 1376, \frac{1401}{1621}, 1822, 1837 \ifeACMemanuscript \frac{95}{5}, \frac{160}{1083}, 1348, 1358 \ifeACMenatbib \frac{70}{164}, 255, 397 \ifeACMenatbibeoverride \frac{1068}{554}, 564 \ifeACMenewfonts \frac{554}{554}, 564 \ifeACMeprintacmref \frac{1069}{1069}, 1412 \ifeACMeprintccs	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276,	2060, 2089, 2094, 2107, 2119, 2139, 2187 J \jobname 355, 358 K \kern 507, 508, 512, 513, 1608 \keywords 13, 1057 L \l@subsection 363 \l@subsubsection 364 \labelenumi 642 \labelenumi 643
\ifeACMebadge \frac{1036}{1472}, 1581, 1597 \ifeACMejournal \frac{96}{575}, 1086, \frac{1349}{1365}, 1376, \frac{1401}{1621}, 1822, 1837 \ifeACMemanuscript \frac{95}{575}, 1086, \frac{1401}{1621}, 1822, 1837 \ifeACMemanuscript \frac{95}{55}, \frac{160}{1083}, 1348, 1358 \ifeACMenatbib \frac{70}{164}, 255, 397 \ifeACMenatbibeoverride \frac{68}{130} \ifeACMenewfonts \frac{554}{564}, 564 \ifeACMeprintacmref \frac{1069}{1069}, 1412 \ifeACMeprintccs \frac{1063}{1063}, 1390	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276,	2060, 2089, 2094, 2107, 2119, 2139, 2187 J \jobname 355, 358 K \kern 507, 508, 512, 513, 1608 \keywords 13, 1057 L \l@subsection 363 \l@subsubsection 364 \labelenumi 642 \labelenumi 643 \labelenumii 644
\ifeACMebadge \frac{1036}{1472}, 1581, 1597 \ifeACMejournal \frac{96}{575}, 1086, \frac{1349}{1365}, 1376, \frac{1401}{1621}, 1822, 1837 \ifeACMemanuscript \frac{95}{95}, \frac{160}{160}, 1083, 1348, 1358 \ifeACMenatbib \frac{70}{164}, 255, 397 \ifeACMenatbibeoverride \frac{68}{130} \ifeACMenewfonts \frac{554}{554}, 564 \ifeACMeprintacmref \frac{1069}{1412} \ifeACMeprintccs \frac{1063}{1063}, 1390 \ifeACMeprintfolios	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276,	2060, 2089, 2094, 2107, 2119, 2139, 2187 J \jobname 355, 358 K \kern 507, 508, 512, 513, 1608 \keywords 13, 1057 L \l@subsection 363 \l@subsubsection 364 \labelenumi 642 \labelenumi 643 \labelenumii 644 \labelenumiv 645
\ifeACMebadge \frac{1036}{1472}, 1581, 1597 \ifeACMejournal \frac{96}{575}, 1086, \frac{1349}{1365}, 1376, \frac{1401}{1621}, 1822, 1837 \ifeACMemanuscript \frac{95}{5}, \frac{160}{1083}, 1348, 1358 \ifeACMenatbib \frac{70}{164}, 255, 397 \ifeACMenatbibeoverride \frac{68}{130} \ifeACMenewfonts \frac{554}{564} \ifeACMeprintacmref \frac{1069}{1412} \ifeACMeprintccs \frac{1063}{1075}, 1390 \ifeACMeprint, 1917,	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276,	2060, 2089, 2094, 2107, 2119, 2139, 2187 J \jobname 355, 358 K \kern 507, 508, 512, 513, 1608 \keywords 13, 1057 L \l@subsection 363 \l@subsubsection 364 \labelenumi 642 \labelenumi 643 \labelenumii 644 \labelenumiv 645 \labelsep 649, 2196
\ifeACMebadge \frac{1036}{1472}, 1581, 1597 \ifeACMejournal \frac{96}{575}, 1086, \frac{1349}{1365}, 1376, \frac{1401}{1621}, 1822, 1837 \ifeACMemanuscript \frac{95}{5}, \frac{160}{1083}, 1348, 1358 \ifeACMenatbib \frac{70}{164}, 255, 397 \ifeACMenatbib@override \frac{68}{130} \ifeACMeprintacmref \frac{1069}{1412} \ifeACMeprintccs \frac{1069}{1063}, 1390 \ifeACMeprintfolios \frac{1075}{1917}, \frac{1918}{1923}, 1924,	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276,	2060, 2089, 2094, 2107, 2119, 2139, 2187 J \jobname 355, 358 K \kern 507, 508, 512, 513, 1608 \keywords 13, 1057 L \lesubsection 363 \lesubsubsection 364 \labelenumi 642 \labelenumi 643 \labelenumi i 644 \labelenumi i 644 \labelenumi i 645 \labelsep 649, 2196 \labelwidth 652
\ifeACMebadge \frac{1036}{1472}, 1581, 1597 \ifeACMejournal \frac{96}{575}, 1086, \frac{1349}{1365}, 1376, \frac{1401}{1621}, 1822, 1837 \ifeACMemanuscript 95, \frac{160}{1083}, 1348, 1358 \ifeACMenatbib \frac{70}{164}, 255, 397 \ifeACMenatbib@override \frac{68}{130} \ifeACMeprintacmref \frac{1069}{1412} \ifeACMeprintccs \frac{1069}{1063}, 1390 \ifeACMeprintfolios \frac{1075}{1917}, \frac{1918}{1923}, 1924, \frac{1931}{1934}, 1939,	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276,	2060, 2089, 2094, 2107, 2119, 2139, 2187 J \jobname 355, 358 K \kern 507, 508, 512, 513, 1608 \keywords 13, 1057 L \lesubsection 363 \lesubsubsection 364 \labelenumi 642 \labelenumi i 643 \labelenumi i 644 \labelenumi i 645 \labelsep 649, 2196 \labelwidth 652 \LARGE 1511,
\ifeACMebadge \frac{1036}{1472}, 1581, 1597 \ifeACMejournal \frac{96}{575}, 1086, \frac{1349}{1365}, 1376, \frac{1401}{1621}, 1822, 1837 \ifeACMemanuscript 95, \frac{160}{160}, 1083, 1348, 1358 \ifeACMematbib \frac{70}{164}, 255, 397 \ifeACMenatbib@override \frac{68}{130} \ifeACMeprintacmref \frac{1069}{1412} \ifeACMeprintccs \frac{1069}{1075}, 1917, \frac{1918}{1918}, 1923, 1924, \frac{1931}{1934}, 1939, \frac{1942}{1946}, 2005, 2030	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276,	2060, 2089, 2094, 2107, 2119, 2139, 2187 J \jobname 355, 358 K \kern 507, 508, 512, 513, 1608 \keywords 13, 1057 L \lesubsection 363 \lesubsubsection 364 \labelenumi 642 \labelenumi 643 \labelenumi 644 \labelenumi 645 \labelsep 649, 2196 \labelwidth 652 \LARGE 1511, 1513, 1515, 1538,
\ifeACMebadge \frac{1036}{1472}, 1581, 1597 \ifeACMejournal \frac{96}{575}, 1086, \frac{1349}{1365}, 1376, \frac{1401}{1621}, 1822, 1837 \ifeACMemanuscript 95, \frac{160}{1083}, 1348, 1358 \ifeACMenatbib \frac{70}{164}, 255, 397 \ifeACMenatbib@override \frac{68}{130} \ifeACMeprintacmref \frac{1069}{1412} \ifeACMeprintccs \frac{1069}{1063}, 1390 \ifeACMeprintfolios \frac{1075}{1917}, \frac{1918}{1923}, 1924, \frac{1931}{1934}, 1939,	\IffileExists 556, 559, 561 \ifNAT@numbers 412 \ifnum 98, 103, 275, 276,	2060, 2089, 2094, 2107, 2119, 2139, 2187 J \jobname 355, 358 K \kern 507, 508, 512, 513, 1608 \keywords 13, 1057 L \lesubsection 363 \lesubsubsection 364 \labelenumi 642 \labelenumi i 643 \labelenumi i 644 \labelenumi i 645 \labelsep 649, 2196 \labelwidth 652 \LARGE 1511,

\Large 1664, 1682, 2072,	\mdseries	\newcommand . 244, 250,
2073, 2075, 2076, 2078	1532, 1534, 1536,	914, 967, 1043,
\large 1669, 1674, 1677,	1540, 1542, 1544,	1048, 1093, 1114,
2066, 2067, 2069, 2070	1546, 1548, 1686, 1689	1624, 1633, 2209, 2224
\lastbox 325	\medskip	\newcount 926
\leaders <u>1608</u>	1424, 1426, 1428,	\newdimen 612,
\leavevmode 259, 1608, 1773	1430, 1720, 1722,	1725, 1959, 1961, 1963
\leftskip . 1607, 1807, 2055	1773, 1816, 1835,	\newenvironment
\let . 194, 196, 208, 210,	1850, 1853, 1855, 1857	606, 609, 1307
212, 238, 277, 365,	\mktitle@bx <u>1316</u> ,	\newfloat 601
366, 398, 399, 400,	$1452, 1455, \overline{1458},$	\newif 68, 95, 96, 97, 554,
401, 402, 403, 404,	1461, 1463, 1465,	1036, 1125, 1127, 1129
407, 553, 616, 652,	1467, 1469, 1471,	\newlength
656, 978, 979, 980,	1560, 1579, 1607,	1038, 1040, 1041, 1876
981, 982, 1113,	1720, 1772, 1773, 1815	\newsavebox 1874
1323, 1324, 1338,	\month 1025	\newskip 1726
1339, 1342, 1410,	\moveleft 630	\newtheorem
1411, 1622, 1625,	\multiply 1986	2168, 2169, 2170,
1626, 1627, 1628,		2171, 2172, 2174, 2175
1629, 1635, 1636,	N	\newtheoremstyle
1638, 1702, 1719,	\NAT@@setcites 234	2126, 2156
1769, 1775, 1804, 1809	\NAT@aysep 225	\newwrite 357
\lineskip 1774, 1808	\NAT@citetp 407	\nobreak 316, 1835
\linespacing 353, 354	\NAT@close	\noindent
\list 650	174, 176, 178, 180, 223	. 526, 1109, 1339,
\LoadClass 156	\NAT@cmprs 202, 204, 206	1424, 1426, 1428,
\long 528,	\NAT@cmt 229	1430, 1449, 1453,
539, 604, 607, 610,	\NAT@ctype 407	1456, 1459, 1473,
1060, 1062, 1308, 1871	\NAT@find@eq 217	1560, 1567, 1570,
\loop 1878, 1980	\NAT@fullfalse 407	1594, 1608, 1609,
	\NAT@longnamestrue . 214	1611, 1692, 1720,
M	\NAT@merge 208, 210, 212	1721, 1772, 1808,
\makebox 1989	\NAT@nmfmt 216	1815, 1816, 1823,
\makelabel 652	\NAT@numbersfalse 188	1835, 1836, 1848,
\maketitle 16, <u>1317</u>	\NAT@numberstrue 190, 192	1853, 1855, 1857, 2188
\MakeUppercase	\NAT@open 174,	\nolinkurl
1705, 1707,	176, 178, 180, 221, 407	1379, 1383, 1760,
2057, 2066, 2069,	\NAT@partrue 407	1762, 1795, 1797, 1848
2072, 2075, 2097, 2101	\NAT@rem@eq 219	\normalcolor 519
\marginfigure <u>606</u>	\NAT@sep 182, 184, 186, 231	\normalfont 551, 1109,
marginfigure (environ-	\NAT@sort 198, 200, 206	1334, 1665, 1670,
ment)		1679, 1680, 1682,
\marginpar 528,	•	1683, 2122, 2137,
605, 608, 611, 1473	•	2149, 2152, 2194, 2231
\marginparsep 613, 1955		\normalsize 1665,
\marginparwidth . 613, 1955	\NAT@up 216	1679, 1680, 1683, 2231
\margintable <u>609</u>	\NAT@yrsep 227	\num@authorgroups
margintable (environ-	\NeedsTeXFormat 1	<u>926,</u> 930, 1320,
ment) <u>17</u>		
\mbox 216	\newblock 408 \newbox 1316, 1614, 1724	1738, 1742, 1744, 1779 \number 275

```
\numberline .... 295, 308
                                       1522, 1524, 1526,
                                                                       1398, 1406, 1424,
                                       1533, 1535, 1537,
                                                                       1426, 1428, 1430,
             o
                                                                       1452, 1453, 1455,
                                       1539, 1541, 1543,
\onehalfspacing .... 162
                                       1545, 1547, 1645,
                                                                       1456, 1458, 1459,
\openout .... 358
                                       1647, 1649, 1651,
                                                                       1471, 1570, 1577,
                                       1653, 1655, 1657,
                                                                       1594, 1605, 1608,
\or . . . . . . . . . . 112,
                                       1659, 1668, 1671,
                                                                       1611, 1613, 1631,
       114, 116, 118, 120,
                                       1672, 1675, 1678,
                                                                       1632, 1633, 1634,
        122, 124, 126, 137,
                                       1681, 1684, 1687,
                                                                       1692, 1696, 1720,
        139, 141, 143, 145,
                                       1740, 1741, 1743,
                                                                       1722, 1728, 1730,
        147, 149, 151, 377,
                                                                       1754, 1756, 1762,
                                       1745, 1781, 1854,
        378, 379, 380, 381,
                                       1856, 1858, 1860,
                                                                       1767, 1773, 1775,
        382, 384, 385, 434,
                                       1862, 1864, 1866,
                                                                       1789, 1791, 1797,
        441, 448, 455, 462,
                                       1868, 1894, 1896,
                                                                       1802, 1807, 1809,
        469, 476, 483, 497,
                                       1898, 1900, 1902,
                                                                       1813, 1814, 1815,
        498, 499, 501, 502,
                                       1904, 1906, 1908,
                                                                       1816, 1827, 1835,
        503, 504, 505, 584,
                                       1922, 1929, 1937,
                                                                       1847, 1849, 1850,
        585, 586, 587, 588,
                                       1968, 1973, 2007,
                                                                       1853, 1855, 1857,
        590, 593, 596, 636,
                                       2015, 2023, 2064,
                                                                       1859, 1861, 1863,
        637, 638, 639, 640,
        641, 646, 647, 714,
                                       2065, 2068, 2071,
                                                                       1865, 1867, 1871, 2192
                                       2074, 2077, 2095,
        718, 723, 727, 731,
                                                               \paragraph 1436, 2045, 2085
                                       2099, 2113, 2114,
                                                               \parbox ... 1566, 1584,
        735, 739, 743, 746,
                                       2115, 2116, 2117,
                                                                       1591, 1599, 1875, 1993
        750, 754, 758, 762,
                                       2118, 2123, 2124,
        764, 768, 772, 774,
                                                               \parindent .....
        776, 778, 782, 786,
                                       2143, 2144, 2145,
                                                                       . 493, 1342, 1344,
                                       2146, 2147, 2148,
                                                                       2045, 2056, 2108, 2138
        790, 794, 798, 802,
                                       2153, 2154, 2181,
                                                               \parskip ..... <u>493</u>, <u>1344</u>
        806, 810, 814, 818,
                                       2182, 2183, 2184,
        822, 826, 830, 834,
                                                               \part .... 2049
                                       2185, 2186, 2189, 2190
                                                               \PassOptionsToClass
        838, 842, 846, 851,
                               \orcid ..... 9, 988
        855, 859, 863, 867,
                                                                       . . . . . . . . . . 91, 92
        871, 875, 879, 883,
                               \outer@nobreak .... 627
                                                               \pdfstringdefDisableCommands
        887, 891, 895, 899,
                                                                       . . . . . . . . . . . . . . . 368
        1026, 1027, 1028,
                                                               \phantomsection . . . .
                                                                       . . . . 168, 1821, 2204
        1173, 1175, 1178,
                               \p@ . . . . . . . . . 361, 493,
                                       500, 507, 508, 512,
        1180, 1181, 1183,
                                                               \popQED ..... 2199
                                       513, 651, 2034,
                                                               \position . 10,974,978,
        1185, 1187, 1190,
                                       2038, 2042, 2043,
        1193, 1195, 1202,
                                                                       979, 980, 981, 982, 1621
                                       2046, 2047, 2050,
                                                               \postcode . . . 10, 981, 1621
        1213, 1224, 1232,
                                       2051, 2081, 2086,
        1238, 1250, 1264,
                                                               printonly (environment)
                                                                                         18
                                       2087, 2091, 2092, 2194
                                                               \ProcessOptionsX .... 93
        1276, 1283, 1290,
                               \PackageError ....
        1296, 1425, 1427,
                                                               \proof ..... <u>2192</u>
                                       . . . 49, 57, 65, 76, 83
        1429, 1431, 1433,
                                                               \proofname .... 2192
                               \PackageInfo .....
        1435, 1437, 1439,
                                                               \protect ..... 295, 308
        1454, 1457, 1460,
                                       . . . 46, 48, 54, 56,
                                                               \protected@edef ....
                                       62, 64, 73, 75, 80, 82
                                                                       . . . . . . 280, 531, 545
        1462, 1464, 1466,
        1468, 1470, 1490,
                               \PageIndex . . . . . . . . 16
                                                               \providecommand ....
        1492, 1494, 1496,
                               \pagestyle .... 1958
                                                                       . . . . . 408, 410, 2106
        1498, 1500, 1502,
                               \par . 260, 316, 352, 515,
                                                               \ProvidesClass ..... 5
        1504, 1512, 1514,
                                       625, 1109, 1342,
                                                               \ProvidesFile ..... 3
        1516, 1518, 1520,
                                       1346, 1350, 1393,
                                                               \pushQED .... 2193
```

\put 1886	2000, 2001, 2033, 2037, 2041, 2045,	\setTrue 351 \sfdefault 571
Q	2049, 2080, 2085, 2090	\sffamily 1511, 1513,
\qed 2193	\renewenvironment	1515, 1517, 1519,
337,	. 603, 650, 1059, 2192	1521, 1525, 1664,
1931, 1934, 1939, 1942	\repeat 1881, 1983	1669, 1673, 1893,
, , ,	\RequirePackage	1895, 1897, 1899,
R	26, 157,	1901, 1903, 1905,
\raggedright	158, 159, 161, 165,	1907, 1909, 1995,
1566, 1607, 1807	367, 420, 429, 509,	2057, 2058, 2059,
\raisebox 1562, 1574,	565, 566, 567, 568,	2066, 2067, 2069,
1586, 1601, 1989, 1991	573, 1111, 1116, 1872	2070, 2075, 2076,
\received <u>15, 1093</u>	\reset@font 529, 542	2097, 2098, 2101, 2102
\RecordChanges 18	\reversemarginpar 491	\shortauthors
\ref 1840, 1846	\rightskip 2054	<i>16</i> , 948, 949, 954,
\refname 167, 168	\rlap 1990	955, 957, 960, 961,
\refstepcounter 279	\rule 536, 549, 1992	963, 1409, 1411, 1889
\relax 98,	, ,	\shortcite 412
103, 110, 135, 217,	S	\shorttitle 1920,
218, 261, 280, 282,	\savebox 1875	1926, 1934, 1942, 1947
286, 300, 314, 329,	screenonly (environ-	\showeprint <u>2224</u>
339, 347, 358, 376,	ment) <u>18</u>	\sidebar <u>601</u>
431, 496, 553, 583,	\scriptsize 1878	sidebar (environment) . 17
635, 710, 927, 930,	\scshape 2109, 2177	\skip 518
1118, 1138, 1143,	\section 167,	\small 529, 605, 608,
1146, 1149, 1154,	1432, 1434, 1438,	611, 1109, 1424,
1157, 1160, 1163,	1440, 1825, 2033, 2203	1426, 1428, 1430,
1166, 1172, 1201,	\section@raggedright	1670, 1823, 1835, 2005
1338, 1423, 1451,	<u>2053,</u> 2057,	\space 304, 1637, 2210
1488, 1510, 1531,	2058, 2066, 2067,	\specialcomment 2201
1643, 1667, 1727,	2069, 2070, 2072,	$\sl 2000$
1736, 1737, 1739,	2073, 2075, 2076,	\startPage 13, <u>1053</u>
1742, 1744, 1746,	2078, 2079, 2084,	\state 10, 980, <u>1621</u>
1748, 1750, 1774,	2097, 2098, 2101, 2102	\stepcounter 993,
1777, 1778, 1780,	\SelectFootnoteRule 510	995, 1002, 1005, 1012
1783, 1785, 1852,	\setbox 325,	\streetaddress 10 , 978 , $\underline{1621}$
1877, 1892, 1916,	540, 630, 1560,	\string 418, 1833, 1834
1967, 1969, 1970,	1579, 1607, 1617,	\strut 1584, 1599
1971, 1974, 1975,	1720, 1729, 1772, 1815	\strutbox 536, 549
1976, 1979, 1981,	\setcitestyle	\subparagraph 2090
1984, 1985, 1986,	20, 171, 245, 251	\subsection 2037
1987, 2003, 2063,	\setcopyright <i>14</i> , <u>1169</u>	\subsubsection 2041, 2080
2112, 2142, 2180, 2194	\setcounter 1333, 1388,	\subtitle 9, <u>924</u>
\removelastskip 352	1446, 2061, 2096, 2100	\subtitlenote <i>12</i> , <u>998</u>
\renewcommand 166,	\setkeys 33,	_
170, 171, 174, 176,	101, 908, 1081, 1169	T
178, 180, 182, 184,	\setlength 493, 494,	\teaserfigure <u>1307</u>
186, 236, 571, 649,	500, 1039, 1042, 1876	teaserfigure (environ-
928, 984, 1309,	\settopmatter 15 , 1081 ,	ment) <u>15</u>
1325, 1913, 1914,	1082, 1084, 1087, 1089	\terms 13, <u>1055</u>

\textbf 1119, 1122 \textbullet 370, 1119,	\thmnote 2136, 2166 \thmnumber 2136, 2166 \thr@@ 212 \title 7, 1833 \titlenote 12, 989, 1834 \topsep 2194	\vtop
\textrightarrow . 371, 1119	\trivlist 2195 \tw@ 210	X \xdef 221,
\textwidth 613, 631, 632, 1328, 1550, 1578,	\twocolumn 1461, 1463, 1465, 1467, 1469	223, 225, 227, 229, 231
1606, 1641, 1736, 1771	1100, 1100, 1107, 1107	Y
\thanks 11, <u>1309</u> , 1871 \thankses	${f U}$	\year 1023
1312, 1314, 1340, 1871	\unskip 328, 369, 516, 977, 983,	Z
\the . 1023, 1025, 1878, 1986	1618, 1637, 1696, 1831	\z@ 200,
\theenumi 642	\unvbox 520, 525, 541	263, 283, 315, 325,
\theenumii 643	\upshape 649	340, 353, 494, 536,
\theenumiii 644	\url 1199, 2210	549, 552, 577, 581,
\theenumiv 645	\urlstyle 374, 383, 386	592, 652, 1326,
\thefootnote 1325	\usebox 1886	1342, 1344, 1562,
\theoremstyle	\usepackage	1574, 1586, 1601,
2167, 2173, 2176	. 10, 11, 12, 13, 14, 15	1807, 1913, 1914,
\thepage 1917,	. 10, 11, 12, 10, 11, 10	1960, 1962, 1964,
1918, 1923, 1924,	${f v}$	1989, 1991, 2000,
1931, 1934, 1939,	\vbox 540,	2001, 2033, 2037,
1942, 1946, 2005, 2030	630, 1560, 1579,	2049, 2056, 2080,
\thispagestyle 1448	1607, 1720, 1772, 1815	2085, 2090, 2120, 2150
\thmname 2136, 2166	\vskip 317, 352, 518, 552, 625	\z@skip 352,625,2055