$\text{\LaTeX} 2_\varepsilon$ Document Styles for the Department of Electronics and Computer Science File version v2.0, dated 2011/11/10

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1   Description

These $\text{\LaTeX} 2_\varepsilon$ document classes are designed to produce thesis, mini-thesis, progress, project, report, GDP report and GDP summary report documents which conform to the University of Southampton guidelines of April 2001. They are based on the document class `book`, but modify some of its layout decisions. An article class is also provided which is based on the document class `article`.

2   The DOCSTRIP modules

The following modules are used in the implementation to direct DOCSTRIP when generating the external files:

thesis	produce the `ecsthesis` document class
minithesis	produce the `ecsminithesis` document class
progress	produce the `ecsprogress` document class
project	produce the `ecsproject` document class
report	produce the `ecsreport` document class
article	produce the `ecsarticle` document class
gdp	produce the `ecsgdp` document class
gdpsummary	produce the `ecsgdpsummary` document class
testthesis	produce an example thesis
testminithesis	produce an example minithesis
testprogress	produce an example progress
testproject	produce an example project
testreport	produce an example report
testarticle	produce an example article
testgdp	produce an example GDP report
testgdpsummary	produce an example GDP summary report
introduction	produce an example introduction chapter
conclusions	produce an example conclusions chapter
appendix	produce an example appendix chapter
figure	produce an example figure file
definitions	produce an example definitions file
references	produce an example references file
bst	produce a bibliography style file
driver	produce a documentation driver file

3 Implementation

All options are passed on to the `book` or `article` class.

1 ⟨∗thesis | minithesis | progress | project | report | article | gdp | gdpsummary⟩

\baseclass

2 ⟨∗thesis | minithesis | progress | project | report | gdp | gdpsummary⟩
3 *\def\baseclass{book}*
4 ⟨/thesis | minithesis | progress | project | report | gdp | gdpsummary⟩
5 ⟨∗article⟩
6 *\def\baseclass{article}*
7 ⟨/article⟩

8 \DeclareOption*{\PassOptionsToClass{\CurrentOption}{\baseclass}}

\@checkoptions   Before we can process the options we must deal with a small problem. That is, we want to change the default options of the `book` or `article` class to `a4paper` and `11pt` or `12pt` but the macro `\ProcessOptions` used by the `book` or `article` class processes the options in the order specified in the file. Because `a4paper` is the first of the paper sizing options it will be overridden by any user defined option. But the same is not true of the font size option `11pt` or `12pt`. To remedy this we define a macro `\@checkoptions{⟨default⟩}{⟨option-list⟩}` which checks to see if any options in ⟨option-list⟩ have been specified and if not adds ⟨default⟩ to the option list.

9 \def\@checkoptions#1#2{

```
10    \edef\@curroptions{\@ptionlist{\@currname.\@currext}}
11    \@tempswafalse
12    \@tfor\@this:=#2\do{
13      \@expandtwoargs\in@{,\@this,}{,\@curroptions,}
14      \ifin@ \@tempswatrue \@break@tfor \fi}
15    \let\@this\@empty
16    \if@tempswa \else \PassOptionsToClass{#1}{\baseclass}\fi
17 }
```

With this macro at our disposal we can continue to process the options

```
18 ⟨*thesis | minithesis | progress | report | article | gdp | gdpsummary⟩
19 \@checkoptions{11pt}{{10pt}{11pt}{12pt}}
20 ⟨/thesis | minithesis | progress | report | article | gdp | gdpsummary⟩
21 ⟨*project⟩
22 \@checkoptions{12pt}{{10pt}{11pt}{12pt}}
23 ⟨/project⟩
24 \PassOptionsToClass{a4paper}{\baseclass}
25 \ProcessOptions\relax
```

and load the `book` or `article` document class with A4 as the default paper size.

```
26 \LoadClass{\baseclass}
```

3.1 Banner

\bhrule   Provide a function to produce a banner on the output making the location of the
\btypeout   current section simpler.

```
27 \newcommand\bhrule{\typeout{------------------------------------------------------------------------
28 \newcommand\btypeout[1]{\bhrule\typeout{\space #1}\bhrule}
```

3.2 Date

\today   This macro uses the TeX primitives \month, \day and \year to provide the date
               of the LaTeX-run in a suitable format.

```
29 ⟨*thesis⟩
30 \def\today{\ifcase\month\or
31   January\or February\or March\or April\or May\or June\or
32   July\or August\or September\or October\or November\or December\fi
33   \space \number\year}
34 ⟨/thesis⟩
```

4 Document Layout

4.1 Spacing

Load the `setspace` package so that spacing can easily be set. The text in all three
styles is set to one and a half spacing, paragraphs not indented, and a newline
between paragraphs.

```
35 \usepackage{setspace}
36 ⟨thesis | minithesis | progress | project | report | gdp | gdpsummary⟩\onehalfspacing
37 ⟨article⟩\singlespacing
```

```
38 \setlength{\parindent}{0pt}
39 \setlength{\parskip}{2.0ex plus0.5ex minus0.2ex}
```

4.2   Margins

Load the `vmargin` package to setup the page dimensions.

```
40 \usepackage{vmargin}
41 ⟨∗thesis | minithesis | progress | project | report | gdp | gdpsummary⟩
42 \setmarginsrb          { 1.5in}  % left margin
43                        { 0.6in}  % top margin
44                        { 1.0in}  % right margin
45                        { 0.8in}  % bottom margin
46                        {  20pt}  % head height
47                        {0.25in}  % head sep
48                        {   9pt}  % foot height
49                        { 0.3in}  % foot sep
50 ⟨/thesis | minithesis | progress | project | report | gdp | gdpsummary⟩
51 ⟨∗article⟩
52 \setmarginsrb          { 0.8in}  % left margin
53                        { 0.6in}  % top margin
54                        { 0.8in}  % right margin
55                        { 0.8in}  % bottom margin
56                        {  20pt}  % head height
57                        {0.25in}  % head sep
58                        {   9pt}  % foot height
59                        { 0.3in}  % foot sep
60 ⟨/article⟩
```

4.3   Breaks

Control how pages and lines are broken.

```
61 \raggedbottom
62 \setlength{\topskip}{1\topskip \@plus 5\p@}
63 \doublehyphendemerits=10000        % No consecutive line hyphens.
64 \brokenpenalty=10000               % No broken words across columns/pages.
65 \widowpenalty=9999                 % Almost no widows at bottom of page.
66 \clubpenalty=9999                  % Almost no orphans at top of page.
67 \interfootnotelinepenalty=9999     % Almost never break footnotes.
```

4.4   Fancy Page Headers

Setup the the default fancy page headers with an underlined header containing chapter, name and page number.

```
68 \usepackage{fancyhdr}
69 \lhead[\rm\thepage]{\fancyplain{}{\sl{\rightmark}}}
70 \rhead[\fancyplain{}{\sl{\leftmark}}]{\rm\thepage}
71 \chead{}\lfoot{}\rfoot{}\cfoot{}
72 \pagestyle{fancy}
```

\chaptermark Redefine `chaptermark` and `sectionmark` to set up the correct header name and
\sectionmark produce a banner on the output making the location of messages simpler.
\subsectionmark
```
73 ⟨∗thesis | minithesis | progress | project | report | gdp⟩
```

74 `\renewcommand{\chaptermark}[1]{\btypeout{\thechapter\space #1}\markboth{\@chapapp\ \thechapter\ #`
75 `\renewcommand{\sectionmark}[1]{}`
76 `\renewcommand{\subsectionmark}[1]{}`
77 ⟨/thesis | minithesis | progress | project | report | gdp⟩
78 ⟨∗article⟩
79 `\renewcommand{\sectionmark}[1]{\btypeout{\thesection\space #1}}`
80 `\renewcommand{\subsectionmark}[1]{}`
81 `\renewcommand{\subsubsectionmark}[1]{}`
82 ⟨/article⟩
83 ⟨gdpsummary⟩`\markboth{GDP Summary Report}{GDP Summary Report}`

`\cleardoublepage` Redefine `cleardoublepage` to remove headers from blank pages in twosided documents.

84 `\def\cleardoublepage{\clearpage\if@twoside \ifodd\c@page\else`
85 `\hbox{}`
86 `\thispagestyle{empty}`
87 `\newpage`
88 `\if@twocolumn\hbox{}\newpage\fi\fi\fi}`

4.5   Mathematics

Load the `amsmath` packages, so we can do some serious math, and setup the theorem environments.

89 `\usepackage{amsmath,amsfonts,amssymb,amscd,amsthm,xspace}`
90 `\theoremstyle{plain}`
91 ⟨∗thesis | minithesis | progress | project | report | gdp⟩
92 `\newtheorem{example}{Example}[chapter]`
93 `\newtheorem{theorem}{Theorem}[chapter]`
94 ⟨/thesis | minithesis | progress | project | report | gdp⟩
95 ⟨∗article | gdpsummary⟩
96 `\newtheorem{example}{Example}[section]`
97 `\newtheorem{theorem}{Theorem}[section]`
98 ⟨/article | gdpsummary⟩
99 `\newtheorem{corollary}[theorem]{Corollary}`
100 `\newtheorem{lemma}[theorem]{Lemma}`
101 `\newtheorem{proposition}[theorem]{Proposition}`
102 `\newtheorem{axiom}[theorem]{Axiom}`
103 `\theoremstyle{definition}`
104 `\newtheorem{definition}[theorem]{Definition}`
105 `\theoremstyle{remark}`
106 `\newtheorem{remark}[theorem]{Remark}`

4.6   Captions

`\fref` Load the `caption2` package to improve formatting of captions, and provide short
`\tref` referencing commands.
`\eref`   Replaced with caption
`\cref`
`\sref` 107 `%%\usepackage[centerlast,small,sc]{caption2}`
`\aref` 108 `\usepackage{caption}`
        109 `\setlength{\captionmargin}{20pt}`
        110 `\newcommand{\fref}[1]{Figure~\ref{#1}}`
        111 `\newcommand{\tref}[1]{Table~\ref{#1}}`

```
112 \newcommand{\eref}[1]{Equation~\ref{#1}}
113 \newcommand{\cref}[1]{Chapter~\ref{#1}}
114 \newcommand{\sref}[1]{Section~\ref{#1}}
115 \newcommand{\aref}[1]{Appendix~\ref{#1}}
```

4.7 Float Placement

`\topfraction`
`\textfraction`
Preventing figures from appearing on a page by themselves. LaTeX's figure placement algorithm is quite biased in favour of putting figures on a page by themselves, instead of on the top of a page with some text below it. Fortunately, the parameters of the algorithm can be changed. The main problem is that LaTeX per default only allows a part of the top of a text-page (70%) to contain figures, and requires at least 20% of a page to be text when text and figures share a page. These parameters should be set to more reasonable values, for example 85% and 10%.

```
116 \renewcommand{\topfraction}{0.85}
117 \renewcommand{\bottomfraction}{.85}
118 \renewcommand{\textfraction}{0.1}
119 \renewcommand{\dbltopfraction}{.85}
```

`\floatpagefraction`
This helps, but sometimes LaTeX puts a figure on a page by itself, although it would fit perfectly well on the top of a page. This happens when the figure will not fit on the page where it was defined. LaTeX then attempts to put it on a figures-only page before it attempts to put it at the top of the next page. A page may contain figures alone if the figure(s) use at least half the page. To prevent half-empty pages this limit should probably be increased to around 75%.

```
120 \renewcommand{\floatpagefraction}{0.75}
121 \renewcommand{\dblfloatpagefraction}{.75}
```

Be careful not to make `floatpagefraction` larger than `topfraction`, then you risk to produce a figure that can neither go on the top of a text page, nor on a page by itself. If that happens, the figure and all later figures will be postponed until next time a `clearpage` is executed (typically at the end of a chapter or the end of the document). This will also happen if a figure is too large to fit on a page.

```
122 \setcounter{topnumber}{9}
123 \setcounter{bottomnumber}{9}
124 \setcounter{totalnumber}{20}
125 \setcounter{dbltopnumber}{9}
```

4.8 Graphics

Load the `graphicx` package, so we can include pictures easily. Load the `epstopdf`, so that eps files are automatically converted to pdf when pdfLaTeX is used. This requires a version of *epstopdf* to be installed on you system. You can find a windows version at
`http://www.ctan.org/tex-archive/support/epstopdf/epstopdf.exe`.

```
126 \usepackage{graphicx}
127 \usepackage{epstopdf}
```

4.9 Subfigures and subtables

Load the `subfigure` package, so we can include subfigures easily.

```
128 \usepackage[scriptsize]{subfigure}
129 \usepackage{booktabs}
130 \usepackage{rotating}
```

4.10 Listings

Load the `listings` package, so we can include listings easily.

```
131 \usepackage{listings}
132 %%\usepackage{lstpatch}
133 \usepackage{xifthen}
134 \lstset{captionpos=b,
135         frame=tb,
136         basicstyle=\scriptsize\ttfamily,
137         showstringspaces=false,
138         keepspaces=true}
139 \lstdefinestyle{matlab} {
140         language=Matlab,
141         keywordstyle=\color{blue},
142         commentstyle=\color[rgb]{0.13,0.55,0.13}\em,
143         stringstyle=\color[rgb]{0.7,0,0} }
```

4.11 Hyperlinks

Load the `hyperref` package to provide hyperlinks in pdf and dvi documents.

```
144 \usepackage[pdfpagemode={UseOutlines},bookmarks=true,bookmarksopen=true,
145    bookmarksopenlevel=0,bookmarksnumbered=true,hypertexnames=false,
146    colorlinks,linkcolor={blue},citecolor={blue},urlcolor={red},
147    pdfstartview={FitV},unicode,breaklinks=true]{hyperref}
148 \pdfstringdefDisableCommands{
149    \let\\\space
150 }
```

5 Internal Names

`\supervisor`
`\examiner`
`\degree`
`\authors`
`\addresses`
`\university`
`\UNIVERSITY`
`\department`
`\DEPARTMENT`
`\group`
`\GROUP`
`\faculty`
`\FACULTY`
`\subject`
`\keywords`

The various elements of the documents are defined as control sequences to make it easy to customize this style for other parts of the University.

```
151 \newcommand*{\supervisor}[1]{\def\supname{#1}}
152 \newcommand*{\examiner}[1]{\def\examname{#1}}
153 \newcommand*{\degree}[1]{\def\degreename{#1}}
154 \newcommand*{\authors}[1]{\def\authornames{#1}}
155 \newcommand*{\addresses}[1]{\def\addressnames{#1}}
156 \newcommand*{\university}[1]{\def\univname{#1} \def\UNIVNAME{\uppercase{#1}}}
157 \newcommand*{\department}[1]{\def\deptname{#1} \def\DEPTNAME{\uppercase{#1}}}
158 \newcommand*{\group}[1]{\def\groupname{#1} \def\GROUPNAME{\uppercase{#1}}}
159 \newcommand*{\faculty}[1]{\def\facname{#1} \def\FACNAME{\uppercase{#1}}}
160 \newcommand*{\subject}[1]{\def\subjectname{#1}}
161 \newcommand*{\keywords}[1]{\def\keywordnames{#1}}
162 \newcommand*{\removecolourlinks}{\hypersetup{colorlinks=true,linkcolor=black,citecolor=black,urlc
```

\supname	The internal names of the elements are set to defaults appropriate to the Depart-
\examname	ment of Electronics and Computer Science.

```
      \degreename
     \authornames
        \univname
        \UNIVNAME
        \deptname
        \DEPTNAME
       \groupname
       \GROUPNAME
         \facname
         \FACNAME
      \subjectname
     \keywordnames
```

```
163 \supervisor  {}
164 \examiner    {}
165 \degree      {}
166 \authors     {}
167 \university  {University of Southampton}
168 \department  {Electronics and Computer Science}
169 \group       {Electronic and Software Systems}
170 \faculty     {Faculty of Physical and Applied Sciences}
171 \addresses   {}
172 \subject     {}
173 \keywords    {}
```

6 Special Pages

6.1 Title Page

\maketitle   Setup an appropriate title page and pdf strings if we are using pdfLaTeX.

```
174 ⟨*thesis | minithesis | progress | project | report | gdp | gdpsummary⟩}
175 \renewcommand\maketitle{
176   \btypeout{Title Page}
177   \hypersetup{pdftitle={\@title}}
178   \hypersetup{pdfsubject=\subjectname}
179   \hypersetup{pdfauthor=\authornames}
180   \hypersetup{pdfkeywords=\keywordnames}
181   \thispagestyle{empty}
182   \begin{titlepage}
183     \let\footnotesize\small
184     \let\footnoterule\relax
185     \let \footnote \thanks
186     \setcounter{footnote}{0}
187     \null\vfil
188     \vskip 60\p@
189     \begin{center}
190       \setlength{\parskip}{0pt}
191       {\large\textbf{\UNIVNAME}\par}
192       \bigskip
193       {\normalsize \FACNAME \par}
194       \smallskip
195       {\normalsize \deptname \par}
196       \vfill
197   \bigskip
198       \bigskip
199       \bigskip
200       \bigskip
201   {\large \bf \@title \par}
202       \bigskip
203       {\Large by \par}
204       \bigskip
205       \bigskip
206       {\large \textbf{\authornames} \par}
```

```
207        \vfill
208 ⟨∗minithesis⟩
209        {\large A mini-thesis submitted for transfer from}
210        {\large MPhil to PhD \par}
211 ⟨/minithesis⟩
212 ⟨∗progress⟩
213        {\large A progress report submitted for continuation}
214        {\large towards a PhD \par}
215 ⟨/progress⟩
216 ⟨∗project⟩
217        {\large A project report submitted for the}
218        {\large award of \par \degreename \par}
219 ⟨/project⟩
220 ⟨∗gdp⟩
221        {\large A group design project report submitted for}
222        {\large the award of \par \degreename \par}
223 ⟨/gdp⟩
224 ⟨∗gdpsummary⟩
225        {\large A group design project summary report submitted}
226        {\large for the award of \par \degreename \par}
227 ⟨/gdpsummary⟩
228 ⟨∗minithesis | progress | project | gdp | gdpsummary⟩
229        \vfill
230        {\normalsize Supervisor: \supname \par}
231        {\normalsize Examiner: \examname \par}
232        \vfill
233 %       \hspace{6mm}\parbox[t][51mm][s]{89mm}{
234 %         \center
235 %         \vfill
236 %         {\large \bf \@title \par}
237 %         \vfill
238 %         {\normalsize by \authornames \par}
239 %         \vfill
240 %         {\normalsize \@date \par}
241 %         \vfill
242 %       }
243 %       \parbox[t][95mm][s]{89mm}{}
244 ⟨/minithesis | progress | project | gdp | gdpsummary⟩
245 ⟨∗thesis | report⟩
246 ⟨∗thesis⟩
247        {\large Thesis for the degree of Doctor of Philosophy\par}
248 ⟨/thesis⟩
249 ⟨report⟩        {\large Technical Report \par}
250 ⟨thesis⟩
251 ⟨/thesis | report⟩
252        \bigskip
253        \bigskip
254        \bigskip
255        {\large \@date \par}
256        \bigskip
257     \end{center}
258     \par
259     \@thanks
260     \vfil\null
```

9

```
261    \end{titlepage}
262    \setcounter{footnote}{0}%
263    \global\let\thanks\relax
264    \global\let\maketitle\relax
265    \global\let\@thanks\@empty
266    \global\let\@author\@empty
267    \global\let\@date\@empty
268 %  \global\let\@title\@empty
269    \global\let\title\relax
270    \global\let\author\relax
271    \global\let\date\relax
272    \global\let\and\relax
273    \cleardoublepage
274 }
275 ⟨/thesis | minithesis | progress | project | report | gdp | gdpsummary⟩
276 ⟨*article⟩
277 \if@titlepage
278    \renewcommand\maketitle{
279      \btypeout{Title Page}
280      \hypersetup{pdftitle={\@title}}
281      \hypersetup{pdfsubject={\subjectname}}
282      \hypersetup{pdfauthor={\authornames}}
283      \hypersetup{pdfkeywords={\keywordnames}}
284      \markboth{\authornames}{\@title}
285      \begin{titlepage}
286      \thispagestyle{empty}
287      \let\footnotesize\small
288      \let\footnoterule\relax
289      \let \footnote \thanks
290      \null\vfil
291      \vskip 60\p@
292      \begin{center}
293        {\LARGE \@title \par}
294        \vskip 3em
295        {\large \lineskip .75em
296           \begin{tabular}[t]{c} \authornames \end{tabular}
297        \par}
298        \vskip 1em
299        {\large \lineskip .5em
300           \begin{tabular}[t]{c} \addressnames \end{tabular}
301        \par}
302        \vskip 1.5em
303        {\large \@date \par}
304        \if\keywordnames
305        \else
306          \quotation
307          \vskip 1.5em
308        {\noindent \normalsize
309             \textbf{Keywords:}
310             \textit{\keywordnames}
311        \par}
312          \endquotation
313        \fi
314      \end{center}
```

```
315     \par
316     \@thanks
317     \vfil\null
318     \end{titlepage}
319     \setcounter{footnote}{0}
320     \global\let\thanks\relax
321     \global\let\maketitle\relax
322     \global\let\@maketitle\relax
323     \global\let\@thanks\@empty
324     \global\let\@author\@empty
325     \global\let\@date\@empty
326     \global\let\@title\@empty
327     \global\let\title\relax
328     \global\let\author\relax
329     \global\let\date\relax
330     \global\let\and\relax
331   }
332 \else
333   \renewcommand\maketitle{
334     \btypeout{Title Page}
335     \hypersetup{pdftitle={\@title}}
336     \hypersetup{pdfsubject=\subjectname}
337     \hypersetup{pdfauthor=\authornames}
338     \hypersetup{pdfkeywords=\keywordnames}
339     \markboth{\authornames}{\@title}
340     \thispagestyle{empty}
341     \par
342     \begingroup
343       \renewcommand\thefootnote{\@fnsymbol\c@footnote}
344       \def\@makefnmark{
345         \rlap{\@textsuperscript{\normalfont\@thefnmark}}}
346       }
347       \long\def\@makefntext##1{
348         \parindent 1em\noindent \hb@xt@1.8em
349         {\hss\@textsuperscript{\normalfont\@thefnmark}}##1
350       }
351       \if@twocolumn
352         \ifnum \col@number=\@ne
353           \@maketitle
354         \else
355           \twocolumn[\@maketitle]%
356         \fi
357       \else
358         \newpage
359         % Prevent figures from going at top of page.
360         \global\@topnum\z@
361         \@maketitle
362       \fi
363       \thispagestyle{plain}\@thanks
364     \endgroup
365     \setcounter{footnote}{0}%
366     \global\let\thanks\relax
367     \global\let\maketitle\relax
368     \global\let\@maketitle\relax
```

```
369     \global\let\@thanks\@empty
370     \global\let\@author\@empty
371     \global\let\@date\@empty
372     \global\let\@title\@empty
373     \global\let\title\relax
374     \global\let\author\relax
375     \global\let\date\relax
376     \global\let\and\relax
377   }
378   \def\@maketitle{
379     \newpage
380     \null
381     \vskip 2em
382     \begin{center}
383       \let \footnote \thanks
384       {\LARGE \@title \par}
385       \vskip 1.5em
386       {\large \lineskip .5em
387         \begin{tabular}[t]{c} \authornames \end{tabular}
388       \par}
389       \vskip 0.7em
390       {\large \lineskip .5em
391         \begin{tabular}[t]{c} \addressnames \end{tabular}
392       \par}
393       \vskip 1em
394       {\large \@date}
395     \end{center}
396     \par
397     \vskip 1.5em
398   }
399 \fi
400 ⟨/article⟩
```

6.2   Abstract Page

\abstract   Setup an appropriate abstract page.

```
401 ⟨∗thesis | minithesis | progress | project | report | gdp⟩
402 \newenvironment{abstract}
403 {
404   \btypeout{Abstract Page}
405   \thispagestyle{empty}
406   \null\vfil
407   \begin{center}
408     \setlength{\parskip}{0pt}
409     {\normalsize \UNIVNAME \par}
410     \bigskip
411     {\underline{ABSTRACT} \par}
412     \bigskip
413     {\normalsize \FACNAME \par}
414 ⟨∗thesis | minithesis | progress | project | report⟩
415     {\normalsize \deptname \par}
416 ⟨/thesis | minithesis | progress | project | report⟩
417     \bigskip
```

```
418 ⟨*thesis⟩
419     {\normalsize \underline{Doctor of Philosophy}\par}
420 ⟨/thesis⟩
421 ⟨*minithesis⟩
422     {\normalsize \underline{A mini-thesis submitted for transfer from MPhil to PhD}\par}
423 ⟨/minithesis⟩
424 ⟨*progress⟩
425     {\normalsize \underline{A progress report submitted for continuation towards a PhD}\par}
426 ⟨/progress⟩
427 ⟨*project⟩
428     {\normalsize \underline{A project report submitted for the award of \degreename}\par}
429 ⟨/project⟩
430 ⟨*gdp⟩
431     {\normalsize \underline{A group design project report submitted for the award of \degreename}
432 ⟨/gdp⟩
433     \bigskip
434     {\normalsize
435     {\MakeUppercase\@title} \par}
436     \medskip
437     {\normalsize by \authornames \par}
438     \bigskip
439   \end{center}
440 }
441 {
442   \vfil\vfil\vfil\null
443   \cleardoublepage
444 }
445 ⟨/thesis | minithesis | progress | project | report | gdp⟩
446 ⟨*article⟩
447 \if@titlepage
448   \renewenvironment{abstract}{
449       \titlepage
450       \null\vfil
451       \@beginparpenalty\@lowpenalty
452       \begin{center}
453         \bfseries \abstractname
454         \@endparpenalty\@M
455       \end{center}
456       \begin{itshape}
457       \noindent
458   }
459   {
460       \par
461       \end{itshape}
462       \if\keywordnames
463       \else
464         \quote
465         \vskip 1.5em
466         {\noindent \normalsize
467             \textbf{Keywords:}
468             \textit{\keywordnames}
469         \par}
470         \endquote
471       \fi
```

13

```
472        \vfil\null\endtitlepage
473    }
474 \else
475    \renewenvironment{abstract}{
476        \if@twocolumn
477          \section*{\abstractname}
478        \else
479          \small
480          \begin{center}
481            {\bfseries \abstractname\vspace{-.5em}\vspace{\z@}}
482          \end{center}
483          \quote
484        \fi
485        \begin{itshape}
486    }
487    {
488        \end{itshape}
489        \if\keywordnames
490        \else
491          \vskip 1.5em
492          {\noindent \normalsize
493              \textbf{Keywords:}
494              \textit{\keywordnames}
495          \par}
496        \fi
497        \if@twocolumn\else\endquote\fi
498    }
499 \fi
500 ⟨/article⟩
```

6.3 Contents Pages

6.3.1 Add to Table of Contents

Ensures numbering for sub-subsections in the table of contents, and provide for 6 levels to appear in toc. Define `addtotoc` to enable adding elements to the toc at chapter level, using a dummy counter to fix bookmarks in pdfLaTeX.

```
501 ⟨∗thesis | minithesis | progress | project | report | gdp | article⟩
502 \addtocounter{secnumdepth}{1}
503 \setcounter{tocdepth}{6}
504 \newcounter{dummy}
505 \newcommand\addtotoc[1]{
506 \refstepcounter{dummy}
507 ⟨∗thesis | minithesis | progress | project | report | gdp⟩
508 \addcontentsline{toc}{chapter}{#1}}
509 ⟨/thesis | minithesis | progress | project | report | gdp⟩
510 ⟨∗article⟩
511 \addcontentsline{toc}{section}{#1}}
512 ⟨/article⟩
```

6.3.2 Table of Contents

`\tableofcontents` Adjust line and paragraph spacing.

```
513 \renewcommand\tableofcontents{
514 \btypeout{Table of Contents}
515 \begin{spacing}{1}{
516     \setlength{\parskip}{1pt}
517     \if@twocolumn
518        \@restonecoltrue\onecolumn
519     \else
520        \@restonecolfalse
521     \fi
```
⟨∗thesis | minithesis | progress | project | report | gdp⟩
```
523     \chapter*{\contentsname
```
⟨/thesis | minithesis | progress | project | report | gdp⟩
⟨∗article⟩
```
526     \section*{\contentsname
```
⟨/article⟩
```
528        \@mkboth{
529           \MakeUppercase\contentsname}{\MakeUppercase\contentsname}}
530     \@starttoc{toc}
531     \if@restonecol\twocolumn\fi
```
⟨thesis | minithesis | progress | project | report | gdp⟩   `\cleardoublepage`
```
533 }\end{spacing}
534 }
```

6.3.3   List of Figures

`\listoffigures`   Adjust line and paragraph spacing.

```
535 \renewcommand\listoffigures{
536 \btypeout{List of Figures}
537 \begin{spacing}{1}{
538     \setlength{\parskip}{1pt}
539     \if@twocolumn
540        \@restonecoltrue\onecolumn
541     \else
542        \@restonecolfalse
543     \fi
```
⟨∗thesis | minithesis | progress | project | report | gdp⟩
```
545     \chapter*{\listfigurename
```
⟨/thesis | minithesis | progress | project | report | gdp⟩
⟨∗article⟩
```
548     \section*{\listfigurename
```
⟨/article⟩
```
550        \@mkboth{\MakeUppercase\listfigurename}
551              {\MakeUppercase\listfigurename}}
552     \@starttoc{lof}
553     \if@restonecol\twocolumn\fi
```
⟨∗thesis | minithesis | progress | project | report | gdp⟩
```
555     \cleardoublepage
```
⟨/thesis | minithesis | progress | project | report | gdp⟩
```
557 }\end{spacing}
558 }
```

6.3.4 List of Tables

`\listoftables`   Adjust line and paragraph spacing.

```
559 \renewcommand\listoftables{
560 \btypeout{List of Tables}
561 \begin{spacing}{1}{
562     \setlength{\parskip}{1pt}
563     \if@twocolumn
564       \@restonecoltrue\onecolumn
565     \else
566       \@restonecolfalse
567     \fi
568 ⟨*thesis | minithesis | progress | project | report | gdp⟩
569     \chapter*{\listtablename
570 ⟨/thesis | minithesis | progress | project | report | gdp⟩
571 ⟨*article⟩
572     \section*{\listtablename
573 ⟨/article⟩
574       \@mkboth{
575         \MakeUppercase\listtablename}{\MakeUppercase\listtablename}}
576     \@starttoc{lot}
577     \if@restonecol\twocolumn\fi
578 ⟨*thesis | minithesis | progress | project | report | gdp⟩
579     \cleardoublepage
580 ⟨/thesis | minithesis | progress | project | report | gdp⟩
581 }\end{spacing}
582 }
```

6.4   List of Symbols

`\listofsymbols`   Provide a `listofsymbols` command to produce a list of symbols,

```
583 ⟨*thesis | minithesis | progress | report | article⟩
584 \newcommand\listsymbolname{Nomenclature}
585 ⟨/thesis | minithesis | progress | report | article⟩
586 ⟨*project | gdp⟩
587 \newcommand\listsymbolname{List of Symbols}
588 ⟨/project | gdp⟩
589 \usepackage{longtable}
590 \newcommand\listofsymbols[2]{
591 \btypeout{\listsymbolname}
592 \addtotoc{\listsymbolname}
593 ⟨*thesis | minithesis | progress | project | report | gdp⟩
594     \chapter*{\listsymbolname
595 ⟨/thesis | minithesis | progress | project | report | gdp⟩
596 ⟨*article⟩
597     \section*{\listsymbolname
598 ⟨/article⟩
599       \@mkboth{
600         \MakeUppercase\listsymbolname}{\MakeUppercase\listsymbolname}}
601 \begin{longtable}[c]{#1}#2\end{longtable}\par
602 ⟨*thesis | minithesis | progress | project | report | gdp⟩
603     \cleardoublepage
604 ⟨/thesis | minithesis | progress | project | report | gdp⟩
```

```
605 }
606 ⟨/thesis | minithesis | progress | project | report | gdp | article⟩
```

6.5   Declaration of Authorship

\authorshipdeclaration   PhD authorship declaration

```
607 \newcommand\authorshipdeclaration[1]{
608 \btypeout{Declaration of Authorship}
609 \addtotoc{Declaration of Authorship}
610 \thispagestyle{plain}
611 \null\vfil
612 \vskip 60\p@
613 %\vspace{-30cm}
614 \begin{center}{\Large\bf Declaration of Authorship \par}\end{center}
615 {\normalsize I, \authornames, declare that the thesis entitled \emph{\@title} and the work presen
616
617 \begin{itemize}
618 \item this work was done wholly or mainly while in candidature for a research degree
619 at this University;
620 \item where any part of this thesis has previously been submitted for a degree or any
621 other qualification at this University or any other institution, this has been clearly
622 stated;
623 \item where I have consulted the published work of others, this is always clearly
624 attributed;
625 \item where I have quoted from the work of others, the source is always given. With
626 the exception of such quotations, this thesis is entirely my own work;
627 \item I have acknowledged all main sources of help;
628 \item where the thesis is based on work done by myself jointly with others, I have
629 made clear exactly what was done by others and what I have contributed myself;
630 \ifthenelse{\isempty{#1}}
631 {\item none of this work has been published before submission}
632 {\item parts of this work have been published as: #1}
633 \end{itemize}
634
635 \vspace{15.0mm}
636 Signed:.......................................................................................................
637
638 \vspace{3.0mm}
639 Date:.........................................................................................................
640 }
641 \vfil\vfil\null
642 \cleardoublepage
643 }
```

6.6   Acknowledgements

\acknowledgements   Thank someone!

```
644 \newcommand\acknowledgements[1]{
645 \btypeout{Acknowledgements}
646 \addtotoc{Acknowledgements}
647 ⟨*thesis | minithesis | progress | project | report | gdp⟩
648 \thispagestyle{plain}
649 \null\vfil
```

```
650 \vskip 60\p@
651 \begin{center}{\Large\bf Acknowledgements \par}\end{center}
652 {\normalsize #1}
653 \vfil\vfil\null
654 \cleardoublepage
655 ⟨/thesis | minithesis | progress | project | report | gdp⟩
656 ⟨∗article⟩
657 \section*{Acknowledgements}
658 {\normalsize #1}
659 ⟨/article⟩
660 }
```

6.7   Dedicatory

\dedicatory   Dedicate the document to someone!

```
661 \newcommand\dedicatory[1]{
662 \btypeout{Dedicatory}
663 ⟨∗thesis | minithesis | progress | project | report | gdp⟩
664 \thispagestyle{plain}
665 \null\vfil
666 \vskip 60\p@
667 \begin{center}{\Large \sl #1}\end{center}
668 \vfil\null
669 \cleardoublepage
670 ⟨/thesis | minithesis | progress | project | report | gdp⟩
671 }
```

7   Parts

\frontmatter   Modify `frontmatter`.

```
672 ⟨∗article⟩
673 \newcommand\frontmatter{ }
674 ⟨/article⟩
```

\mainmatter   Modify `mainmatter`.

```
675 ⟨∗article⟩
676 \newcommand\mainmatter{ }
677 ⟨/article⟩
```

\backmatter   Modify `backmatter` to add the bibliography to the table of contents.

```
678 ⟨∗thesis | minithesis | progress | project | report | gdp⟩
679 \renewcommand{\bibname}{References}
680 \renewcommand\backmatter{
681   \if@openright
682     \cleardoublepage
683   \else
684     \clearpage
685   \fi
686   \addtotoc{\bibname}
687   \btypeout{\bibname}
688   \@mainmatterfalse}
```

```
689 ⟨/thesis | minithesis | progress | project | report | gdp⟩
690 ⟨∗article⟩
691 \newcommand\bibname{References}
692 \newcommand\backmatter{
693   \addtotoc{\bibname}
694   \btypeout{\bibname}
695 }
696 ⟨/article⟩

697 ⟨/thesis | minithesis | progress | project | report | article | gdp | gdpsummary⟩
```

8   Example Documents

```
698 ⟨∗testthesis⟩
699 %% Final copy must be double sided printing.
700 \documentclass[twoside]{ecsthesis}      % Use the Thesis Style
701 ⟨/testthesis⟩
702 ⟨∗testminithesis⟩
703 \documentclass{ecsminithesis}  % Use the minithesis Style
704 ⟨/testminithesis⟩
705 ⟨∗testprogress⟩
706 \documentclass{ecsprogress}    % Use the progress Style
707 ⟨/testprogress⟩
708 ⟨∗testproject⟩
709 \documentclass{ecsproject}     % Use the Project Style
710 ⟨/testproject⟩
711 ⟨∗testreport⟩
712 \documentclass{ecsreport}      % Use the Report Style
713 ⟨/testreport⟩
714 ⟨∗testarticle⟩
715 \documentclass{ecsarticle}     % Use the Article Style
716 ⟨/testarticle⟩
717 ⟨∗testgdp⟩
718 \documentclass{ecsgdp}         % Use the GDP Report Style
719 ⟨/testgdp⟩
720 ⟨∗testgdpsummary⟩
721 \documentclass{ecsgdpsummary}  % Use the GDP Summary Report Style
722 ⟨/testgdpsummary⟩
723 ⟨∗testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp | testgdpsummary⟩
724 \graphicspath{{../Figures/}}   % Location of your graphics files
725 \usepackage{natbib}            % Use Natbib style for the refs.
726 %% \removecolourlinks    % Uncomment this command to remove colour from any links
727 \input{Definitions}           % Include your abbreviations
728 %% -----------------------------------------------------------------
729 \begin{document}
730 \frontmatter
731 \title      {An Investigation into \dots}
732 \authors    {\texorpdfstring
733              {\href{mailto:S.R.Gunn@ecs.soton.ac.uk}{Steve R. Gunn}}
734              {Steve R. Gunn}
735             }
736 \department {Electronics and Computer Science}
737 \group      {Electronic and Software Systems}
738 \addresses  {\groupname\\\deptname\\\univname}
```

```
739 \date        {\today}
740 \subject     {}
741 \keywords    {}
742 ⟨∗testminithesis | testprogress | testproject | testgdp | testgdpsummary⟩
743 \supervisor {Mr Beavis}
744 \examiner    {Dr Butthead}
745 ⟨/testminithesis | testprogress | testproject | testgdp | testgdpsummary⟩
746 ⟨∗testproject⟩
747 \degree       {BEng Electronic Engineering}
748 ⟨/testproject⟩
749 ⟨∗testgdp | testgdpsummary⟩
750 \degree       {Master of Engineering}
751 ⟨/testgdp | testgdpsummary⟩
752 \maketitle
753 ⟨/testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp | testgdpsummary⟩
754 ⟨∗testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp⟩
755 \begin{abstract}
756 This work is all about \dots
757 \end{abstract}
758 \tableofcontents
759 \listoffigures
760 \listoftables
761
762 %% ----------------------
763 %% lstpatch.sty
764 %% ----------------------
765 %% lstpatch cannot be distributed with these files. I believe it is only needed if the
766 %% \lstlistoflistings is used. So this has been turned off by default. Re-add if required:
767 %% \usepackage{lstpatch}
768 %% \lstlistoflistings
769 %% You will need to download lstpatch, possibly from:
770 %% http://web.mit.edu/texsrc/source/latex/listings/lstpatch.sty
771 %% ----------------------
772
773 ⟨/testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp⟩
774
775 ⟨∗testthesis⟩
776 %% ----------------------
777 %% Authorship declaration
778 %% ----------------------
779 %% Either include citations like below (as many as required spaced with commas or 'and').
780 \authorshipdeclaration{\citep{Gunn:2001:pdflatex}, \citep{Lovell:2011:updated} and \citep{Gunn:20
781 %% Or state no citations like below
782 %% \authorshipdeclaration{}
783 %% ----------------------
784 ⟨/testthesis⟩
785
786 ⟨∗testthesis | testminithesis | testprogress | testproject | testreport | testgdp⟩
787 \acknowledgements{Thanks to no one.}
788 %\dedicatory{To \dots}
789 ⟨/testthesis | testminithesis | testprogress | testproject | testreport | testgdp⟩
790 ⟨∗testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp | testgdpsummary⟩
791 ⟨∗testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp⟩
792 \listofsymbols{ll}{$w$ & The weight vector}
```

```
793 ⟨/testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp⟩
794 \mainmatter
795 %% ---------------------------------------------------------------
796 ⟨/testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp | testgdpsummary⟩
797 ⟨*testthesis | testminithesis | testprogress | testproject | testreport | testgdp⟩
798 \include{Introduction}
799 \include{Conclusions}
800 \appendix
801 \include{AppendixA}
802 \backmatter
803 \bibliographystyle{apalike}
804 \bibliography{ECS}
805 ⟨/testthesis | testminithesis | testprogress | testproject | testreport | testgdp⟩
806 ⟨*testgdpsummary⟩
807 \section*{Introduction}
808 \section*{Objectives}
809 \section*{Resources}
810 \section*{Constraints}
811 \section*{Approaching the task}
812 \section*{Team Organisation}
813 \section*{Important Results}
814 \section*{Conclusions}
815 \section*{Recommendations}
816 ⟨/testgdpsummary⟩
817 ⟨*introduction⟩
818 \chapter{Introduction} \label{Chapter:Introduction}
819 ⟨/introduction⟩
820 ⟨*testarticle⟩
821 \section{Introduction} \label{Section:Introduction}
822 ⟨/testarticle⟩
823 ⟨*introduction | testarticle⟩
824 You probably found all the files from \cite{Gunn:2001:pdflatex}.
825 \tref{Table:tabex} illustrates the results of my work~\citep{Gunn:2011:updated2}.
826 \begin{table}[!htb]
827   \centering
828   \begin{tabular}{cc}
829   \toprule
830   \textbf{Training Error} & \textbf{Testing Error}\\
831   \midrule
832   0 & $\infty$\\
833   \bottomrule
834   \end{tabular}
835   \caption{The Results}
836   \label{Table:tabex}
837 \end{table}
838
839 \fref{Figure:figex} shows why this is the case.
840 \begin{figure}[!htb]
841   \centering
842   \includegraphics[width=8cm]{figure}
843   \caption{A colourful picture.}
844   \label{Figure:figex}
845 \end{figure}
846
```

```
847 This page shows you a subfigure example in \fref{Figure:figsubex}.
848 \begin{figure}[!htb]
849   \centering
850   \subfigure[The left caption]{
851     \includegraphics[width=4.2cm]{figure}
852     \label{Figure:figsubex:left}
853   }
854   \subfigure[The right caption]{
855     \includegraphics[width=4.2cm]{figure}
856     \label{Figure:figsubex:right}
857   }
858   \caption{A doubly colourful picture.}
859   \label{Figure:figsubex}
860 \end{figure}
861
862
863 Example of~\eref{eq:equation1}.
864 \begin{equation}
865 y = ax^2 + bx + c
866 \label{eq:equation1}
867 \end{equation}
868
869 ⟨/introduction | testarticle⟩
870 ⟨∗conclusions⟩
871 \chapter{Conclusions} \label{Chapter: Conclusions}
872 ⟨/conclusions⟩
873 ⟨∗testarticle⟩
874 %% ----------------------------------------------------------------
875 \section{Conclusions} \label{Section: Conclusions}
876 ⟨/testarticle⟩
877 ⟨∗conclusions | testarticle⟩
878 It works.
879 ⟨/conclusions | testarticle⟩
880 ⟨∗testarticle⟩
881 \acknowledgements{Thanks to no one.}
882 \backmatter
883 \bibliographystyle{ecs}
884 \bibliography{ECS}
885 \appendix
886 ⟨/testarticle⟩
887 ⟨∗appendix | testarticle⟩
888 ⟨∗appendix⟩
889 \chapter{Stuff} \label{Chapter:Stuff}
890 ⟨/appendix⟩
891 ⟨∗testarticle⟩
892 %% ----------------------------------------------------------------
893 \section{Stuff} \label{Section:Stuff}
894 ⟨/testarticle⟩
895 The following gets in the way of the text....
896 ⟨/appendix | testarticle⟩
897 ⟨∗testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp | testgdpsummary⟩
898 \end{document}
899 %% ----------------------------------------------------------------
900 ⟨/testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp | testgdpsummary⟩
```

8.1 Example Figure

```
901 ⟨∗figure⟩
902 %%BoundingBox: 0 150 600 650
903 %%EndComments
904 0.0 setlinewidth
905 /length 0.1 def
906 /width 0.02 def
907 /hsvcircle {
908 gsave
909     /h 0.0 def
910     0 4 360 {
911     pop
912     gsave
913     0.5 0.0 translate
914     newpath
915     0.0 0.0 moveto
916     length 0.0 lineto
917     length width lineto
918     0.0 width lineto
919     closepath
920     h 1.0 1.0 sethsbcolor
921     fill
922     grestore
923     /h h 4 360 div add def
924     4 rotate
925     } for
926 grestore
927 } def
928 0.0 setlinewidth
929 0.0 setgray
930 300 400 translate
931 500 500 scale
932 30 rotate
933 1.0 0.7 scale
934 -30 rotate
935 hsvcircle
936 0.8 0.8 scale
937 hsvcircle
938 0.8 0.8 scale
939 hsvcircle
940 0.8 0.8 scale
941 hsvcircle
942 0.8 0.8 scale
943 hsvcircle
944 0.8 0.8 scale
945 hsvcircle
946 0.8 0.8 scale
947 hsvcircle
948 showpage
949 ⟨/figure⟩
```

8.2 Definitions File

```
950 ⟨∗definitions⟩
```

```
951 \newcommand{\BibTeX}{{\rm B\kern-.05em{\sc i\kern-.025em b}\kern-.08em T\kern-.1667em\lower.7ex\h
952
953 %% People
954 \newcounter{address}
955 \setcounter{address}{1}
956 \renewcommand{\theaddress}{\textsuperscript{\fnsymbol{address}}}
957 \newcommand{\address}[1]{\refstepcounter{address}\theaddress#1\\}
958 \newcommand{\Name}[3]{\texorpdfstring{\href{mailto:#3}{#2}#1}{#2}\xspace}
959 \newcommand{\SteveRGunn}[1]{\Name{#1}{Steve R. Gunn}{S.R.Gunn@ecs.soton.ac.uk}}
960
961 %% Dingbats
962 \newcommand{\tick}{\ding{51}}
963 \newcommand{\cross}{\ding{55}}
964
965 %% Calculus
966 \newcommand{\pd}[2]{\ensuremath{\frac{\partial #1}{\partial #2}}\xspace}
967 \newcommand{\fd}[2]{\ensuremath{\frac{d #1}{d #2}}\xspace}
968 \newcommand{\dint}{\ensuremath{\int\!\!\!\!\int}\xspace}
969 \newcommand{\tint}{\ensuremath{\int\!\!\!\!\int\!\!\!\!\int}\xspace}
970
971 %% Math Sets
972 \newcommand{\Q}[1]{\ensuremath{\mathbb{#1}}\xspace}
973 \newcommand{\R}{\Q{R}}
974
975 %% Matrix, Vector
976 \newcommand{\V}[1]{\ensuremath{\boldsymbol{#1}}\xspace}
977 \newcommand{\M}[1]{\ensuremath{\boldsymbol{#1}}\xspace}
978 \newcommand{\0}{\V{0}}
979 \newcommand{\1}{\V{1}}
980 \newcommand{\I}{\M{I}}
981
982 %% Math Functions
983 \newcommand{\F}[1]{\ensuremath{\mathrm{#1}}\xspace}
984 \newcommand{\sgn}{\F{sgn}}
985 \newcommand{\tr}{\F{trace}}
986 \newcommand{\diag}{\F{diag}}
987
988 %% Math Names
989 \newcommand{\N}[1]{\ensuremath{\mathit{#1}}\xspace}
990
991 %% Data
992 \newcommand{\mc}[1]{\ensuremath{\mathcal{#1}}\xspace}
993 \newcommand{\Hyp}{\mc{H}}
994 \newcommand{\D}{\mc{D}}
995
996 %% Kernel
997 \newcommand{\K}{\M{K}}
998 \newcommand{\eins}{\texorpdfstring{\ensuremath{\epsilon}}{\textepsilon}-insensitive\xspace}
999 \newcommand{\e}{\ensuremath{\epsilon}\xspace}
1000 \newcommand{\Bxi}{\ensuremath{\boldsymbol{\xi}}\xspace}
1001 \newcommand{\Kanova}{\ensuremath{\mathit{K_{ANOVA}}}\xspace}
1002 \newcommand{\Kspline}{\ensuremath{\mathit{K_{spline}}}\xspace}
1003
1004 %% Bayesian
```

24

```latex
1005 \newcommand{\MP}{\ensuremath{\mathit{{\scriptscriptstyle \hspace{-1.5pt}M\hspace{-1.5pt}P}}}\xspa
1006 \newcommand{\ML}{\ensuremath{\mathit{{\scriptscriptstyle \hspace{-1.5pt}M\hspace{-1.5pt}L}}}\xspa
1007 \newcommand{\Qw}{\ensuremath{Q_{\w}(\w)}\xspace}
1008 \newcommand{\Qa}{\ensuremath{Q_{\Ba}(\Ba)}\xspace}
1009 \newcommand{\Qb}{\ensuremath{Q_{\beta}(\beta)}\xspace}
1010 \newcommand{\wMPab}{\ensuremath{\w_{\MP|\bar {\Ba},\bar \beta}}\xspace}
1011 \newcommand{\wMP}{\ensuremath{\w_{\MP}}\xspace}
1012 \newcommand{\yMP}{\ensuremath{y_{\MP}}\xspace}
1013 \newcommand{\BaMP}{\ensuremath{\Ba_{\hspace{1pt}\MP}}\xspace}
1014 \newcommand{\aMP}{\ensuremath{\alpha_{\hspace{1pt}\MP}}\xspace}
1015 \newcommand{\bMP}{\ensuremath{\beta_{\hspace{1pt}\MP}}\xspace}
1016 \newcommand{\Sab}{\ensuremath{\M{\Sigma}_{\bar \Ba,\bar \beta}}\xspace}
1017 \newcommand{\Ba}{\ensuremath{\boldsymbol{\alpha}}\xspace}
1018 \newcommand{\Bb}{\ensuremath{\boldsymbol{\beta}}\xspace}
1019 \newcommand{\Bm}{\ensuremath{\boldsymbol{\mu}}\xspace}
1020 \newcommand{\BL}{\ensuremath{\boldsymbol{\Lambda}}\xspace}
1021 \newcommand{\BPhi}{\ensuremath{\boldsymbol{\Phi}}\xspace}
1022 \newcommand{\SMP}{\ensuremath{\M{\Sigma}_{\MP}}\xspace}
1023
1024 \newcommand{\Pa}{\ensuremath{P(\alpha|\mathcal{H})}\xspace}
1025 \newcommand{\Pb}{\ensuremath{P(\beta|\mathcal{H})}\xspace}
1026 \newcommand{\Pab}{\ensuremath{P(\alpha,\beta|\mathcal{H})}\xspace}
1027 \newcommand{\Pw}{\ensuremath{P(\w|\mathcal{H})}\xspace}
1028 \newcommand{\PD}{\ensuremath{P(\D|\mathcal{H})}\xspace}
1029 \newcommand{\PwIa}{\ensuremath{P(\w|\alpha,\mathcal{H})}\xspace}
1030 \newcommand{\PDIwb}{\ensuremath{P(\D|\w,\beta,\mathcal{H})}\xspace}
1031 \newcommand{\PDwab}{\ensuremath{P(\D,\w,\alpha,\beta|\mathcal{H})}\xspace}
1032 \newcommand{\PDIw}{\ensuremath{P(\D|\w,\mathcal{H})}\xspace}
1033 \newcommand{\PwID}{\ensuremath{P(\w|\D,\mathcal{H})}\xspace}
1034 \newcommand{\PwabID}{\ensuremath{P(\w,\alpha,\beta|\D,\mathcal{H})}\xspace}
1035
1036 \newcommand{\PanH}{\ensuremath{P(\alpha)}\xspace}
1037 \newcommand{\PbnH}{\ensuremath{P(\beta)}\xspace}
1038 \newcommand{\PabnH}{\ensuremath{P(\alpha,\beta)}\xspace}
1039 \newcommand{\PwnH}{\ensuremath{P(\w)}\xspace}
1040 \newcommand{\PDnH}{\ensuremath{P(\D)}\xspace}
1041 \newcommand{\PwIanH}{\ensuremath{P(\w|\alpha)}\xspace}
1042 \newcommand{\PDIwbnH}{\ensuremath{P(\D|\w,\beta)}\xspace}
1043 \newcommand{\PDwabnH}{\ensuremath{P(\D,\w,\Ba,\beta)}\xspace}
1044 \newcommand{\PDIwnH}{\ensuremath{P(\D|\w)}\xspace}
1045 \newcommand{\PwIDnH}{\ensuremath{P(\w|\D)}\xspace}
1046 \newcommand{\PwabIDnH}{\ensuremath{P(\w,\alpha,\beta|\D)}\xspace}
1047
1048 \newcommand{\PDwBab}{\ensuremath{P(\D,\w,\Ba,\beta|\mathcal{H})}\xspace}
1049 \newcommand{\PwIBa}{\ensuremath{P(\w|\Ba,\mathcal{H})}\xspace}
1050 \newcommand{\PBab}{\ensuremath{P(\Ba,\beta|\mathcal{H})}\xspace}
1051 \newcommand{\PwBabID}{\ensuremath{P(\w,\Ba,\beta|\D,\mathcal{H})}\xspace}
1052
1053 \newcommand{\PBanH}{\ensuremath{P(\Ba)}\xspace}
1054 \newcommand{\PwIBanH}{\ensuremath{P(\w|\Ba)}\xspace}
1055
1056 %% Snakes
1057 \newcommand{\Esnake}{\ensuremath{\mathit{E_{snake}}}\xspace}
1058 \newcommand{\Eimage}{\ensuremath{\mathit{E_{image}}}\xspace}
```

```
1059 \newcommand{\Econt}{\ensuremath{\mathit{E_{cont}}}\xspace}
1060 \newcommand{\Ecurv}{\ensuremath{\mathit{E_{curv}}}\xspace}
1061 \newcommand{\Eint}{\ensuremath{\mathit{E_{int}}}\xspace}
1062 \newcommand{\Eext}{\ensuremath{\mathit{E_{ext}}}\xspace}
1063 \newcommand{\Eterm}{\ensuremath{\mathit{E_{term}}}\xspace}
1064 \newcommand{\Eline}{\ensuremath{\mathit{E_{line}}}\xspace}
1065 \newcommand{\Eedge}{\ensuremath{\mathit{E_{edge}}}\xspace}
1066 \newcommand{\Econ}{\ensuremath{\mathit{E_{con}}}\xspace}
1067 \newcommand{\Eangle}{\ensuremath{\mathit{E_{angle}}}\xspace}
1068 \newcommand{\Elshape}{\ensuremath{\mathit{E_{lshape}}}\xspace}
1069 \newcommand{\Eedgedir}{\ensuremath{\mathit{E_{edgedir}}}\xspace}
1070 \newcommand{\Emodel}{\ensuremath{\mathit{E_{model}}}\xspace}
1071 \newcommand{\wte}{\ensuremath{\mathit{w_{term}}}\xspace}
1072 \newcommand{\wli}{\ensuremath{\mathit{w_{line}}}\xspace}
1073 \newcommand{\wed}{\ensuremath{\mathit{w_{edge}}}\xspace}
1074 \newcommand{\wco}{\ensuremath{\mathit{w_{con}}}\xspace}
1075
1076
1077 %% Environments
1078 \newcounter{alg}
1079 \newenvironment{algorithm}[1]
1080 {
1081     \stepcounter{alg}
1082     \begin{table}[htb]
1083     \centering
1084     \begin{tabular}[t]{ll}
1085     \hline&\\
1086     \multicolumn{2}{l}{\bf Algorithm \arabic{alg}: #1}\\&\\
1087 } {
1088     &\\
1089     \hline
1090     \end{tabular}
1091     \end{table}
1092 }
1093 ⟨/definitions⟩
```

8.3 References File

```
1094 ⟨*references⟩
1095 @MISC{Gunn:2001:pdflatex,
1096   author =        {S.R. Gunn},
1097   title =         {PDFLaTeX Instructions},
1098   year =          {2001},
1099   url =           {http://www.ecs.soton.ac.uk/~srg/softwaretools/document/}
1100 }
1101 @MISC{Lovell:2011:updated,
1102   author =        {C. J. Lovell},
1103   title =         {Updated templates},
1104   year =          {2011}
1105 }
1106 @MISC{Gunn:2011:updated2,
1107   author =        {S.R. Gunn and C. J. Lovell},
1108   title =         {Updated templates reference 2},
1109   year =          {2011}
1110 }
```

1111 ⟨/references⟩

8.4   Bibliography Style File

```
1112 ⟨∗bst⟩
1113 %% File: 'ecs.bst'
1114 %% A modification of 'plainnat.bst' for use with natbib package
1115 %%
1116 %% Copyright 1993-1999 Patrick W Daly
1117 %% Max-Planck-Institut f\"ur Aeronomie
1118 %% Max-Planck-Str. 2
1119 %% D-37191 Katlenburg-Lindau
1120 %% Germany
1121 %% E-mail: daly@linmpi.mpg.de
1122 %%
1123 %% This program can be redistributed and/or modified under the terms
1124 %% of the LaTeX Project Public License Distributed from CTAN
1125 %% archives in directory macros/latex/base/lppl.txt; either
1126 %% version 1 of the License, or any later version.
1127 %%
1128 %% Includes field URL for Internet addresses
1129 %%
1130 ENTRY
1131   { address
1132     author
1133     booktitle
1134     chapter
1135     edition
1136     editor
1137     howpublished
1138     institution
1139     isbn
1140     issn
1141     journal
1142     key
1143     month
1144     note
1145     number
1146     organization
1147     pages
1148     publisher
1149     school
1150     series
1151     title
1152     type
1153     url
1154     volume
1155     year
1156   }
1157   {}
1158   { label extra.label sort.label short.list }
1159
1160 INTEGERS { output.state before.all mid.sentence after.sentence after.block }
1161
1162 FUNCTION {init.state.consts}
```

```
1163 { #0 'before.all :=
1164   #1 'mid.sentence :=
1165   #2 'after.sentence :=
1166   #3 'after.block :=
1167 }
1168
1169 STRINGS { s t }
1170
1171 FUNCTION {output.nonnull}
1172 { 's :=
1173   output.state mid.sentence =
1174     { ", " * write$ }
1175     { output.state after.block =
1176         { add.period$ write$
1177           newline$
1178           "\newblock " write$
1179         }
1180         { output.state before.all =
1181             'write$
1182             { add.period$ " " * write$ }
1183           if$
1184         }
1185       if$
1186       mid.sentence 'output.state :=
1187     }
1188   if$
1189   s
1190 }
1191
1192 FUNCTION {output}
1193 { duplicate$ empty$
1194     'pop$
1195     'output.nonnull
1196   if$
1197 }
1198
1199 FUNCTION {output.check}
1200 { 't :=
1201   duplicate$ empty$
1202     { pop$ "empty " t * " in " * cite$ * warning$ }
1203     'output.nonnull
1204   if$
1205 }
1206
1207 FUNCTION {fin.entry}
1208 { add.period$
1209   write$
1210   newline$
1211 }
1212
1213 FUNCTION {new.block}
1214 { output.state before.all =
1215     'skip$
1216     { after.block 'output.state := }
```

```
1217    if$
1218 }
1219
1220 FUNCTION {new.sentence}
1221 { output.state after.block =
1222     'skip$
1223     { output.state before.all =
1224         'skip$
1225         { after.sentence 'output.state := }
1226       if$
1227     }
1228   if$
1229 }
1230
1231 FUNCTION {not}
1232 {    { #0 }
1233      { #1 }
1234   if$
1235 }
1236
1237 FUNCTION {and}
1238 {    'skip$
1239      { pop$ #0 }
1240   if$
1241 }
1242
1243 FUNCTION {or}
1244 {    { pop$ #1 }
1245      'skip$
1246   if$
1247 }
1248
1249 FUNCTION {new.block.checka}
1250 { empty$
1251      'skip$
1252      'new.block
1253   if$
1254 }
1255
1256 FUNCTION {new.block.checkb}
1257 { empty$
1258   swap$ empty$
1259   and
1260     'skip$
1261     'new.block
1262   if$
1263 }
1264
1265 FUNCTION {new.sentence.checka}
1266 { empty$
1267      'skip$
1268      'new.sentence
1269   if$
1270 }
```

```
1271
1272 FUNCTION {new.sentence.checkb}
1273 { empty$
1274   swap$ empty$
1275   and
1276     'skip$
1277     'new.sentence
1278   if$
1279 }
1280
1281 FUNCTION {field.or.null}
1282 { duplicate$ empty$
1283     { pop$ "" }
1284     'skip$
1285   if$
1286 }
1287
1288 FUNCTION {emphasize}
1289 { duplicate$ empty$
1290     { pop$ "" }
1291     { "{\em " swap$ * "}" * }
1292   if$
1293 }
1294
1295 INTEGERS { nameptr namesleft numnames }
1296
1297 FUNCTION {format.names}
1298 { 's :=
1299   #1 'nameptr :=
1300   s num.names$ 'numnames :=
1301   numnames 'namesleft :=
1302     { namesleft #0 > }
1303     { s nameptr "{ff~}{vv~}{ll}{, jj}" format.name$ 't :=
1304       nameptr #1 >
1305         { namesleft #1 >
1306             { ", " * t * }
1307             { numnames #2 >
1308                 { "," * }
1309                 'skip$
1310               if$
1311               t "others" =
1312                 { " et~al." * }
1313                 { " and " * t * }
1314               if$
1315             }
1316           if$
1317         }
1318         't
1319       if$
1320       nameptr #1 + 'nameptr :=
1321       namesleft #1 - 'namesleft :=
1322     }
1323   while$
1324 }
```

```
1325
1326 FUNCTION {format.key}
1327 { empty$
1328     { key field.or.null }
1329     { "" }
1330   if$
1331 }
1332
1333 FUNCTION {format.authors}
1334 { author empty$
1335     { "" }
1336     { author format.names }
1337   if$
1338 }
1339
1340 FUNCTION {format.editors}
1341 { editor empty$
1342     { "" }
1343     { editor format.names
1344       editor num.names$ #1 >
1345         { ", editors" * }
1346         { ", editor" * }
1347       if$
1348     }
1349   if$
1350 }
1351
1352 FUNCTION {format.isbn}
1353 { isbn empty$
1354     { "" }
1355     { new.block "ISBN " isbn * }
1356   if$
1357 }
1358
1359 FUNCTION {format.issn}
1360 { issn empty$
1361     { "" }
1362     { new.block "ISSN " issn * }
1363   if$
1364 }
1365
1366 %FUNCTION {format.url}
1367 %{ url empty$
1368 %    { "" }
1369 %    { new.block "URL \url{" url * "}" * }
1370 %  if$
1371 %}
1372 %
1373 %FUNCTION {format.title}
1374 %{ title empty$
1375 %    { "" }
1376 %    { title "t" change.case$ }
1377 %  if$
1378 %}
```

```
1379 FUNCTION {format.url}
1380 { ""
1381 }
1382
1383 FUNCTION {format.title}
1384 { title empty$
1385     { "" }
1386     { url empty$
1387         { title "t" change.case$ }
1388         { "\href{" url * "}{" * title "t" change.case$ * "}" * }
1389       if$
1390     }
1391     if$
1392 }
1393
1394
1395 FUNCTION {format.full.names}
1396 {'s :=
1397   #1 'nameptr :=
1398   s num.names$ 'numnames :=
1399   numnames 'namesleft :=
1400     { namesleft #0 > }
1401     { s nameptr
1402       "{vv~}{ll}" format.name$ 't :=
1403       nameptr #1 >
1404         {
1405           namesleft #1 >
1406             { ", " * t * }
1407             {
1408               numnames #2 >
1409                 { "," * }
1410                 'skip$
1411               if$
1412               t "others" =
1413                 { " et~al." * }
1414                 { " and " * t * }
1415               if$
1416             }
1417           if$
1418         }
1419         't
1420       if$
1421       nameptr #1 + 'nameptr :=
1422       namesleft #1 - 'namesleft :=
1423     }
1424   while$
1425 }
1426
1427 FUNCTION {author.editor.full}
1428 { author empty$
1429     { editor empty$
1430         { "" }
1431         { editor format.full.names }
1432       if$
```

32

```
1433     }
1434     { author format.full.names }
1435   if$
1436 }
1437
1438 FUNCTION {author.full}
1439 { author empty$
1440     { "" }
1441     { author format.full.names }
1442   if$
1443 }
1444
1445 FUNCTION {editor.full}
1446 { editor empty$
1447     { "" }
1448     { editor format.full.names }
1449   if$
1450 }
1451
1452 FUNCTION {make.full.names}
1453 { type$ "book" =
1454   type$ "inbook" =
1455   or
1456     'author.editor.full
1457     { type$ "proceedings" =
1458         'editor.full
1459         'author.full
1460       if$
1461     }
1462   if$
1463 }
1464
1465 FUNCTION {output.bibitem}
1466 { newline$
1467   "\bibitem[" write$
1468   label write$
1469   ")" make.full.names duplicate$ short.list =
1470     { pop$ }
1471     { * }
1472    if$
1473   "]{" * write$
1474   cite$ write$
1475   "}" write$
1476   newline$
1477   ""
1478   before.all 'output.state :=
1479 }
1480
1481 FUNCTION {n.dashify}
1482 { 't :=
1483   ""
1484     { t empty$ not }
1485     { t #1 #1 substring$ "-" =
1486         { t #1 #2 substring$ "--" = not
```

```
1487              { "--" *
1488                t #2 global.max$ substring$ 't :=
1489              }
1490              {   { t #1 #1 substring$ "-" = }
1491                  { "-" *
1492                    t #2 global.max$ substring$ 't :=
1493                  }
1494                while$
1495              }
1496            if$
1497          }
1498          { t #1 #1 substring$ *
1499            t #2 global.max$ substring$ 't :=
1500          }
1501        if$
1502      }
1503    while$
1504 }
1505
1506 FUNCTION {format.date}
1507 { year duplicate$ empty$
1508     { "empty year in " cite$ * warning$
1509        pop$ "" }
1510     'skip$
1511   if$
1512   month empty$
1513     'skip$
1514     { month
1515       " " * swap$ *
1516     }
1517   if$
1518   extra.label *
1519 }
1520
1521 FUNCTION {format.btitle}
1522 { title emphasize
1523 }
1524
1525 FUNCTION {tie.or.space.connect}
1526 { duplicate$ text.length$ #3 <
1527     { "~" }
1528     { " " }
1529   if$
1530   swap$ * *
1531 }
1532
1533 FUNCTION {either.or.check}
1534 { empty$
1535     'pop$
1536     { "can't use both " swap$ * " fields in " * cite$ * warning$ }
1537   if$
1538 }
1539
1540 FUNCTION {format.bvolume}
```

34

```
1541 { volume empty$
1542     { "" }
1543     { "volume" volume tie.or.space.connect
1544       series empty$
1545         'skip$
1546         { " of " * series emphasize * }
1547       if$
1548       "volume and number" number either.or.check
1549     }
1550   if$
1551 }
1552
1553 FUNCTION {format.number.series}
1554 { volume empty$
1555     { number empty$
1556         { series field.or.null }
1557         { output.state mid.sentence =
1558             { "number" }
1559             { "Number" }
1560           if$
1561           number tie.or.space.connect
1562           series empty$
1563             { "there's a number but no series in " cite$ * warning$ }
1564             { " in " * series * }
1565           if$
1566         }
1567       if$
1568     }
1569     { "" }
1570   if$
1571 }
1572
1573 FUNCTION {format.edition}
1574 { edition empty$
1575     { "" }
1576     { output.state mid.sentence =
1577         { edition "l" change.case$ " edition" * }
1578         { edition "t" change.case$ " edition" * }
1579       if$
1580     }
1581   if$
1582 }
1583
1584 INTEGERS { multiresult }
1585
1586 FUNCTION {multi.page.check}
1587 { 't :=
1588   #0 'multiresult :=
1589     { multiresult not
1590       t empty$ not
1591       and
1592     }
1593     { t #1 #1 substring$
1594       duplicate$ "-" =
```

```
1595      swap$ duplicate$ "," =
1596      swap$ "+" =
1597      or or
1598        { #1 'multiresult := }
1599        { t #2 global.max$ substring$ 't := }
1600      if$
1601    }
1602  while$
1603  multiresult
1604 }

1605
1606 FUNCTION {format.pages}
1607 { pages empty$
1608     { "" }
1609     { pages multi.page.check
1610         { "pages" pages n.dashify tie.or.space.connect }
1611         { "page" pages tie.or.space.connect }
1612       if$
1613     }
1614   if$
1615 }

1616
1617 FUNCTION {format.vol.num.pages}
1618 { volume field.or.null
1619   number empty$
1620     'skip$
1621     { "\penalty0 (" number * ")" * *
1622       volume empty$
1623         { "there's a number but no volume in " cite$ * warning$ }
1624         'skip$
1625       if$
1626     }
1627   if$
1628   pages empty$
1629     'skip$
1630     { duplicate$ empty$
1631         { pop$ format.pages }
1632         { ":\penalty0 " * pages n.dashify * }
1633       if$
1634     }
1635   if$
1636 }

1637
1638 FUNCTION {format.chapter.pages}
1639 { chapter empty$
1640     'format.pages
1641     { type empty$
1642         { "chapter" }
1643         { type "l" change.case$ }
1644       if$
1645       chapter tie.or.space.connect
1646       pages empty$
1647         'skip$
1648         { ", " * format.pages * }
```

```
1649        if$
1650      }
1651    if$
1652 }
1653
1654 FUNCTION {format.in.ed.booktitle}
1655 { booktitle empty$
1656      { "" }
1657      { editor empty$
1658          { "In " booktitle emphasize * }
1659          { "In " format.editors * ", " * booktitle emphasize * }
1660        if$
1661      }
1662    if$
1663 }
1664
1665 FUNCTION {empty.misc.check}
1666 { author empty$ title empty$ howpublished empty$
1667    month empty$ year empty$ note empty$
1668    and and and and and
1669    key empty$ not and
1670      { "all relevant fields are empty in " cite$ * warning$ }
1671      'skip$
1672    if$
1673 }
1674
1675 FUNCTION {format.thesis.type}
1676 { type empty$
1677      'skip$
1678      { pop$
1679        type "t" change.case$
1680      }
1681    if$
1682 }
1683
1684 FUNCTION {format.tr.number}
1685 { type empty$
1686      { "Technical Report" }
1687      'type
1688    if$
1689    number empty$
1690      { "t" change.case$ }
1691      { number tie.or.space.connect }
1692    if$
1693 }
1694
1695 FUNCTION {format.article.crossref}
1696 { key empty$
1697      { journal empty$
1698          { "need key or journal for " cite$ * " to crossref " * crossref *
1699            warning$
1700            ""
1701          }
1702          { "In {\em " journal * "\/}" * }
```

```
1703        if$
1704     }
1705     { "In " key * }
1706   if$
1707   " \citep{" * crossref * "}" *
1708 }
1709
1710 FUNCTION {format.book.crossref}
1711 { volume empty$
1712     { "empty volume in " cite$ * "'s crossref of " * crossref * warning$
1713       "In "
1714     }
1715     { "Volume" volume tie.or.space.connect
1716       " of " *
1717     }
1718   if$
1719   editor empty$
1720   editor field.or.null author field.or.null =
1721   or
1722     { key empty$
1723         { series empty$
1724             { "need editor, key, or series for " cite$ * " to crossref " *
1725               crossref * warning$
1726               "" *
1727             }
1728             { "{\em " * series * "\/}" * }
1729         if$
1730         }
1731         { key * }
1732     if$
1733     }
1734     'skip$
1735   if$
1736   ", \citet{" * crossref * "}" *
1737 }
1738
1739 FUNCTION {format.incoll.inproc.crossref}
1740 { editor empty$
1741   editor field.or.null author field.or.null =
1742   or
1743     { key empty$
1744         { booktitle empty$
1745             { "need editor, key, or booktitle for " cite$ * " to crossref " *
1746               crossref * warning$
1747               ""
1748             }
1749             { "In {\em " booktitle * "\/}" * }
1750         if$
1751         }
1752         { "In " key * }
1753     if$
1754     }
1755     { "In " }
1756   if$
```

```
1757  " \citet{" * crossref * "}" *
1758 }
1759
1760 FUNCTION {article}
1761 { output.bibitem
1762   format.authors "author" output.check
1763   author format.key output
1764   new.block
1765   format.title "title" output.check
1766   new.block
1767   crossref missing$
1768     { journal emphasize "journal" output.check
1769       format.vol.num.pages output
1770       format.date "year" output.check
1771     }
1772     { format.article.crossref output.nonnull
1773       format.pages output
1774     }
1775   if$
1776   format.issn output
1777   format.url output
1778   new.block
1779   note output
1780   fin.entry
1781 }
1782
1783 FUNCTION {book}
1784 { output.bibitem
1785   author empty$
1786     { format.editors "author and editor" output.check
1787       editor format.key output
1788     }
1789     { format.authors output.nonnull
1790       crossref missing$
1791         { "author and editor" editor either.or.check }
1792         'skip$
1793       if$
1794     }
1795   if$
1796   new.block
1797   format.btitle "title" output.check
1798   crossref missing$
1799     { format.bvolume output
1800       new.block
1801       format.number.series output
1802       new.sentence
1803       publisher "publisher" output.check
1804       address output
1805     }
1806     { new.block
1807       format.book.crossref output.nonnull
1808     }
1809   if$
1810   format.edition output
```

39

```
1811   format.date "year" output.check
1812   format.isbn output
1813   format.url output
1814   new.block
1815   note output
1816   fin.entry
1817 }
1818
1819 FUNCTION {booklet}
1820 { output.bibitem
1821   format.authors output
1822   author format.key output
1823   new.block
1824   format.title "title" output.check
1825   howpublished address new.block.checkb
1826   howpublished output
1827   address output
1828   format.date output
1829   format.isbn output
1830   format.url output
1831   new.block
1832   note output
1833   fin.entry
1834 }
1835
1836 FUNCTION {inbook}
1837 { output.bibitem
1838   author empty$
1839     { format.editors "author and editor" output.check
1840       editor format.key output
1841     }
1842     { format.authors output.nonnull
1843       crossref missing$
1844         { "author and editor" editor either.or.check }
1845         'skip$
1846       if$
1847     }
1848   if$
1849   new.block
1850   format.btitle "title" output.check
1851   crossref missing$
1852     { format.bvolume output
1853       format.chapter.pages "chapter and pages" output.check
1854       new.block
1855       format.number.series output
1856       new.sentence
1857       publisher "publisher" output.check
1858       address output
1859     }
1860     { format.chapter.pages "chapter and pages" output.check
1861       new.block
1862       format.book.crossref output.nonnull
1863     }
1864   if$
```

```
1865   format.edition output
1866   format.date "year" output.check
1867   format.isbn output
1868   format.url output
1869   new.block
1870   note output
1871   fin.entry
1872 }
1873
1874 FUNCTION {incollection}
1875 { output.bibitem
1876   format.authors "author" output.check
1877   author format.key output
1878   new.block
1879   format.title "title" output.check
1880   new.block
1881   crossref missing$
1882     { format.in.ed.booktitle "booktitle" output.check
1883       format.bvolume output
1884       format.number.series output
1885       format.chapter.pages output
1886       new.sentence
1887       publisher "publisher" output.check
1888       address output
1889       format.edition output
1890       format.date "year" output.check
1891     }
1892     { format.incoll.inproc.crossref output.nonnull
1893       format.chapter.pages output
1894     }
1895   if$
1896   format.isbn output
1897   format.url output
1898   new.block
1899   note output
1900   fin.entry
1901 }
1902
1903 FUNCTION {inproceedings}
1904 { output.bibitem
1905   format.authors "author" output.check
1906   author format.key output
1907   new.block
1908   format.title "title" output.check
1909   new.block
1910   crossref missing$
1911     { format.in.ed.booktitle "booktitle" output.check
1912       format.bvolume output
1913       format.number.series output
1914       format.pages output
1915       address empty$
1916         { organization publisher new.sentence.checkb
1917           organization output
1918           publisher output
```

```
1919           format.date "year" output.check
1920         }
1921       { address output.nonnull
1922         format.date "year" output.check
1923         new.sentence
1924         organization output
1925         publisher output
1926       }
1927     if$
1928   }
1929   { format.incoll.inproc.crossref output.nonnull
1930     format.pages output
1931   }
1932 if$
1933 format.isbn output
1934 format.url output
1935 new.block
1936 note output
1937 fin.entry
1938 }
1939
1940 FUNCTION {conference} { inproceedings }
1941
1942 FUNCTION {manual}
1943 { output.bibitem
1944   format.authors output
1945   author format.key output
1946   new.block
1947   format.btitle "title" output.check
1948   organization address new.block.checkb
1949   organization output
1950   address output
1951   format.edition output
1952   format.date output
1953   format.url output
1954   new.block
1955   note output
1956   fin.entry
1957 }
1958
1959 FUNCTION {mastersthesis}
1960 { output.bibitem
1961   format.authors "author" output.check
1962   author format.key output
1963   new.block
1964   format.title "title" output.check
1965   new.block
1966   "Master's thesis" format.thesis.type output.nonnull
1967   school "school" output.check
1968   address output
1969   format.date "year" output.check
1970   format.url output
1971   new.block
1972   note output
```

```
1973    fin.entry
1974 }
1975
1976 FUNCTION {misc}
1977 { output.bibitem
1978   format.authors output
1979   author format.key output
1980   title howpublished new.block.checkb
1981   format.title output
1982   howpublished new.block.checka
1983   howpublished output
1984   format.date output
1985   format.issn output
1986   format.url output
1987   new.block
1988   note output
1989   fin.entry
1990   empty.misc.check
1991 }
1992
1993 FUNCTION {phdthesis}
1994 { output.bibitem
1995   format.authors "author" output.check
1996   author format.key output
1997   new.block
1998   format.btitle "title" output.check
1999   new.block
2000   "PhD thesis" format.thesis.type output.nonnull
2001   school "school" output.check
2002   address output
2003   format.date "year" output.check
2004   format.url output
2005   new.block
2006   note output
2007   fin.entry
2008 }
2009
2010 FUNCTION {proceedings}
2011 { output.bibitem
2012   format.editors output
2013   editor format.key output
2014   new.block
2015   format.btitle "title" output.check
2016   format.bvolume output
2017   format.number.series output
2018   address output
2019   format.date "year" output.check
2020   new.sentence
2021   organization output
2022   publisher output
2023   format.isbn output
2024   format.url output
2025   new.block
2026   note output
```

```
2027   fin.entry
2028 }
2029
2030 FUNCTION {techreport}
2031 { output.bibitem
2032   format.authors "author" output.check
2033   author format.key output
2034   new.block
2035   format.title "title" output.check
2036   new.block
2037   format.tr.number output.nonnull
2038   institution "institution" output.check
2039   address output
2040   format.date "year" output.check
2041   format.url output
2042   new.block
2043   note output
2044   fin.entry
2045 }
2046
2047 FUNCTION {unpublished}
2048 { output.bibitem
2049   format.authors "author" output.check
2050   author format.key output
2051   new.block
2052   format.title "title" output.check
2053   format.url output
2054   new.block
2055   note "note" output.check
2056   format.date output
2057   fin.entry
2058 }
2059
2060 FUNCTION {default.type} { misc }
2061
2062
2063 MACRO {jan} {"January"}
2064
2065 MACRO {feb} {"February"}
2066
2067 MACRO {mar} {"March"}
2068
2069 MACRO {apr} {"April"}
2070
2071 MACRO {may} {"May"}
2072
2073 MACRO {jun} {"June"}
2074
2075 MACRO {jul} {"July"}
2076
2077 MACRO {aug} {"August"}
2078
2079 MACRO {sep} {"September"}
2080
```

```
2081 MACRO {oct} {"October"}
2082
2083 MACRO {nov} {"November"}
2084
2085 MACRO {dec} {"December"}
2086
2087
2088
2089 MACRO {acmcs} {"ACM Computing Surveys"}
2090
2091 MACRO {acta} {"Acta Informatica"}
2092
2093 MACRO {cacm} {"Communications of the ACM"}
2094
2095 MACRO {ibmjrd} {"IBM Journal of Research and Development"}
2096
2097 MACRO {ibmsj} {"IBM Systems Journal"}
2098
2099 MACRO {ieeese} {"IEEE Transactions on Software Engineering"}
2100
2101 MACRO {ieeetc} {"IEEE Transactions on Computers"}
2102
2103 MACRO {ieeetcad}
2104  {"IEEE Transactions on Computer-Aided Design of Integrated Circuits"}
2105
2106 MACRO {ipl} {"Information Processing Letters"}
2107
2108 MACRO {jacm} {"Journal of the ACM"}
2109
2110 MACRO {jcss} {"Journal of Computer and System Sciences"}
2111
2112 MACRO {scp} {"Science of Computer Programming"}
2113
2114 MACRO {sicomp} {"SIAM Journal on Computing"}
2115
2116 MACRO {tocs} {"ACM Transactions on Computer Systems"}
2117
2118 MACRO {tods} {"ACM Transactions on Database Systems"}
2119
2120 MACRO {tog} {"ACM Transactions on Graphics"}
2121
2122 MACRO {toms} {"ACM Transactions on Mathematical Software"}
2123
2124 MACRO {toois} {"ACM Transactions on Office Information Systems"}
2125
2126 MACRO {toplas} {"ACM Transactions on Programming Languages and Systems"}
2127
2128 MACRO {tcs} {"Theoretical Computer Science"}
2129
2130
2131 READ
2132
2133 FUNCTION {sortify}
2134 { purify$
```

```
2135   "l" change.case$
2136 }
2137
2138 INTEGERS { len }
2139
2140 FUNCTION {chop.word}
2141 { 's :=
2142   'len :=
2143   s #1 len substring$ =
2144     { s len #1 + global.max$ substring$ }
2145     's
2146   if$
2147 }
2148
2149 FUNCTION {format.lab.names}
2150 { 's :=
2151   s #1 "{vv~}{ll}" format.name$
2152   s num.names$ duplicate$
2153   #2 >
2154     { pop$ " et~al." * }
2155     { #2 <
2156         'skip$
2157         { s #2 "{ff }{vv }{ll}{ jj}" format.name$ "others" =
2158             { " et~al." * }
2159             { " and " * s #2 "{vv~}{ll}" format.name$ * }
2160           if$
2161         }
2162       if$
2163     }
2164   if$
2165 }
2166
2167 FUNCTION {author.key.label}
2168 { author empty$
2169     { key empty$
2170         { cite$ #1 #3 substring$ }
2171         'key
2172       if$
2173     }
2174     { author format.lab.names }
2175   if$
2176 }
2177
2178 FUNCTION {author.editor.key.label}
2179 { author empty$
2180     { editor empty$
2181         { key empty$
2182             { cite$ #1 #3 substring$ }
2183             'key
2184           if$
2185         }
2186         { editor format.lab.names }
2187       if$
2188     }
```

46

```
2189      { author format.lab.names }
2190   if$
2191 }
2192
2193 FUNCTION {author.key.organization.label}
2194 { author empty$
2195     { key empty$
2196         { organization empty$
2197             { cite$ #1 #3 substring$ }
2198             { "The " #4 organization chop.word #3 text.prefix$ }
2199           if$
2200         }
2201         'key
2202       if$
2203     }
2204     { author format.lab.names }
2205   if$
2206 }
2207
2208 FUNCTION {editor.key.organization.label}
2209 { editor empty$
2210     { key empty$
2211         { organization empty$
2212             { cite$ #1 #3 substring$ }
2213             { "The " #4 organization chop.word #3 text.prefix$ }
2214           if$
2215         }
2216         'key
2217       if$
2218     }
2219     { editor format.lab.names }
2220   if$
2221 }
2222
2223 FUNCTION {calc.short.authors}
2224 { type$ "book" =
2225   type$ "inbook" =
2226   or
2227     'author.editor.key.label
2228     { type$ "proceedings" =
2229         'editor.key.organization.label
2230         { type$ "manual" =
2231             'author.key.organization.label
2232             'author.key.label
2233           if$
2234         }
2235       if$
2236     }
2237   if$
2238   'short.list :=
2239 }
2240
2241 FUNCTION {calc.label}
2242 { calc.short.authors
```

```
2243   short.list
2244   "("
2245   *
2246   year duplicate$ empty$
2247   short.list key field.or.null = or
2248     { pop$ "" }
2249     'skip$
2250   if$
2251   *
2252   'label :=
2253 }
2254
2255 FUNCTION {sort.format.names}
2256 { 's :=
2257   #1 'nameptr :=
2258   ""
2259   s num.names$ 'numnames :=
2260   numnames 'namesleft :=
2261     { namesleft #0 > }
2262     { nameptr #1 >
2263         { "   " * }
2264         'skip$
2265       if$
2266       s nameptr "{vv{ } }{ll{ }}{  ff{ }}{  jj{ }}" format.name$ 't :=
2267       nameptr numnames = t "others" = and
2268         { "et al" * }
2269         { t sortify * }
2270       if$
2271       nameptr #1 + 'nameptr :=
2272       namesleft #1 - 'namesleft :=
2273     }
2274   while$
2275 }
2276
2277 FUNCTION {sort.format.title}
2278 { 't :=
2279   "A " #2
2280     "An " #3
2281       "The " #4 t chop.word
2282     chop.word
2283   chop.word
2284   sortify
2285   #1 global.max$ substring$
2286 }
2287
2288 FUNCTION {author.sort}
2289 { author empty$
2290     { key empty$
2291         { "to sort, need author or key in " cite$ * warning$
2292           ""
2293         }
2294         { key sortify }
2295       if$
2296     }
```

```
2297      { author sort.format.names }
2298   if$
2299 }
2300
2301 FUNCTION {author.editor.sort}
2302 { author empty$
2303     { editor empty$
2304        { key empty$
2305           { "to sort, need author, editor, or key in " cite$ * warning$
2306             ""
2307           }
2308           { key sortify }
2309         if$
2310        }
2311        { editor sort.format.names }
2312      if$
2313     }
2314     { author sort.format.names }
2315   if$
2316 }
2317
2318 FUNCTION {author.organization.sort}
2319 { author empty$
2320     { organization empty$
2321        { key empty$
2322           { "to sort, need author, organization, or key in " cite$ * warning$
2323             ""
2324           }
2325           { key sortify }
2326         if$
2327        }
2328        { "The " #4 organization chop.word sortify }
2329      if$
2330     }
2331     { author sort.format.names }
2332   if$
2333 }
2334
2335 FUNCTION {editor.organization.sort}
2336 { editor empty$
2337     { organization empty$
2338        { key empty$
2339           { "to sort, need editor, organization, or key in " cite$ * warning$
2340             ""
2341           }
2342           { key sortify }
2343         if$
2344        }
2345        { "The " #4 organization chop.word sortify }
2346      if$
2347     }
2348     { editor sort.format.names }
2349   if$
2350 }
```

```
2351
2352 FUNCTION {presort}
2353 { calc.label
2354   label sortify
2355   "    "
2356   *
2357   type$ "book" =
2358   type$ "inbook" =
2359   or
2360     'author.editor.sort
2361     { type$ "proceedings" =
2362         'editor.organization.sort
2363       { type$ "manual" =
2364             'author.organization.sort
2365             'author.sort
2366           if$
2367       }
2368       if$
2369     }
2370   if$
2371   "    "
2372   *
2373   year field.or.null sortify
2374   *
2375   "    "
2376   *
2377   title field.or.null
2378   sort.format.title
2379   *
2380   #1 entry.max$ substring$
2381   'sort.label :=
2382   sort.label *
2383   #1 entry.max$ substring$
2384   'sort.key$ :=
2385 }
2386
2387 ITERATE {presort}
2388
2389 SORT
2390
2391 STRINGS { longest.label last.label next.extra }
2392
2393 INTEGERS { longest.label.width last.extra.num number.label }
2394
2395 FUNCTION {initialize.longest.label}
2396 { "" 'longest.label :=
2397   #0 int.to.chr$ 'last.label :=
2398   "" 'next.extra :=
2399   #0 'longest.label.width :=
2400   #0 'last.extra.num :=
2401   #0 'number.label :=
2402 }
2403
2404 FUNCTION {forward.pass}
```

```
2405 { last.label label =
2406     { last.extra.num #1 + 'last.extra.num :=
2407       last.extra.num int.to.chr$ 'extra.label :=
2408     }
2409     { "a" chr.to.int$ 'last.extra.num :=
2410       "" 'extra.label :=
2411       label 'last.label :=
2412     }
2413   if$
2414   number.label #1 + 'number.label :=
2415 }
2416
2417 FUNCTION {reverse.pass}
2418 { next.extra "b" =
2419     { "a" 'extra.label := }
2420     'skip$
2421   if$
2422   extra.label 'next.extra :=
2423   extra.label
2424   duplicate$ empty$
2425     'skip$
2426     { "{\natexlab{" swap$ * "}}" * }
2427   if$
2428   'extra.label :=
2429   label extra.label * 'label :=
2430 }
2431
2432 EXECUTE {initialize.longest.label}
2433
2434 ITERATE {forward.pass}
2435
2436 REVERSE {reverse.pass}
2437
2438 FUNCTION {bib.sort.order}
2439 { sort.label  'sort.key$ :=
2440 }
2441
2442 ITERATE {bib.sort.order}
2443
2444 SORT
2445
2446 FUNCTION {begin.bib}
2447 {   preamble$ empty$
2448     'skip$
2449     { preamble$ write$ newline$ }
2450   if$
2451   "\begin{thebibliography}{" number.label int.to.str$ * "}" *
2452   write$ newline$
2453   "\expandafter\ifx\csname natexlab\endcsname\relax\def\natexlab#1{#1}\fi"
2454   write$ newline$
2455   "\expandafter\ifx\csname url\endcsname\relax" write$ newline$
2456   "  \def\url#1{{\tt #1}}\fi" write$ newline$
2457 }
2458
```

```
2459 EXECUTE {begin.bib}
2460
2461 EXECUTE {init.state.consts}
2462
2463 ITERATE {call.type$}
2464
2465 FUNCTION {end.bib}
2466 { newline$
2467   "\end{thebibliography}" write$ newline$
2468 }
2469
2470 EXECUTE {end.bib}
2471 ⟨/bst⟩
```