

Resource-Constrained Project Scheduling Models, algorithms, extensions and applications

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Contents

Foreword	7
Roger ROUSSEAU, Christian SCHEEN	
Typographic conventions	8
Introduction	9
Roger ROUSSEAU, Christian SCHEEN	
Chapter 1. Structure Commands	13
Roger ROUSSEAU, Christian SCHEEN	
1.1. Books, monographs, and edited collections	13
1.2. The master \LaTeX source file	15
1.3. Class options	15
1.4. \LaTeX preamble	16
1.5. Document body	17
1.6. Front matter	19
1.7. Main matter	19
1.7.1. Book parts	19
1.7.2. Monograph chapters	19
1.7.3. Edited collection chapters	20
1.7.4. Appendices	20
1.8. Back matter	21
1.8.1. The glossary	21
1.8.2. The bibliography	21
1.8.2.1. Bib \TeX bibliography databases	21
1.8.2.2. Bibliography chapters in monographs	22
1.8.2.3. Bibliography sections in edited collections	22
1.8.3. The index	22
1.8.3.1. Index preparation	23

6 Resource-Constrained Project Scheduling

1.8.3.2. The <code>\index</code> command	24
1.8.3.3. How to merge letters in the index	25
1.9. Automatic typesetting procedure	25
Chapter 2. Other Specific Commands	27
Roger ROUSSEAU, Christian SCHEEN	
2.1. Floating figures and tables	27
2.1.1. An environment for figures	27
2.1.2. An environment for tables	29
2.2. Special insets	29
2.2.1. Comments, examples, notes, and similar insets	29
2.2.2. Definitions, theorems, lemmas, and similar insets	30
2.2.3. Quotes	30
2.3. The optional form for the Hermes office	31
2.4. Exponents, indices, and numberings	31
2.5. Specific control commands	32
2.5.1. Controlling the page-breaking mechanism	32
2.5.2. Controlling displayed mathematics	32
2.5.3. Controlling the table of contents	33
2.5.4. Controlling overruns	33
2.5.5. Controlling footnote rules	34
Bibliography	35
Index	37

Foreword

The aim of this document is to describe how to use \LaTeX in order to typeset books (namely, monographs or edited collections; this terminology will be defined later on in this document) according to the Hermes Science Publishing (HSP) guidelines and instructions to authors. The Ouvrage-Hermes package contains a \LaTeX document class file, a Bib \TeX alphanumeric bibliography style file, and a MakeIndex index style file. Index typesetting is made easier through a basic Bourne shell script and two associated awk (or gawk) filters. Of course, the use of this indexing mechanism is completely optional; everything is possible (but sometimes more involved) through the standard MakeIndex program that comes with every \TeX system distribution. Finally, the Ouvrage-Hermes package contains a `Makefile` script for the make utility; its use is also optional and makes it easy to keep the main target (namely, the final document in PostScript format) current, based on differences in the modification times of the \TeX source files that the PostScript target is dependent on.

Let us stress that users of the Ouvrage-Hermes package should definitely *not* use the \LaTeX source files of this user's guide as the starting point of the \LaTeX source files of any actual book (this user's guide is a very special case that is laid out as an edited collection, but that also possesses some monograph features). The Ouvrage-Hermes package provides users with appropriate templates instead; see the `hsp-monograph.ltx` and `hsp-treatise.ltx` files in the `Ouvrage-Hermes/` top-level directory for details.

\LaTeX itself is Leslie Lamport's generic typesetting system [LAM 94] that uses Donald E. Knuth's \TeX formatting system [KNU 86] as its underlying engine. The main idea behind \LaTeX is to let the user concentrate on the layout and the structure of the document rather than on formatting details. With this aim in mind, the \LaTeX system adds an abstraction layer onto the plain \TeX commands; the user is provided with high-level commands that make document typesetting easier. The \LaTeX format contains a precompiled image of all these \LaTeX commands, the \TeX font metrics (".tfm") information for preloaded fonts, and a set of word-breaking hyphenation

patterns for each language that one might want to use. A number of excellent books on \LaTeX and related tools and techniques are available. In addition to the books by Knuth [KNU 86] and Lamport [LAM 94], let us refer to the introduction guide by Helmut Kopka and Patrick W. Daly [KOP 04], to the editions of the \LaTeX “companion” by Frank Mittelbach *et al.* [GOO 94, MIT 04], to the \LaTeX graphics “companion” by Michel Goossens *et al.* [GOO 97], and to the \LaTeX Web “companion” by Michel Goossens *et al.* [GOO 99]. French-speaking users are moreover referred to the introduction guides by Christian Rolland [ROL 99] and Bernard Desgraupes [DES 03].

Typographic conventions

We use the standard typographic conventions throughout the document (see for instance [MIT 04, p. 11-13]):

- programs (such as `MakeIndex`, `xindy`, `make`, `awk`, and `gawk`) and drivers (such as `dvips` and `ps2pdf`) are typeset in sans serif text font;
- scripts (such as `Makefile` and `Makeindex`) and so-called filters (such as `makeindex-pre.awk` and `makeindex-post.awk`) are typeset in monospaced typewriter text font;
- \LaTeX , \BibTeX , and `MakeIndex` classes and style files (such as `book.cls`, `chapterbib.sty`, `ouvrage-hermes.bst`, and `ouvrage-hermes.ist`) are typeset in sans serif text font;
- \LaTeX commands and environments (such as `\makeindex` and `flushright`) are typeset in monospaced typewriter text font. Besides, environments are typeset in slanted shape font;
- place-holders (also known as meta-variables) are typeset in italic shape font between “ \langle ” and “ \rangle ” angle brackets (for instance, $\langle text \rangle$).

Roger ROUSSEAU
Christian SCHEEN

Introduction

This document describes how to use \LaTeX in order to typeset books (namely, monographs or edited collections) according to the Hermes Science Publishing (HSP) guidelines and instructions to authors, with the Ouvrage-Hermes package. Many examples are given (\LaTeX source files templates, syntax of user commands and environments, etc.).

The Ouvrage-Hermes package consists of the following files:

- the `ouvrage-hermes.cls` \LaTeX document class file. It shall be used instead of the `book.cls` standard \LaTeX document class file;
- the `ouvrage-hermes.bst` Bib \TeX bibliography style file. It shall drive the Bib \TeX program in order to produce appropriate alphanumeric bibliographies;
- the `Makeindex` Bourne shell script. It can be used instead of the standard `MakeIndex` program, but this mechanism is completely optional; if it is actually used, it will automatically produce the desired index layout and it will properly sort out (French, etc.) words with diacritical signs (in alphabetical order). This script uses two filters written in the AWK language (namely the `makeindex-pre.awk` pre-processor and the `makeindex-post.awk` post-processor). It also uses the `ouvrage-hermes.ist` `MakeIndex` index style file; if one does not use the `Makeindex` script, this index style file shall drive the standard `MakeIndex` program that comes with every \TeX system distribution;
- the `Makefile` script. It can drive the `make` utility, but this mechanism is also completely optional; if it is actually used, it will automatically keep the final document (in PostScript format) current, based on differences in the modification times of the \TeX source files that the PostScript target is dependent on.

Introduction written by Roger ROUSSEAU and Christian SCHEEN.

Though the Ouvrage-Hermes package scrupulously respects each and every type-setting guideline designed by Hermes Science Publishing, it does its utmost to achieve this aim without sacrificing compatibility with standard \LaTeX system commands and environments. One should therefore use those standard structures in the usual way, with the usual syntax and semantics (some have indeed been internally redefined in order to comply with specific Hermes guidelines, but this is transparent from the user's point of view).

However, there are few cases where compliance could not be achieved through the redefinition of existing standard \LaTeX commands and environments. In that case, we provide the user with a new structure whose name always has an initial capital letter (this distinguishes new structures from standard ones). Here is the complete list of these new commands and environments (see also Table 1):

- the `\ChapterAuthor` command. It is used in the case of edited collections (joint works) and starts a new chapter that has been written by specific authors;
- the `\Name` command. It mentions the name of an author and typesets it in small capitals font shape;
- the `\PresentationOfAuthors` command. It introduces specifically the names of the authors of an unnumbered chapter (such as a foreword or an introduction);
- the `Figure` and `Table` environments. These are functionally similar to their standard counterparts (namely, the `figure` and `table` standard \LaTeX environments), but the caption and the label are now specified as the mandatory argument of the new environments. This mechanism controls the caption positioning;
- the `\Remark`, `\Example`, and `\Note` commands. These typeset a *short* text as a comment, an example, or a note. Actually, any similar inset may be designed with the `\GenericRemark` command;
- the `Remarks`, `Examples`, and `Notes` environments. These typeset a *longer* text (made up of two or more paragraphs) as a comment, an example, or a note;
- the `\Definition`, `\Theorem`, and `\Lemma` commands. These typeset text as a definition, a theorem, or a lemma. Actually, any similar inset may be designed with the `\GenericDefinition` command;
- the `\Publisher` command. It typesets (at the end of the book) a note intended for the Hermes office.

We have also introduced some supplementary commands that will certainly be seldom used, but that can be a help to \LaTeX novices (see also Table 1):

- the `\DelayNewPage` and `\ForceNewPage` commands. These control \TeX 's page-breaking mechanism in the remaining problematic cases where \TeX 's decision is not satisfactory;
- the `\EqnCont` command. Within the `eqnarray` environment, it breaks a long equation into two lines and helps to stay in the type area;

- the `\AddToContents` command. It introduces some specific text in the table of contents;
- the `\CropMarksOn` and `\CropMarksOff` commands. These respectively activate and disable crop marks on output pages;
- the `\LargeFnRule` and `\SmallFnRule` commands. These respectively produce long (namely, 12 cm) and short (namely, 25 mm) footnote rules. These commands shall be used whenever a footnote exceptionally extends over two or more pages.

Command or environment	Description	Scope
<code>\ChapterAuthor [] {} {}</code>	start a chapter with specific authors	collections
<code>\Name {}</code>	typeset a surname in small capitals	all books
<code>\PresentationOfAuthors {}</code>	introduce author full names	collections
<code>Figure [] {}</code>	control typesetting of floating figures	all books
<code>Table [] {}</code>	control typesetting of floating tables	all books
<code>\Remark {}</code>	typeset a small comment (single paragraph)	all books
<code>\Example {}</code>	typeset a small example (single paragraph)	all books
<code>\Note {}</code>	typeset a small note (single paragraph)	all books
<code>\GenericRemark {} {}</code>	define a new “comment-like” inset	all books
<code>Remarks</code>	typeset a longer comment	all books
<code>Examples</code>	typeset a longer example	all books
<code>Notes</code>	typeset a longer note	all books
<code>\Definition {}</code>	typeset a definition (italic shape)	all books
<code>\Theorem {}</code>	typeset a theorem (italic shape)	all books
<code>\Lemma {}</code>	typeset a lemma (italic shape)	all books
<code>\GenericDefinition {} {}</code>	define a new “definition-like” inset	all books
<code>\Publisher {} {} {}</code>	produce a note for the Hermes office	optional
<code>\DelayNewPage {}</code>	control T _E X’s page breaks	optional
<code>\ForceNewPage</code>	control T _E X’s page breaks	optional
<code>\EqnCont</code>	break a long equation into two lines	optional
<code>\AddToContents {} {} {}</code>	introduce text in the table of contents	optional
<code>\CropMarksOn</code>	activate crop marks on output pages	optional
<code>\CropMarksOff</code>	disable crop marks on output pages	optional
<code>\LargeFnRule</code>	make long footnote rules	all books
<code>\SmallFnRule</code>	make short footnote rules	all books

Table 1. *New structures introduced by the Ouvrage-Hermes package*

The Ouvrage-Hermes package shall be used in order to typeset either a monograph or an edited collection (see section 1.1 on page 13 for the definition of these terms). Though this user’s guide is basically laid out as an edited collection, it does exhibit

some features that are only encountered in the case of monographs; its general layout is somewhat hybrid. For this very reason, authors should definitely *not* use the \LaTeX source files of this user's guide as the starting point of the \LaTeX source files of any actual book. Instead, the `Ouvrage-Hermes/` top-level directory holds appropriate templates of master \LaTeX source files. On the other hand, local excerpts from this user's guide may provide one with examples of good typographic practice.

Chapter 1 describes structure commands. These commands shall be used in order to lay out any actual book; they structure the whole document and all its components (\LaTeX preamble, front matter, main matter, and back matter; these great subdivisions may then contain parts, chapters, sections, paragraphs, and all other components down to the smallest units). Chapter 2 describes new commands and environments that are introduced by the `Ouvrage-Hermes` package through its `ouvrage-hermes.cls` \LaTeX document class file. Excerpts from the `Hermes Science Publishing` guidelines and instructions to authors are given wherever appropriate. The final bibliography and the index have been produced respectively by the `BibTeX` program (with the mandatory `ouvrage-hermes.bst` style file) and by the suggested `Makeindex` Bourne shell script (with the mandatory `ouvrage-hermes.ist` style file and the optional `awk` utility and scripts).

Chapter 1

Structure Commands

This chapter describes the main commands that structure the whole book (L^AT_EX preamble, front matter, main matter, and back matter; these great subdivisions may then contain parts, chapters, sections, paragraphs, and smaller components).

1.1. Books, monographs, and edited collections

In accordance with the Hermes Science Publishing terminology, let us use the term *book* for any typeset document whose general layout is based on the notion of a chapter made up of several pages. Chapters may be gathered within larger parts, and they are subdivided with the help of smaller subtitles characterized by their level n . Subtitles of level 1 down to level 4 are allowed; in L^AT_EX, these correspond respectively to `\section` (level 1), `\subsection` (level 2), `\subsubsection` (level 3), and `\paragraph` (level 4) commands. According to the Hermes guidelines, level $n \geq 5$ subtitles must not appear in any actual book; in L^AT_EX parlance, this means that authors should not use the `\subparagraph` (level 5) command (see Table 1.1). Monographs, edited collections, joint works, technical reports, handbooks, and doctoral dissertations may all be considered as books from the structural point of view. Hermes Science Publishing defines monographs and edited collections; let us specify this terminology.

DEFINITION 1.1.— *In a monograph, all chapters are written by the same author or by the same group of authors. The book possesses a single bibliography chapter whose contents is therefore shared by all regular chapters; the bibliography is typeset at the end of the book, before the index.*

Chapter written by Roger ROUSSEAU and Christian SCHEEN.

DEFINITION 1.2.— *In an edited collection, each chapter is written by its own author or by its own group of authors. The book is coordinated by one or more scientific directors. Each chapter possesses its specific bibliography section; the bibliography is typeset at the end of the chapter.*

Command	Level	Automatic style
<code>\part</code>	−1	flush right on a special page
<code>\chapter</code>	0	flush right or centered [†]
<code>\section</code>	1	upright shape, bold series
<code>\subsection</code>	2	italic shape, bold series
<code>\subsubsection</code>	3	italic shape, medium series
<code>\paragraph</code>	4	upright shape, medium series
<code>\subparagraph</code>	5	forbidden in Hermes books

[†] Flush right for monographs, centered for edited collections.

Table 1.1. *ℒ_{TEX}'s standard sectioning commands*
(*ℒ_{TEX} levels coincide with Hermes levels*)

All books are laid out along three great subdivisions:

- 1) the *front matter* (`\frontmatter`) contains the title page, the table of contents, and small unnumbered chapters. These unnumbered chapters have usually no subtitles at all; therefore, one may include, for instance, a preface, a foreword, and a small introduction in the front matter;
- 2) the *main matter* (`\mainmatter`) contains all regular numbered chapters. Optionally, those regular chapters may be followed by numbered appendices;
- 3) the *back matter* (`\backmatter`) contains the bibliography chapter (only in the case of a monograph), an optional glossary, and the index. These are all unnumbered chapters.

Chapter numbering (and appendix numbering) is automatic and depends on its position amongst these subdivisions. For instance, a small introduction with few subtitles shall be placed in the front matter, where it will automatically be typeset as an unnumbered chapter. On the other hand, a longer and/or structured introduction shall be placed at the beginning of the main matter, where it will automatically be typeset as a regular numbered chapter (of course, its subtitles will automatically be numbered, too). In order to disable the appearance of an unnumbered chapter in the table of contents, one can use the starred form of the `\chapter` command (namely, `\chapter*{⟨Chapter Title⟩}`).

Commands that define the general layout of the book shall be gathered in the master \mathcal{L}_{TEX} source file that we describe below.

1.2. The master L^AT_EX source file

The master L^AT_EX source file defines the general layout of the book and consists of two parts: the preamble (between the `\documentclass` and the `\begin{document}` commands) and the document body (between the `\begin{document}` and the `\end{document}` commands). See Figure 1.1 for details.

```
\documentclass[<class options>]{ouvrage-hermes}[2005/11/14]

% The LaTeX preamble may contain package loading commands and
% user-defined LaTeX commands and environments. The optional
% \usepackage, \newcommand, and \newenvironment commands shall
% be included here.

\title[%
Shortened Book Title]{%
Complete Book Title\\
with Optional Line Breaks}

\author{%
John \Name{Smith}\\ Paul \Name{Jones}}

\date{%
November~14, 2005}

\makeindex

\begin{document}
% The document body is described in another section.
\end{document}
```

Figure 1.1. *General structure of the L^AT_EX preamble*

The `\documentclass` command is given the `ouvrage-hermes` mandatory parameter that specifies the name of the `ouvrage-hermes.cls` document class, and the *<class options>* optional parameter that controls various specific aspects of document typesetting; available class options are described below.

1.3. Class options

The default behavior of the `ouvrage-hermes.cls` document class makes it possible to typeset a monograph written in French, without crop marks, and without blank

pages printing. According to the desired book type, the following class options will be used (see also Table 1.2):

- the `treatise` class option typesets an edited collection. The default behavior is to typeset a monograph;
- the `english` class option typesets a book written in English. The default behavior is to typeset a book written in French. Obviously, the \LaTeX format must include word-breaking hyphenation patterns for the intended language¹. This class option defines the basic language of the book. However, if specific chapters are not written in the basic language, these shall start with the `\selectlanguage{<language>}` language selection command;
- the `cropmarks` class option draws the page borders: a first rectangle corresponds to the text dimensions, and a taller one shows the page limits (after the trimming process). The default behavior is to disable crop marks. The final copy of a book shall not exhibit crop marks;
- the `allpages` class option prints out blank pages. The default behavior is to suppress blank pages printing. This class option enables one to save printing (let us recall that chapters always start on odd pages). The final copy of a book shall enable blank pages printing.

Class option	Implied behavior	Default behavior
<code>treatise</code>	typeset an edited collection	typeset a monograph
<code>english</code>	typeset a book in English	typeset a book in French
<code>cropmarks</code>	enable crop marks drawing	disable crop marks drawing [†]
<code>allpages</code>	enable blank pages printing [†]	disable blank pages printing

[†] Required behavior for the final copy.

Table 1.2. *Class options and their implied behavior*

Let us now consider the \LaTeX preamble details.

1.4. \LaTeX preamble

The \LaTeX preamble shall successively contain (see Figure 1.1):

- 1) optional package loading commands. For instance, one might want to use the `\usepackage[fleqn]{amsmath}` command in order to load advanced mathematical structures designed by the American Mathematical Society;

1. The \LaTeX format generation process is beyond the scope of this user's guide. Let us stress that Hermes uses French and American English hyphenation patterns.

2) optional user-defined commands and environments. User-defined structures shall be defined with the `\newcommand` and `\newenvironment` \LaTeX commands; one should not use plain \TeX commands (such as `\def`, etc.);

3) the `\title[Shortened Book Title]{Complete Book Title}` statement. The *Shortened Book Title* parameter is used as the running title on even pages and its length shall not exceed 55 mm in 9 pt font size; the `ouvrage-hermes.cls` document class raises a warning message when this condition is not met;

4) the `\author` statement. The `\Name` command distinguishes surnames from given names. The `\\` command separates the full names of successive authors. The example below shows the exact syntax;

5) the `\date{version date}` statement, as usual.

EXAMPLE.— The `\author` statement shall be given as follows:

```
\author{%
<Given name #1> \Name{<Surname #1>}\\
<Given name #2> \Name{<Surname #2>}}
```

1.5. Document body

Within the document body, the top-level structure commands are `\frontmatter`, `\mainmatter`, and `\backmatter`.

The contents of each chapter shall be placed within one single dedicated file; chapter files shall be included with the `\include` (not `\input`) command in the master \LaTeX source file. In the case of an edited collection, where each chapter has its own bibliography section, this requirement is mandatory.

Some unnumbered chapters such as the table of contents, the bibliography chapter (in the case of a monograph), and the index are produced by specific commands placed at appropriate positions in the master \LaTeX source file.

The optional `\appendix` command notifies the start of the appendices. In order to generate appropriate table of contents entries, the `\appendix` command shall be placed at the beginning of the first included appendix file (not in the master \LaTeX source file itself).

Figure 1.2 gives a rather complete example of document body; see Figure 1.1 for its location within the whole master \LaTeX source file.

As already mentioned, authors should definitely *not* use the \LaTeX source files of this user's guide as the starting point of the \LaTeX source files of any actual book;

the Ouvrage-Hermes/ top-level directory holds suitable templates of master L^AT_EX source files:

- for monographs, use the `hsp-monograph.ltx` template,
- for edited collections, use the `hsp-treatise.ltx` template.

```
\begin{document}

\frontmatter %-----

\maketitle
\include{preface}
\tableofcontents
\include{foreword}
\include{introduction}

\mainmatter %-----

\part[<Short Title for Part #1>]{<Complete Title for Part #1>}

\include{chapter1}
\include{chapter2}

\part[<Short Title for Part #2>]{<Complete Title for Part #2>}

\include{chapter3}
\include{chapter4}

% Appendices

\include{appendix1} % starts with the \appendix command
\include{appendix2}

\backmatter %-----

\bibliography{bibtex-database} % only in the case of monographs
\printindex
\Publisher{01 23 45 67 89}{98 76 54 32 10}{user@provider.com}

\end{document}
```

Figure 1.2. *General structure of the document body*

1.6. Front matter

The table of contents is the only mandatory component of the front matter; it is produced by the usual `\tableofcontents` command. The table of contents usually contains entries for all level 1 to level 3 subtitles. If page constraints come into play, it is possible to reduce the table of contents “depth” with the following command (that shall be placed in the preamble of the master \LaTeX source file):

```
\setcounter{tocdepth}{2}
```

Front matter chapters are unnumbered; moreover, the following behavior applies:

- chapters that use the `\chapter` command have an entry in the table of contents (for instance, `\chapter{Introduction}`);
- chapters that use the `\chapter*` command have no entry in the table of contents (for instance, `\chapter*{Preface}`).

1.7. Main matter

1.7.1. Book parts

Main matter chapters are numbered and may optionally be gathered within larger parts that are defined by the `\part[⟨Shortened Part Title⟩]{⟨Complete Part Title⟩}` command. The *⟨Shortened Part Title⟩* argument is optional. The *⟨Complete Part Title⟩* argument is mandatory; it is possible to break the complete title into multiple lines with the help of the `\\` command.

EXAMPLE.– The `\part` statement shall be given as follows:

```
\part[%
Hermes Guidelines]{%
Hermes Guidelines\\
for Monographs and Edited Collections}
```

1.7.2. Monograph chapters

In the case of monographs, chapters are stated with the classical command, namely `\chapter[⟨Shortened Chapter Title⟩]{⟨Complete Chapter Title⟩}`. The *⟨Complete Chapter Title⟩* argument is mandatory. If its length exceeds 55 mm in 9 pt font size, then the *⟨Shortened Chapter Title⟩* argument will also be provided; it is used as the running title on odd pages. It is possible to break the complete title into multiple lines with the help of the `\\` command.

1.7.3. *Edited collection chapters*

In the case of edited collections, chapters shall be stated with the new command `\ChapterAuthor` [*Shortened Chapter Title*]{*Complete Chapter Title*}{*Authors Full Names*} that possesses one optional argument (*Shortened Chapter Title*) and two mandatory arguments (*Complete Chapter Title* and *Authors Full Names*). The complete title and its optional short rewording shall be used as in the case of the classical `\chapter` command (see paragraph 1.7.2); authors full names shall be stated as in the example below.

EXAMPLE.— The `\ChapterAuthor` statement shall be given as follows:

```
\ChapterAuthor[%
Shortened Chapter Title]{%
Complete Chapter Title}{%
John \Name{Smith}\and Paul \Name{Jones}}
```

The `\Name` command distinguishes surnames from given names; the `\and` command separates the full names of successive authors. Authors full names are automatically typeset as an unnumbered footnote on the first page of the chapter and as an entry in the table of contents. This information is introduced by a sentence in the appropriate language (« Chapitre rédigé par » in French; “Chapter written by” in English). The default sentence is appropriate in the case of a regular chapter, but not in the case of a special unnumbered chapter. For instance, in the case of an introduction, the `\PresentationOfAuthors` command shall be used according to the following example.

EXAMPLE.— The `\PresentationOfAuthors` command shall be used as follows, before the `\ChapterAuthor` command:

```
\PresentationOfAuthors{Introduction written by~}
\ChapterAuthor{Introduction}{John \Name{Smith}}
```

1.7.4. *Appendices*

Appendices belong to the main matter; they are separated from the regular chapters by the `\appendix` command. Appendix chapters shall be included with the `\include` (not `\input`) command, and the `\appendix` command shall be placed at the beginning of the first included appendix file (not in the master \LaTeX source file itself).

The appendices are structured as any regular chapter (with the `\chapter` or `\ChapterAuthor` statement, and with the customary `\section`, `\subsection`, `\subsubsection`, and `\paragraph` sectioning commands), but their numbering uses uppercase Latin letters and their table of contents entries are handled differently. Of course, all these typographic details are automatically taken into account.

1.8. Back matter

1.8.1. *The glossary*

The optional glossary shall be introduced as an unnumbered back matter chapter. Hermes Science Publishing does not define typesetting guidelines for glossaries.

1.8.2. *The bibliography*

1.8.2.1. *BibTeX bibliography databases*

The use of BibTeX with L^AT_EX is described in a report by Oren Patashnik [PAT 88] and, for instance, in the editions of the L^AT_EX “companion” (see [GOO 94, p. 375-384, 398-407] and [MIT 04, p. 761-773, 790-804]). The Ouvrage-Hermes package includes the ouvrage-hermes.bst BibTeX bibliography style file. It produces the Hermes variant of the standard alpha.bst BibTeX style file; its use is automatic and straightforward. Its only peculiarity deals with the inproceedings BibTeX entry type. The new date BibTeX entry field has been introduced: it allows one to define both the date of the scientific meeting (with date) and the publishing date of the associated proceedings (with year and optionally month). See below for a complete example.

EXAMPLE.— The inproceedings BibTeX entry type shall be defined as follows:

```
@INPROCEEDINGS{Wald97,
  author      = {Wald, Robert M.},
  title       = {Quantum Field Theory in Curved Spacetime},
  editor      = {Francaviglia, Mauro and Longhi, Giorgio and
                Lusanna, Luca and Sorace, Emanuele},
  booktitle   = {Proceedings of the Fourteenth International
                Conference on General Relativity and
                Gravitation},
  organization = {International Society on General Relativity
                and Gravitation},
  address     = {Florence, Italy},
  date        = {\Aug 6-12, 1995},
  publisher   = {World Scientific, Singapore},
  pages       = {401-415},
  year        = {1997}}
```

Month names shall use the \Jan, \Feb, \Mar, \Apr, \May, \Jun, \Jul, \Aug, \Sep, \Oct, \Nov, and \Dec commands: they produce consistent language-dependent output. All other BibTeX entry types and fields are standard.

1.8.2.2. *Bibliography chapters in monographs*

In the case of monographs, there is only one bibliography chapter whose contents is shared by all regular chapters.

The bibliography chapter shall be typeset at the end of the book, before the index; this is actually a matter of one simple command:

```
\bibliography{BibTeX database file}
```

where *BibTeX database file* [.bib] is the file name of the relevant BibTeX database file. There shall be no BibTeX bibliography style file statement in the author's L^AT_EX source files.

In order to produce the bibliography chapter, the BibTeX program shall be run on the master L^AT_EX source file.

1.8.2.3. *Bibliography sections in edited collections*

In the case of edited collections, the chapterbib.sty style file is automatically used in order to typeset one bibliography section per chapter. For proper operation of this style file, the contents of each chapter shall be placed within one single dedicated file, and chapter files shall be included with the \include (not \input) command in the master L^AT_EX source file.

The bibliography section shall be typeset at the end of each chapter; this is actually a matter of two simple commands:

```
\bibliographystyle{ouvrage-hermes}  
\bibliography{BibTeX database file}
```

where ouvrage-hermes [.bst] is the mandatory BibTeX bibliography style file (the style file is the same for all chapters) and where *BibTeX database file* [.bib] is the file name of the relevant BibTeX database file (the database file is not necessarily the same for all chapters).

In order to produce each bibliography section, the BibTeX program shall be run on each chapter file name.

1.8.3. *The index*

The use of MakeIndex with L^AT_EX is described in reports by Pehong Chen and Michael A. Harrison [CHE 88] and by Leslie Lamport [LAM 87]; this is also described, for instance, in the editions of the L^AT_EX “companion” (see [GOO 94, p. 345-357] and [MIT 04, p. 647-659]). The article by Chen and Harrison [CHE 88] is available as an electronic document coming with the MakeIndex distribution. Index preparation is a tedious and time-consuming task that is briefly addressed here.

1.8.3.1. *Index preparation*

The process successively involves the following steps:

- 1) load the `makeidx.sty` L^AT_EX style file. This step is already automatically done in the `ouvrage-hermes.cls` document class file;
- 2) put a `\makeindex` command in the preamble of the master L^AT_EX source file, before the `\begin{document}` statement;
- 3) put a `\printindex` command at the end of the master L^AT_EX source file, before the `\end{document}` statement;
- 4) put `\index` commands at appropriate locations in all L^AT_EX source files;
- 5) run the `MakelIndex` program on the master raw index file. For example, if the master L^AT_EX source file is `\langle master \rangle.tex`, run `MakelIndex` on `\langle master \rangle.idx` with the mandatory `ouvrage-hermes.ist` index style file.

However, the standard `MakelIndex` program that comes with every T_EX system distribution has the following shortcomings:

- 1) its support for non-English languages is rather weak; it is especially difficult to sort out words with (French, etc.) diacritical signs;
- 2) its output does not fully comply with the Hermes Science Publishing guidelines for indexes.

Here is a list of methods to solve the above difficulties:

- 1) use the standard `MakelIndex` program, but pay special attention to words with diacritical signs; for instance, here is the index entry for the French word *événement*:
`\index{evenement@événement};`
- 2) the designer of the `Ouvrage-Hermes` package (RR) has set up a pipeline-based system that successfully addresses all the above difficulties and successively involves the following steps:
 - a) pre-process the `\langle master \rangle.idx` raw index file produced by L^AT_EX. This step calls the included `makeindex-pre.awk` filter written in the AWK language, and requires the `awk` or `gawk` program (this program is available under Unix, GNU/Linux, *BSD, Mac OS X, and Microsoft Windows/Cygwin platforms),
 - b) run the standard `MakelIndex` program on the raw index file produced at step (a) with the mandatory `ouvrage-hermes.ist` index style file,
 - c) post-process the `\langle master \rangle.ind` index file produced at step (b). This step calls the included `makeindex-post.awk` filter written in the AWK language;
- 3) one of the authors of this document (CS) uses the `xindy` flexible indexing system [MIT 04, p. 666-679]. This program is available under Unix, GNU/Linux, OS/2, and Microsoft Windows platforms; it may be downloaded from the Comprehensive T_EX Archive Network mirrors (see <ftp://ftp.tex.ac.uk/tex-archive/support/xindy> for instance).

METHOD (1).— The standard MakeIndex program comes with every T_EX system distribution; the command line for method (1) above is as follows:

```
makeindex -c -l -s ouvrage-hermes.ist <master>.idx
```

METHOD (2).— The included Makeindex Bourne shell script automatically produces a compliant index file according to method (2) above. This script requires a Bourne-compatible shell (this program is available under Unix, GNU/Linux, *BSD, Mac OS X, and Microsoft Windows/Cygwin platforms). The command line for method (2) above is as follows:

```
Makeindex <master>.idx
```

METHOD (3).— See the second edition of the L^AT_EX “companion” by Frank Mittelbach *et al.* [MIT 04, p. 666-679].

1.8.3.2. The \index command

The index has at most two levels and its presentation may merge two or more letters if they are underrepresented; Figure 1.3 illustrates both features.

A	G, H
algebra 292	geometry 76
algorithm 155, 171	Gibbs (triangle of) 60, 180, 183, 189
@ sign 2	Goethe 18
...	history of color 23
	hyper-tetrahedron 85
	...
C	M
Cauchy lemma 101	macro-command 169, 230, 237, 292, 297,
theorem 39, 95, 153	302, 310
cécité 1	mixing 31, 268
color 33	blue/white 55
bright 19	chamber 86
cold 19	ternary 69, 151, 160, 181, 188, 235,
complementary 25, 49	245, 285
...	...

Figure 1.3. Excerpt from an index

The argument of an \index command contains the mandatory level 1 main entry, the optional level 2 subentry (*after* the “!” character), and the optional sort key (*before* the “@” character).

Examples of level 1 entries are (see Figure 1.3):

```
\index{algebra}
\index{at sign@\texttt{"@} sign}
\index{cecite@cécité}
```

If one uses method (2) above, index entries may be written with explicit diacritical signs (provided they use ISO-Latin 1 coding):

```
\index{cécité}
```

An example of level 2 index entry *without* any specific entry for the common word is (see Figure 1.3):

```
\index{Cauchy!lemma}
\index{Cauchy!theorem}
```

An example of level 2 index entry *with* a specific entry for the common word is (see Figure 1.3):

```
\index{color!}
\index{color!bright}
\index{color!cold}
\index{color!complementary}
```

1.8.3.3. How to merge letters in the index

If an initial letter is missing or is underrepresented, the Hermes guidelines mention that this letter and an adjacent one should be merged into one common initial (see for instance the “G, H” initial in Figure 1.3). In order to automatically produce the desired result, one should modify the included `makeindex-post.awk` filter (the use of this filter requires the `awk` or `gawk` program). For instance, the following AWK code merges the “G” and “H” initial letters:

```
/\mkidxletter{G}/{ gsub(/\{G\}/,"{G, H}") ; print $0 ; next }
/\mkidxletter{H}/{ next }
```

In order to disable this feature, it is sufficient to comment out the relevant code lines (with the “#” character). On the other hand, the following AWK code merges the “I”, “J”, and “K” initial letters:

```
/\mkidxletter{I}/{ gsub(/\{I\}/,"{I, J, K}") ; print $0 ; next }
/\mkidxletter{J}/{ next }
/\mkidxletter{K}/{ next }
```

1.9. Automatic typesetting procedure

Using BibTeX and MakeIndex with L^AT_EX requires a number of successive L^AT_EX, BibTeX, and MakeIndex runs in order to get cross-references right. Figure 1.4 illustrates all the command lines that are required in the case of a *monograph* (we assume that the master L^AT_EX source file is *⟨master⟩.tex*).

```
latex ⟨master⟩.tex
bibtex ⟨master⟩.aux
latex ⟨master⟩.tex
latex ⟨master⟩.tex
makeindex -c -l -s ouvrage-hermes.ist ⟨master⟩.idx
latex ⟨master⟩.tex
latex ⟨master⟩.tex
dvips -t a4 ⟨master⟩.dvi
```

Figure 1.4. *The typesetting procedure*

In the case of an *edited collection*, the BibTeX command line of Figure 1.4 shall be replaced by a BibTeX run on each chapter file name (the BibTeX program shall be run once on each chapter that possesses a bibliography section).

The Ouvrage-Hermes package includes a generic Makefile script that should be configured in order to drive the make program (this program is available under Unix, GNU/Linux, *BSD, Mac OS X, and Microsoft Windows/Cygwin platforms). The Makefile script automates the whole typesetting procedure.

Chapter 2

Other Specific Commands

This chapter describes the specific commands defined by the Ouvrage-Hermes package. These new commands have been introduced in order to comply with special Hermes Science Publishing guidelines. Of course, other standard \LaTeX commands may be used in the usual way, with the usual syntax and semantics.

2.1. Floating figures and tables

In order to comply with the Hermes guidelines, one should use the new *Figure* and *Table* environments, not the standard \LaTeX *figure* and *table* environments; the syntax is slightly different.

2.1.1. An environment for figures

All figures (namely, those produced directly by \LaTeX commands and those included with the `epsfig.sty` or `graphicx.sty` style file) shall be typeset with the new *Figure* environment.

SYNTAX.— The *Figure* syntax is as follows:

```
\begin{Figure}[\langle place \rangle]{\langle text \rangle \label{\langle ref \rangle}}  
  [\includegraphics[...]{...} or \epsfig{...} commands]  
\end{Figure}
```

Chapter written by Roger ROUSSEAU and Christian SCHEEN.

The arguments are as follows:

- $\langle place \rangle$ is the float placement specifier (“h” means *here if possible*, “t” means *top of page*, “b” means *bottom of page*, and “p” means *page of floats*);
- $\langle text \rangle$ is the complete text of the caption (if desired, one can use the `\` line-breaking command at appropriate places within $\langle text \rangle$);
- $\langle ref \rangle$ is the label internal key, for cross-references only. The `\label` command shall be stated as part of the mandatory argument of the opening declaration.

There exists a number of commands that are able to crop, shrink or enlarge, and include (encapsulated) PostScript figure files:

- `\epsfig` (from the `epsfig.sty` style file) is described in [GOO 94, p. 317-320], but may be considered obsolete;
- `\includegraphics` (from the `graphicx.sty` style file) is described in [MIT 04, p. 613-628]; it is strongly recommended.

EXAMPLE.— The following code produces Figure 2.1. It modifies the final height of the included figure; its width is computed automatically:

```
\begin{Figure}[!htbp]{<text>\label{figA}}
\includegraphics[height=175pt]{12.example-figure.eps}
\end{Figure}
```

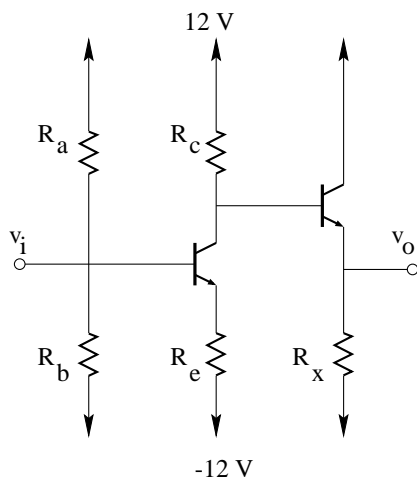


Figure 2.1. Short captions (width w such that $w < 36$ cm) are automatically centered on one, two, or three lines; the standard line-breaking command (namely, `\`) is available, but its use is optional. Long captions (width w such that $w \geq 36$ cm), like the present one, are automatically justified.

Users of the `epsfig.sty` style file might also want to use our `\EpsFigure` command. It adds two arguments to the aforementioned *Figure* environment: the first argument is the final height of the included figure; the second argument is the (EPS) file name. The following command produces the same result as the preceding code:

```
\EpsFigure[!htbp]{\text\label{figA}}%
{175pt}{12.example-figure.eps}
```

The final width of the included figure is computed automatically. If the height argument is empty, the original dimensions are used.

2.1.2. An environment for tables

Tables are typeset, as usual, with the *tabular*, *tabular**, *tabularx*, and *array* L^AT_EX standard environments. Table structures shall then be placed inside our *Table* environment: it takes care of the required font size and sets the line thickness to 0.25 pt.

SYNTAX.— The *Table* syntax is as follows:

```
\begin{Table}[\langle place \rangle]{\langle text \rangle\label{\langle ref \rangle}}
[table construction (with tabular, etc. environments)]
\end{Table}
```

where the float placement specifier *place*, the complete text of the caption *text*, and the label internal key *ref* are used as in the case of a figure (see paragraph 2.1.1).

2.2. Special insets

2.2.1. Comments, examples, notes, and similar insets

Comments, examples, and notes shall be typeset with our `\Remark{\text}`, `\Example{\text}`, and `\Note{\text}` commands; their mandatory argument *text* holds the text of the comment, example, or note. Other similar insets shall use the `\GenericRemark{\keyword}{\text}` command.

SYNTAX.— In order to typeset this “syntax” inset, the following command with appropriate *text* argument shall be used:

```
\GenericRemark{Syntax}{\text}
```

All these insets may contain several paragraphs; the vertical skip between paragraphs is adjusted automatically. Users who would rather typeset *environments* (and

not *commands*) may use the *Remarks*, *Examples*, and *Notes* environments (paying special attention to the final letter “s”).

SYNTAX.— The *Remarks* syntax is as follows:

```
\begin{Remarks}
  \textit{paragraphs separated by blank lines}
\end{Remarks}
```

COMMENT.— Command names (`\Remark` and `\GenericRemark`) and environment names (*Remarks*) have been chosen so as to be unambiguous and compatible with the classical notion of a *commented code* in the T_EX/L^AT_EX sense.

2.2.2. Definitions, theorems, lemmas, and similar insets

Definitions, theorems, and lemmas shall be typeset with `\Definition{<text>}`, `\Theorem{<text>}`, and `\Lemma{<text>}` commands; their mandatory argument `<text>` holds the text of the definition, theorem, or lemma (the text is automatically typeset in italic shape). These insets are generally rather short; for this reason, environment-based counterparts are not provided. Other similar insets shall use the `\GenericDefinition{<keyword>}{<text>}` command.

AXIOM.— In order to typeset this “axiom” inset, the following command with appropriate `<text>` argument shall be used:

```
\GenericDefinition{Axiom}{<text>}
```

If one wishes to typeset several similar insets (for instance, several axioms), one should define a new command (for instance, the `\Axiom` command) in the preamble of the master L^AT_EX source file (next, any `\Axiom{<text>}` command will produce the desired effect); for instance:

```
\newcommand{\Axiom}[1]{\GenericDefinition{Axiom}{#1}}
```

If one wishes to equip definitions, theorems, or lemmas with an automatic numbering, one should proceed according to the following example in the preamble of the master L^AT_EX source file:

```
\newcounter{statement}[chapter]
\renewcommand{\thestatement}{\thechapter.\arabic{statement}}
\newcommand{\NumberedStatement}[1]{%
  \refstepcounter{statement}%
  \GenericDefinition{Statement~\thestatement{}}{#1}}
```

STATEMENT 2.1.— *The cross-references mechanism is available within numbered insets owing to the usual \LaTeX commands, namely `\label{<ref>}` and `\ref{<ref>}`.*

STATEMENT 2.2.— *Statement 2.2 proves Statement 2.1.*

2.2.3. Quotes

The standard \LaTeX environment for extended quotes, namely `quote`, has been redefined; it automatically produces appropriate vertical skips, but its use remains standard.

2.3. The optional form for the Hermes office

The `\Publisher` command is optional; it should be placed at the end of the book (after the index), where it will bring together some information (phone `<phone>`, fax `<fax>`, and email `<email>` of the book director, and various typesetting data) intended for the Hermes office.

SYNTAX.— The `\Publisher` syntax is as follows:

```
\Publisher{<phone>}{<fax>}{<email>}
```

2.4. Exponents, indices, and numberings

Mathematical exponents and mathematical indices are typeset, of course, in mathematical mode. For instance, the Ricci curvature tensor is written as $R^\beta_\delta \equiv R^{\mu\beta}_{\mu\delta}$ with the following code:

```
$R^{\beta}_{\delta} \equiv R^{\mu\beta}_{\mu\delta}$
```

Textual exponents shall be typeset with the `\up` command and textual indices shall be typeset with the `\down` command; examples are as follows:

- the code “`1\up{st}`” produces “1st”,
- the code “`H\down{2}SO\down{4}`” produces “H₂SO₄”.

Numberings shall be typeset with various commands that are defined by the `babel.sty` style file¹.

1. The `ouvrage-hermes.cls` document class automatically loads the `babel.sty` style file with the required style options.

Some examples are as follows:

- the code “`\no{\}~2`” produces “n° 2”,
- the code “`\No{\}~2`” produces “N° 2”,
- the code “`1\ier{\}`” produces “1^{er}”,
- the code “`2\ieme{\}`” produces “2^e”,
- etc.

2.5. Specific control commands

2.5.1. Controlling the page-breaking mechanism

Under rare problematic circumstances, it might be useful to enlarge specific pages by one or two lines and/or to force page breaks in order to coerce the \LaTeX typesetting engine into producing the desired presentation; \LaTeX commands `\enlargethispage` and `\pagebreak` would come in very handy in such a case.

The `ouvrage-hermes.cls` document class introduces two more commands that are arguably easier to use:

- the `\DelayNewPage{<number>}` command enlarges the current page by a number of lines equal to its mandatory argument *<number>*. Sensible values are *<number>* = 1 and *<number>* = 2;
- the `\ForceNewPage` command forces a page break at its location in the source code. It does not indent text at the start of the next page.

2.5.2. Controlling displayed mathematics

Numbered formulas are typeset by the usual *equation* and *eqnarray* \LaTeX environments. They automatically produce the required type of numbering (see the example of the Painlevé VI equation [2.1]).

Many long formulas need at least one possible break point and an associated line-breaking decision. The `\EqnCont` basic command may be used at any appropriate break point, within the *eqnarray* environment:

$$\begin{aligned} \frac{d^2u}{dx^2} = & \frac{1}{2} \left[\frac{1}{u} + \frac{1}{u-1} + \frac{1}{u-x} \right] \left(\frac{du}{dx} \right)^2 - \left[\frac{1}{x} + \frac{1}{x-1} + \frac{1}{u-x} \right] \frac{du}{dx} \\ & + \frac{u(u-1)(u-x)}{x^2(x-1)^2} \left[\alpha + \frac{\beta x}{u^2} + \frac{\gamma(x-1)}{(u-1)^2} + \frac{\delta x(x-1)}{(u-x)^2} \right] \quad [2.1] \end{aligned}$$

This equation corresponds to the following code (it uses the `\EqnCont` command in order to split the right-hand side and it aligns both sides with ampersands):

```
\begin{eqnarray}
\frac{\mathrm{d}^2 u}{\mathrm{d} x^2}
&= & \frac{1}{2}
&\quad \left[ \frac{1}{u} + \frac{1}{u-1} + \frac{1}{u-x} \right]
&\quad \left( \frac{\mathrm{d} u}{\mathrm{d} x} \right)^2
&- \left[ \frac{1}{x} + \frac{1}{x-1} + \frac{1}{u-x} \right]
&\quad \frac{\mathrm{d} u}{\mathrm{d} x} \frac{\mathrm{d} x}{\mathrm{d} u} \EqnCont
& & {} + \frac{u(u-1)(u-x)}{x^2(x-1)^2}
&\quad \left[ \alpha
&\quad + \frac{\beta x}{u^2}
&\quad + \frac{\gamma (x-1)}{(u-1)^2}
&\quad + \frac{\delta x (x-1)}{(u-x)^2}
&\right] \label{eqn:P-VI}
\end{eqnarray}
```

2.5.3. Controlling the table of contents

The table of contents is produced automatically. However, it is sometimes necessary to add further information into the table of contents. Any direct hand-editing of the table of contents would of course be ill-advised: \LaTeX refreshes the `<master>.toc` file each time it is run. The solution is to use the new `\AddToContents` command inside the source file itself: this ensures that these adjustments are automatically taken into account.

SYNTAX.— The `\AddToContents` syntax is as follows:

```
\AddToContents{<level>}{<indent>}{<text>}
```

where:

- `<level>` is the numerical level of the corresponding sectioning command (see Table 1.1 on page 14 for details, especially column 2);
- `<indent>` is a dimension corresponding to the total indentation from the left margin;
- `<text>` is the complete text that should appear in the table of contents. Fragile commands must be protected with the `\protect` command.

EXAMPLE.— Here is an example for the `\AddToContents` command:

```
\AddToContents{2}{10mm}{Further information}
```

2.5.4. Controlling overruns

The generated `<master>.log` transcript file provides users with some valuable information dealing with the typesetting process. One important information deals

with underfull and overfull horizontal (`\hbox`) and vertical (`\vbox`) boxes. Underfull boxes are characterized by a “badness” number; overfull boxes are much more serious and are associated with the value of the overrun in points ($1\text{ pt} = \frac{1}{72.27}\text{ in} \approx 0.351\text{ mm}$). It is possible to visualize the overruns:

- the `cropmarks` class option (see section 1.3) draws the page limits and the text borders; this allows one to assess overruns. This class option acts at the level of the whole book;
- the `\CropMarksOn` and `\CropMarksOff` commands respectively activate and disable the crop marks plotting. These commands act at the local (page) level.

2.5.5. Controlling footnote rules

As far as footnote rules are concerned, the Hermes Science Publishing guidelines are as follows:

- at the *start* of footnotes, the width of the footnote rule is equal to 25 mm (default value);
- whenever a footnote extends over more than one single page, the width of the *continuation* footnote rule is equal to 120 mm (exceptional value). Of course, the setting must be back to normal (25 mm) as soon as the long footnote is over.

The `ouvrage-hermes.cls` document class sets the default width of footnote rules to 25 mm. The `\LargeFnRule` command shall be used whenever a footnote extends over more than one single page; this command must be located in the page where the footnote *continues* (not where the footnote *starts*²). Moreover, the `\SmallFnRule` command shall be used as soon as the long footnote is over (on the next page); this command brings the setting back to normal.

2. In order to illustrate the point being made here, the `\LargeFnRule` command has been used on the current page even though this is not necessary (the footnote starts and ends on the same page).

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Index

`\AddToContents`, 11, 33
`allpages` (class option), 16
ampersand, 33
`\and`, 20
`\appendix`, 17, 18, 20
`\Apr`, 21
`array`, 29
`\Aug`, 21
`\author`, 15, 17
`awk` (program), 23, 25
`babel.sty`, 31
back matter, 21
`\backmatter`, 14, 17, 18
`\\`, 17, 19, 28
`\begin{document}`, 15, 18
bibliography, 21
`\bibliography`, 18, 22
`\bibliographystyle`, 22
`BibTeX` (program), 22, 25, 26
book (definition), 13
box, 34
caption text, 28
`\chapter`, 14, 19, 20
`\chapter*`, 14, 19
`\ChapterAuthor`, 10, 11, 20
`chapterbib.sty`, 22
class option, 15
`cropmarks` (class option), 16, 34
`\CropMarksOff`, 11, 34
`\CropMarksOn`, 11, 34
`\date`, 15, 17
date (`BibTeX` entry field), 21
`\Dec`, 21
`\def`, 17
`\Definition`, 10, 11, 30
`\DelayNewPage`, 10, 11, 32
displayed mathematics, 32
document, 15, 18
document body, 17
`\documentclass`, 15
`\down`, 31
`dvips` (driver), 26
edited collection (definition), 13, 14
`\end{document}`, 15, 18
english (class option), 16
`\enlargethispage`, 32
`\epsfig`, 27, 28
`epsfig.sty`, 27, 28
`\EpsFigure`, 28
eqnarray, 32
`\EqnCont`, 10, 11, 32, 33
equation, 32
`\Example`, 10, 11, 29
Examples, 10, 11, 29
exponent, 31
 mathematical, 31
 textual, 31
`\Feb`, 21
Figure, 10, 11, 27, 28
figure, 27
float placement specifier, 28
footnote rule, 34
`\ForceNewPage`, 10, 11, 32
front matter, 19

`\frontmatter`, 14, 17, 18
`gawk` (program), 23, 25
`\GenericDefinition`, 10, 11, 30
`\GenericRemark`, 10, 11, 29
 glossary, 21
`graphicx.sty`, 27, 28
`\hbox`, 34
`hsp-monograph.ltx`, 18
`hsp-treatise.ltx`, 18
`\ieme`, 32
`\ier`, 32
`\include`, 17, 18, 20, 22
`\includegraphics`, 27, 28
 index, 31
 mathematical, 31
 textual, 31
`\index`, 23–25
`inproceedings` (BibTeX entry type), 21
`\input`, 17, 20, 22
`\Jan`, 21
`\Jul`, 21
`\Jun`, 21
`\label`, 27, 28, 30
 label internal key, 28
`\LargeFnRule`, 11, 34
 L^AT_EX preamble, 16
`\Lemma`, 10, 11, 30
 main matter, 19
`\mainmatter`, 14, 17, 18
`make` (program), 25
`Makefile` (script), 9, 25
`makeidx.sty`, 23
`\makeindex`, 15, 23
`MakeIndex` (program), 23–26
`Makeindex` (script), 9, 24
`makeindex-post.awk`, 9, 23, 25
`makeindex-pre.awk`, 9, 23
`\maketitle`, 18
`\Mar`, 21
 master L^AT_EX source file, 15
`\May`, 21
 monograph (definition), 13
`month` (BibTeX entry field), 21
`\Name`, 10, 11, 17, 20
`\newcommand`, 15, 17
`\newenvironment`, 15, 17
`\No`, 32
`\no`, 32
`\Note`, 10, 11, 29
Notes, 10, 11, 29
`\Nov`, 21
 numbering, 31
`\Oct`, 21
`ouvrage-hermes.bst`, 9, 21, 22
`ouvrage-hermes.cls`, 9
`ouvrage-hermes.ist`, 9, 23, 24, 26
 overfull box, 34
 overrun, 33
 page break, 32
`\pagebreak`, 32
`\paragraph`, 14
`\part`, 14, 18, 19
 point (unit), 34
 preamble, 16
`\PresentationOfAuthors`, 10, 11, 20
`\printindex`, 18, 23
`\protect`, 33
`\Publisher`, 10, 11, 18, 31
quote, 30
`\ref`, 30
`\Remark`, 10, 11, 29
Remarks, 10, 11, 29
`\section`, 14
`\selectlanguage`, 16
`\Sep`, 21
`\setcounter`, 19
`\SmallFnRule`, 11, 34
`\subparagraph`, 14
`\subsection`, 14
`\subsubsection`, 14
Table, 10, 11, 27, 29
table, 27
 table of contents, 33
`\tableofcontents`, 18, 19
tabular, 29
*tabular**, 29
tabularx, 29
`\Theorem`, 10, 11, 30
`\title`, 15, 17
`tocdepth` (counter), 19
treatise (class option), 16
 typographic convention, 8
 underfull box, 34
`\up`, 31

`\usepackage`, 15, 16
`\vbox`, 34
`xindy` (program), 23

`year` (Bib_T_EX entry field), 21