HyperText Documents with LaTeX 2ε V4.2d

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Contents

HyperLaTeX 2ε

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1 Introduction

Traditional texts only have a linear structure given by its series of characters. But this is not sufficient for any kind of documents one may think of. Thus, recently the number of documents using a more complex graphical structure (called "hyper text" documents) have increased.

This package provides the generation of such documents based on the already given structure of LaTeX 2ε-documents without the document writer having to consider new commands.

2 Usage

Just insert `\usepackage{hyper}` in the preamble of your LaTeX2e–document as the last package to be loaded.

If you use the theorem package define the theorems via `\newtheorem` after inserting the hyper package.

You may also give some options for the package, i.e. instead of the command above you may use `\usepackage[<option list>]{hyper}` in your preamble.

Currently the following options are known:

- `yes`, `no` determine whether the hypertext marks are inserted or not (default is `yes`)
- `fixhyperbox` modifies the position of the html-marks in the `dvi`-file so that `dvips` creates the right bounding boxes for the hyper references; it is highly recommended to use this option (though for compatibility reasons with earlier versions this is not the default setting); note, that the text of the reference is packed into a horizontal box (`\hbox`) due to the need of measuring its size
- `black`, `gray`, `color` determine the colors anchors and references are printed in (default is `black`);
  the colors can be changed by `\definecolor{refcolor}{rgb}{`r,g,b`}` for references, `\definecolor{undefrefcolor}{rgb}{`r,g,b`}` for unresolved references, and `\definecolor{anchorcolor}{rgb}{`r,g,b`}` for anchors where

r, *g*, *b* stand for the red, green, and blue, respectively, values (between 0.0 and 1.0) of the color (cf. `graphics` package)

- `pagenumber`, `pagetop` determine whether a page number refers to the page number of the respectively page or to the top of the page
- `indexcmds` has to be given explicitely whenever an index or glossary file has been created using this package if the file is not regenerated using the commands `\makeindex` and `\makeglossary`, respectively.
- `backcitepages`, `backcitesections` introduce back references from the bibliography to the pages and sections, respectively, they have been cited in
- `amsart`, `amsbook`, `amsdtx`, `amsldoc`, `amsproc`, `article`, `book`, `cweb`, `letter`, `ltxdoc`, `ltxguide`, `ltnews`, `proc`, `report`, `slides` determine the document class for which the modifications are loaded (default is the document class given via `\documentclass` if it can be derived)
- `leqno` adds modifications for the document class option `leqno` (will be used automagically for known document classes)
- `amsmath`, `amstex`, `amsthm`, `doc`, `fancyheadings`, `ftnright`, `longtable`, `natbib`, `subeqnarray`, `theorem`, `upref` add modifications for the corresponding package (will be used automagically)
- `xr` add modifications for the package `xr` and redefine it's internal macro `\externaldocument` addint a new parameter determining the URL–address of the document for the cross references used (will be used automagically)
- `harvard` add modifications for the respectively packages that are part of the distribution but provided by other authors
- `<other>` add a modification file `<other>.hyp` that has to be provided by yourself

3 Macros Provided

The following macros are defined by the package and may be used:

- `\hyperanchor#1#2` lets `#1` being the hypertext anchor for `#2` (`#1` may neither be a natural number nor beginning with `page.` or `fn.`)
- `\blindhyperanchor#1` lets `#1` being a hypertext anchor (`#1` may neither be a natural number nor beginning with `page.` or `fn.`)
- `\hyperreference#1#2` lets `#2` being a hypertext reference to the anchor `#1`, (`#1` may not start with a `[`)
- `\hyperURL#1#2#3#4` lets `#4` being a hypertext reference to an external URL with type `#1`, domain `#2`, and document `#3`, i.e. to the URL `#1://#2/#3`

- `\labeltext#1#2` lets `#1` being the hypertext capable (LaTeX 2_ε) reference to the text `#2` and prints `#2`
- `\noref[#1]#2` lets `#1` being a hypertext reference to the anchor defined by the LaTeX 2_εreference `#2` without printing the reference (`#1` is not optional!)
- `\ref[#1]#2` is the same as LaTeX 2_ε's original `#1~\ref{#2}` except that the hypertext reference is provided from the complete `#1~\ref{#2}` instead of `\ref{#2}` only
- `\pageref[#1]#2` is the same as `\ref` except that we get a reference to the page number
- `\refcurrent#1` lets `#1` being a hypertext reference to the last numerical anchor that has been generated
- `\refnext#1` lets `#1` being a hypertext reference to the next numerical anchor that will be generated

The following macros are redefined when using the corresponding packages:

- for `xr`:
  - `\externaldocument(#1)[#2]#3`, `\externaldocument[#1](#2)#3` are equivalent to the original `\externaldocument` of the `xr`–package except for the additional parameter surrounded by `()` determining the URL–address of the external document (the URL–type `file:` is added automagically) (default is `#3.dvi`)

The following macros are provided when using the option `backcitepages` or `backcitesections` (definitions show default value):

- `\def\hyperbackcitepage{Cited on page~}` is the text preceeding a back reference to a single page number.
- `\def\hyperbackcitepages{Cited on pages~}` is the text preceeding a back reference to multiple page numbers.
- `\def\hyperbackcitesection{Cited in~}` is the text preceeding a back reference to a single section reference.
- `\def\hyperbackcitesections{Cited in~}` is the text preceeding a back reference to multiple section references.
- `\def\hyperbackcitenormalseparator{, }` is the text between two page numbers or section references (except for the last pair).
- `\def\hyperbackcitefinalseparatorpair{ and~}` is the text between the page numbers or section references if there are exactly two entries.
- `\def\hyperbackcitefinalseparatorlist{, and~}` is the text between the last pair page numbers or section references if there are more than two entries.

4 Viewing HyperLaTeX 2ε–documents

There are several methods that can be used to view the dvi–documents with html–marks resulting from using this package.

- For UNIX™–systems with the graphical user interface `X` there is a modification of `xdvi` called `xhdvi` available at any CTAN-site.
- For systems running under NeXTSTEP™ there exists a HyperTeX-capable modification of `TeXview`, called `HyperTeXview`.
- There exists a variant of `dvips` (called `dvihps`) translating hyperdvi–files to hyperps–files containing the html–marks when using the parameter `-z`. (`emtex` provides this feature with `dvips`).

  The resulting files can be viewed using a HyperPS-capable Postscript-viewer, (e.g. a hacked version of `ghostview` (for UNIX™) or the actual `gsview` (for Windows™))
- Another way is to use `dvihps` to get a HyperPS–file ready to be handled by the Acrobat™–distiller available from Adobe or by ghostscript's `pdfwriter`–output–device which both can translate hyperps–files to `pdf`–files that can be viewed using an Acrobat™–reader or any other `pdf`–reader.

5 Bugs

Currently there are only a few known problems. Unfortunately they cannot be avoided. You have to care about this:

- If you write your bibliographies with the `thebibliograpy`-environment by hand (not using bibtex) you may get an error message due to a command not matching its definition. This can be avoided by providing an empty line or a `\par` command at the end of each bibliographic entry (with `\bibitem`) including the last entry before `\end{thebibliography}`.
- If you include an index or glossary file into the current document you may get a message from LaTeX like `Undefined control sequence. ... \hyperpage`. This is due to you not using `\makeindex` or `\makeglossary` in the preamble. In this case just add the package option `indexcmds` when loading the hyper–package.
- In indexing commands you can't use `]` without surrounding braces. If you do, TeX will parse the command in a wrong way. To get the sorting of the index right you therefore should use `\index{A[zzzzB@A{]}B}` instead of `\index{A]B}`.
- Similarly, a protected |, i.e. `"|` is not handled correctly. Use a similar method as above to circumnavigate this problem.

There is another problem in connection with (a html-capable) `dvips` and paper formats different from `letter`. Apparently the positions for the `html`-specials are not computed correctly. The package provides a perl-script that allows to modify the positions of these specials. When using e.g. a4paper you have to call `perl dvi2pdf.pl -z "-s0,50" -nopdf <normal parameters to dvips>` to create an appropriate ps-file. Note, that the script `dvi2pdf.pl` has to be configured and has only been tested on a Windows™ system.

Other problems are not known so far. But surely there are some (otherwise the history would not be already that long). Thus, if you detect one please report it with the package version and a small example to

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6 Related Work, Acknowledgement

Sebastian Rahtz has written another package for adding HyperText–capabilities to LaTeX. His package `hyperref` has been developed in parallel with this one and uses a slightly different realization for getting similar results. Some of the ideas found there have been added to this package, too. Thus, I have to give a special thank to him.

Thanks also to Ulrich Fuchs for further suggestions.

7 History

When	By	What	V
1998/10/29	Michael Mehlich	fixed macro name for `amsthm`	4.2d
1998/10/28	Michael Mehlich	corrected problem with wrong references produced	4.2c
1997/09/22	Michael Mehlich	corrected problem with `\uppercase` and `\lowercase` in internally used names	4.2b
1997/09/15	Michael Mehlich	corrected problem with `\noalign` in `eqnarray` environment	4.2a
1997/08/28	Michael Mehlich	corrected definition of new hyper anchor name to appear only locally within `\labeltext` redefined `\label` for `amstex.sty` added support for package `subeqnarray`	4.2
1997/08/24	Michael Mehlich	reduced problems when adding or removing the `hyper`-package patched around problem in interaction of option `fixhyperbox` with `dvips` problem with undefined hyper references when using cross references provided by the package `xr` resolved	4.1
1997/07/14	Michael Mehlich	corrected bug when creating cross-references between documents (bug was introduced when introducing resolution of nested html-marks)	4.0h
1997/05/28	Michael Mehlich	ensured hyper references for footnotes being created even if footnote is moved to the next page (but not further) corrected marks introduced by the index environment `\theindex` in the classes `report` and `book` changed mechanism for change flags	4.0g
1997/05/07	Michael Mehlich	redirected output for special hyper informations to main auxiliary file	4.0f
1997/04/25	Michael Mehlich	changed catcodes for reading the parameters of `\hyperURL`	4.0e
1997/04/17	Michael Mehlich	resolved some problem with the `cweb`-package modifications	4.0d
1997/03/25	Michael Mehlich	resolved problem with wrong footnote references when using package `footnpag` (this also corrects the former wrong naming of anchors for footnotes)	4.0c
1997/03/21	Michael Mehlich	removed bug in interaction of package with 8`web`'s chunk naming mechanism	4.0b

When	By	What	V
1997/03/08	Michael Mehlich	added color for external URL added by `\hyperURL`	4.0a
1997/03/01	Michael Mehlich	added check for anchor existing before introducing reference to it added check whether the anchors have changed beween two LaTeX 2_ε runs added handling of nested html-marks by unnesting (shit, this conflicts with the option `fixhyperbox`) added option `fixhyperbox` changed creation of anchor names for footnotes due to illegal names and duplicated names in the old version improved extension package `backcites` added handling of sorted citations for package `natbib` changed macros for package `natbib` added support for common package `fancyheadings` (this was needed for handling page references to page numbers when creating pages with empty headers and footers) modified header and footer modification for inserting appropriate anchors and references	4.0
1997/02/03	Michael Mehlich	allow `\makeindex` and `\makeglossary` to appear after including the package corrected mishandling of `pagetop` changed colors for references and anchors added documentation about how to change colors for colored references and anchors	3.0c
1997/01/12	Michael Mehlich	corrected problem with loop occurring on even pages	3.0b
1996/11/01	Michael Mehlich	corrected problem with empty headings causing an overful hbox bug of having two page anchors on empty pages in case of `pagetop` removed adapted to current version of `natbib`	3.0a

When	By	What	V
1996/10/26	Michael Mehlich	added code for bibliographic references with `natbib` added possibility of let pagelinks go to the top of the page	3.0
1996/10/21	Michael Mehlich	corrected problem with empty page style	2.8a
1996/01/07	Michael Mehlich	adapted to current version of latex	2.8
1995/12/19	Michael Mehlich	adapted to current version of the cweb–package	2.7b
1995/10/22	Michael Mehlich	made reference commands robust	2.7a
1995/09/24	Michael Mehlich	added support for the CWEB document class	2.7
1995/07/13	Michael Mehlich	`\hyper @next` changed to `\fragilerefnext` to avoid problems when writing the command into the `.toc`–file	2.6a
1995/07/06	Michael Mehlich	`\hyperbackcite` occurred mistakenly in each file bug fix in redefinition of `theindex`-environment in `doc.hyp` handling of footnotes corrected modified `\@xeqncr` instead of `\@eqncr` adapted redefinition of captions for `longtable` to current version of `longtable`	2.6
1995/07/04	Michael Mehlich	correction of optional parameter of \\ in eqnarray–environment mistakenly ignored	2.5d
1995/06/14	Michael Mehlich	corrected `\hyper @oddfoot`	2.5c
1995/05/29	Michael Mehlich	added support for contribution `harvard.hyp`, changed automatical uploading of packages to conditional uploading (tests if the package really exists)	2.5b
1995/05/23	Michael Mehlich	changed wrong page numbers for certain document classes	2.5a
1995/05/10	Michael Mehlich	added support for backcites	2.5
1995/05/08	Michael Mehlich	internal handling of references to pages simplified bug in `xr.hyp` fixed anchor on empty pages added	2.4c
1995/05/07	Michael Mehlich	let `\item` accept `]` in optional argument	2.4b

When	By	What	V
1995/04/20	Michael Mehlich	added new option `indexcmds`	2.4a
1995/04/20	Michael Mehlich	added support for `amstex`	2.4
1995/04/18	Michael Mehlich	corrected bug in index (reported by Ulrich Fuchs)	2.3a
1995/02/12	Michael Mehlich	support for package `xr` added handling of options improved	2.3
1995/02/11	Michael Mehlich	definition of `\label` corrected (bug introduced at 1995/01/31)	2.2b
1995/02/02	Michael Mehlich	macros for `amsthm` changed according to new definition in amslatex	2.2a
1995/02/01	Michael Mehlich	support for package `amslatex` added support for package `longtable` added	2.2
1995/01/31	Michael Mehlich	support for package `theorem` added catcodes of `|`, `@`, and `!` for parsing the parameters of `\index` and `\glossary` changed `\@makecaption` modified hypertext references in `eqnarray` corrected redefinition of `\label` changed	2.1
1995/01/30	Michael Mehlich	handling of series of page numbers for index/glossary added `\protected @write` stopped from inserting an extra space	2.0b
1995/01/29	Michael Mehlich	references from headers to sections for bibliography, index, glossary, and table of contents added	2.0a
1995/01/26	Michael Mehlich	options to be handled are determined automagically now protected the anchor and reference adding macros instead of `"` some internal algorithms changed some macro–names changed	2.0
1995/01/25	Michael Mehlich	handling of index and glossary added	1.3
1995/01/24	Michael Mehlich	handling of options changed color support for anchors and references added	1.2
1995/01/24	Michael Mehlich	`\noref` added bug in writing wrong page numbers to auxiliary files removed	1.1
1995/01/20	Michael Mehlich	protected `"` for compatibility with the package `german.sty`	1.0g
1995/01/12	Michael Mehlich	first official version	1.0

8 The Realization

8.1 The Package Header

We need a version of LaTeX2e dated with June 1, 1995 or newer. Thus, we just demand it.

```
⟨*hyper⟩
\NeedsTeXFormat{LaTeX2e}[1995/12/01]
```

Now we have to introduce ourself.

```
\ProvidesPackage{hyper}[\filedate\space HyperLaTeX2e extension]
```

8.2 Special Characters

First of all let us reserve some characters which are important and are not preserved by every other package.

```
\bgroup
  \catcode`\!00\relax
  \catcode`\"12\relax
  !catcode`!\12!relax
  !gdef!hyper@quote{"}
  !gdef!hyper@backslash{\}
  !global!edef!hyper@hash{!string#}
  !global!edef!hyper@tilde{!string~}
!egroup
```

For compatibility with other packages this may need to be extended. But for now we suppose this being sufficient.

8.3 The Basic Anchor/Reference-Entries

Let us set the output channel for special hyper informations first.

```
\AtBeginDocument{\let\hyper@auxout\@auxout}
```

We have to define some macros that allow us to insert the hypertext marks for anchors and references into the resulting dvi-file. This can be done by using the `\special`–macro.
But before introducing them, we need some auxiliaries that allow us to write the hyper anchors to the auxiliary file and reread them at program start. This way we can check, whether we use a reference to an existing anchor; thus we can avoid introducing invalid references. This mechanism can additionally be used to check whether the hyper anchors may have changed between two LaTeX 2_ε runs.
This is also a good place to recheck whether there have been some undefined or multiply defined hyper anchors or forwarded references used in hyper references.

```
\newcount\hyper@changed
\global\hyper@changed=0
\newcount\hyper@cnt%careful, this is used as a temporary counter in various places
\def\hyper@change#1{%set change value (powers of 2 only), in use: 1,2,4,8
  \hyper@cnt\hyper@changed\relax%
```

```
  \divide\hyper@cnt#1\relax%
  \ifodd\hyper@cnt\else%
     \global\advance\hyper@changed#1\relax%
  \fi%
}
\def\newhyper#1#2{%
  \bgroup%
     \def\uppercase{<UPPERCASE>}%
     \def\lowercase{<LOWERCASE>}%
     \expandafter\ifx\csname hyper@#1\endcsname\relax\else%
        \hyper@change2\relax%
        \PackageWarningNoLine{hyper}%
                     {Hyper anchor #1 multiply defined}%
     \fi%
     \expandafter\global\expandafter\def\csname hyper@#1\endcsname{#2}%
  \egroup%
}
\def\newhyper@check#1#2{%
   \def\reserved@a{#2}%
  \bgroup%
     \def\uppercase{<UPPERCASE>}%
     \def\lowercase{<LOWERCASE>}%
     \expandafter\ifx\csname hyper@#1\endcsname\reserved@a\else%
       \expandafter\ifx\csname hyper@new@#1\endcsname\reserved@a\else%
          \global\hyper@change4\relax%
        \fi%
     \fi%
  \egroup%
}
\let\hyper@enddocument\enddocument
\def\hyper@check@end{%
  \ifodd\hyper@changed%1
     \PackageWarningNoLine{hyper}{There were undefined hyper references}%
  \fi%
  \divide\hyper@changed2\relax%
  \ifodd\hyper@changed%2
     \PackageWarningNoLine{hyper}%
          {There were multiply defined hyper anchors}%
  \fi%
  \divide\hyper@changed2\relax%
  \ifodd\hyper@changed%4
     \PackageWarningNoLine{hyper}%
          {Hyper anchor(s) may have changed.\MessageBreak
           Rerun to get hyper references right}%
  \fi%
  \divide\hyper@changed2\relax%
  \ifodd\hyper@changed%8
     \PackageWarningNoLine{hyper}%
          {Footnote hyper reference(s) may have been forwarded\MessageBreak
             to next page.\MessageBreak
```

```
          Check result to ensure this being correct.\MessageBreak
          If not rerun to get footnote hyper references right}%
  \fi%
}
\def\enddocument{%
  \let\hyper@@end\@@end%
  \def\@@end{\hyper@check@end\hyper@@end}%
  \let\newhyper\newhyper@check%
  \hyper@enddocument%
}
\def\hyper@to@aux#1{%
  \bgroup%
     \def\uppercase{<UPPERCASE>}%
     \def\lowercase{<LOWERCASE>}%
     \expandafter\ifx\csname hyper@#1\endcsname\relax%
        \expandafter\ifx\csname hyper@new@#1\endcsname\relax%
           \expandafter\global%
             \expandafter\expandafter\expandafter\def\csname hyper@new@#1\endcsname%
                 {{\@currentlabel}{\thepage}}%
        \fi%
     \fi%
     \@bsphack%
        \protected@write%
           \hyper@auxout%
             {}%
             {\string\newhyper%
               {#1}%
               {{\@currentlabel}{\thepage}}%
             }%
     \@esphack%
   \egroup%
}
```

The macros `\hyperreference` `\hyperpagereference` and insert a html-reference to an internal label except when the first parameter begins with `[`. Then the parameter must have the form `[#1][#2]` where `#1` is an external URL and `#2` an anchor within this URL. This is used when generating cross references between documents.

The whole stuff is complicated by two problems: We have to avoid nesting of the html-markups in the dvi-file and we have to tell `dvips` about the right dimension of the box by modifying the positions of the specials from which `dvips` gets the bounding box for a hyper reference (The latter one is optionally done when passing the corresponding parameter to the package).

```
\newbox\hyper@box@text
\newbox\hyper@box@ref
\newdimen\hyper@fixdim
\newif\if@hyper@is@active
\@hyper@is@activefalse
\def\hyper@html{html:}
```

```
\bgroup
  \catcode`\<12\catcode`\>12\relax%
  \catcode`\:12\catcode`\=12\catcode`\/12\relax%
  \gdef\hyper{%
    \def\hyper@unnested@special##1##2##3{%
       \special{\hyper@html##1}##3\special{\hyper@html##2}%
    }%
    \def\hyper@unnested@special@anchor@nofix##1##2##3{%
       \special{\hyper@html##1}\hyper@anchor@color{##3}\special{\hyper@html##2}%
    }%
    \def\hyper@unnested@special@reference@nofix##1##2##3{%
       \special{\hyper@html##1}\hyper@ref@color{##3}\special{\hyper@html##2}%
    }%
    \def\hyper@unnested@special##1##2{%
       \hyper@fixdim\ht\hyper@box@text%
       \advance\hyper@fixdim\dp\hyper@box@text%
       \advance\hyper@fixdim-8pt%
       \setbox\hyper@box@ref=\hbox{%
          \parindent0pt\leftskip0pt\rightskip0pt%
          \leftmargin0pt\rightmargin\wd\hyper@box@text\advance\rightmargin0.5pt%
          \linewidth\rightmargin\textwidth\rightmargin%
          \noindent\vbox{%
             \hrule height \hyper@fixdim width 0pt%
             \special{\hyper@html##1}\hbox to\linewidth{\hfill}%
             \hrule height -\hyper@fixdim width 0pt%
             \hbox to\linewidth{\hfill\special{\hyper@html##2}}%
             \hrule height 0pt width 0pt%
          }%
       }%
       \ht\hyper@box@ref0pt%
       \dp\hyper@box@ref0pt%
       \wd\hyper@box@ref0pt%
       \hyper@fixdim\ht\hyper@box@text%
       \advance\hyper@fixdim-8pt%
       \hbox{\raise\hyper@fixdim\copy\hyper@box@ref\copy\hyper@box@text}%
       \setbox\hyper@box@ref=\hbox{}%
    }%
    \def\hyper@unnested@special@anchor@fix##1##2##3{%
       \setbox\hyper@box@text=\hbox{\hyper@anchor@color{##3}}%
       \hyper@unnested@special{##1}{##2}%
       \setbox\hyper@box@text=\hbox{}%
    }%
    \def\hyper@unnested@special@reference@fix##1##2##3{%
       \setbox\hyper@box@text=\hbox{\hyper@ref@color{##3}}%
       \hyper@unnested@special{##1}{##2}%
       \setbox\hyper@box@text=\hbox{}%
    }
    \let\hyper@unnested@special@reference\hyper@unnested@special@reference@nofix%
    \let\hyper@unnested@special@anchor\hyper@unnested@special@anchor@nofix%
    \def\hyper@nested@special##1##2##3##4{%
```

```
    \ifx\hyper@unnested@special@reference\hyper@unnested@special@reference@nofix%
       \if@hyper@is@active%
          \expandafter\expandafter\expandafter%
               \special\expandafter\@firstoftwo\hyper@special@last%
            {\def\hyper@special@last{{{\hyper@html##4}}{{\hyper@html##2}}}%
             ##1{##2}{##4}{##3}%
            }%
          \expandafter\expandafter\expandafter%
              \special\expandafter\@secondoftwo\hyper@special@last%
       \else%
         \def\hyper@special@last{{{\hyper@html##4}}{{\hyper@html##2}}}%
         \@hyper@is@activetrue\relax%
         ##1{##2}{##4}{##3}%
         \@hyper@is@activefalse\relax%
       \fi%
    \else%
       \if@hyper@is@active%
          ##1{##2}{##4}{##3}%
       \else%
         \@hyper@is@activetrue\relax%
         ##1{##2}{##4}{##3}%
         \@hyper@is@activefalse\relax%
       \fi%
    \fi%
}%
\def\hyper@special@anchor{\hyper@nested@special\hyper@unnested@special@anchor}
\def\hyper@special@reference{\hyper@nested@special\hyper@unnested@special@reference}
\def\f@hyper@ref@ext[##1][##2][##3]\end@hyper@ref##4{%
  \ifvmode\leavevmode\fi%
  \hyper@special@reference%
     {<a href=\hyper@quote##1##2\hyper@hash##3\hyper@quote>}%
        {##4}%
     {</a>}%
}%
\def\hyper@check@fn##1.##2.##3.##4\hyper@check@fn{%
   \def\hyper@tmpa{fn}%mark for link to footnote
   \def\hyper@tmpb{##1}%
   \ifx\hyper@tmpa\hyper@tmpb{%
       \ifx?##3\relax%
          \global\let\hyper@forwarded@fn\@empty%
       \else%
          \hyper@cnt##3\relax%                                    fetch page
          \advance\hyper@cnt1\relax%                              advance page by one
          \global\edef\hyper@forwarded@fn{fn.##2.\the\hyper@cnt}%create new link
       \fi%
     }%
   \else%
     \global\let\hyper@forwarded@fn\@empty%
   \fi%
}%
```

```
\let\hyper@thepage\thepage%
\def\f@hyper@ref@int##1\end@hyper@ref##2{%
  \ifvmode\leavevmode\fi%
  \expandafter\ifx\csname hyper@##1\endcsname\relax%
     \expandafter\ifx\csname hyper@new@##1\endcsname\relax%
        \hyper@check@fn##1...\hyper@check@fn%
        \ifx\hyper@forwarded@fn\@empty%
           \PackageWarning{hyper}%
              {Hyper reference `##1' for `##2' on page \hyper@thepage\space undefined}%
           \hyper@change1\relax%
           \hyper@undef@color{##2}%
        \else%
           \expandafter\ifx\csname hyper@\hyper@forwarded@fn\endcsname\relax%
              \expandafter\ifx\csname hyper@new@\hyper@forwarded@fn\endcsname\relax%
                 \PackageWarning{hyper}%
                    {Hyper reference `##1' for `##2'  %
                     on page \hyper@thepage\space undefined}%
                 \hyper@change1\relax%
                 \hyper@undef@color{##2}%
              \else%
                 \hyper@change8\relax%
                 \PackageWarning{hyper}%
                    {Hyper reference `##1' for `##2' on page \hyper@thepage\space%
                     forwarded to `\hyper@forwarded@fn'}%
                 \hyper@special@reference%
                    {<a href=\hyper@quote\hyper@hash\hyper@forwarded@fn\hyper@quote>}%
                       {##2}%
                    {</a>}%
              \fi%
           \else%
              \hyper@change8\relax%
              \PackageWarning{hyper}%
                 {Hyper reference `##1' for `##2' on page \hyper@thepage\space%
                  forwarded to `\hyper@forwarded@fn'}%
              \hyper@special@reference%
                 {<a href=\hyper@quote\hyper@hash\hyper@forwarded@fn\hyper@quote>}%
                    {##2}%
                 {</a>}%
           \fi%
        \fi%
     \else%
        \hyper@special@reference%
           {<a href=\hyper@quote\hyper@hash##1\hyper@quote>}%
              {##2}%
           {</a>}%
     \fi%
  \else%
    \hyper@special@reference%
       {<a href=\hyper@quote\hyper@hash##1\hyper@quote>}%
          {##2}%
```

```
          {</a>}%
    \fi%
  }%
  \def\f@hyper@ref{%
    \@ifnextchar[{\f@hyper@ref@ext[]}{\f@hyper@ref@int}%
  }%
  \def\fragilehyperreference##1{%
    \expandafter\expandafter\expandafter\f@hyper@ref##1\end@hyper@ref%
  }%
  \def\f@hyper@page@ref{%
    \@ifnextchar[{\f@hyper@ref@page@ext[page.]}{\f@hyper@ref@int page.}%
  }%
  \def\fragilehyperpagereference##1{%
    \expandafter\expandafter\expandafter%
    \f@hyper@page@ref##1\end@hyper@ref%
  }%
  \def\fragilehyperanchor##1##2{%
    \ifvmode\leavevmode\fi%
    \hyper@special@anchor%
       {<a name=\hyper@quote##1\hyper@quote>}%
          {\hyper@to@aux{##1}%
           ##2%
          }%
       {</a>}%
  }%
  \def\fragileblindhyperanchor##1{%
    \hyper@special@anchor%
       {<a name=\hyper@quote##1\hyper@quote>}%
          {\hyper@to@aux{##1}}%
       {</a>}%
  }%
  \def\fragilehyperURL##1##2##3##4{%
    \ifvmode\leavevmode\fi%
    \def\hyper@tmp{##4}%
    \def\hyper@tmpa{##1}%
    \def\hyper@tmpb{##2}%
    \def\hyper@tmpc{##3}%
    \ifx\hyper@tmp\@empty%
       %
    \else\ifx\hyper@tmpa\@empty%
       \ifx\hyper@tmpb\@empty%
          \ifx\hyper@tmpc\@empty%
             {##4}%
          \else%
             \hyper@special@reference%
                {<a href=\hyper@quote##3\hyper@quote>}%
                   {##4}%
                {</a>}%
          \fi%
       \else\ifx\hyper@tmpc\@empty%
```

```
            \hyper@special@reference%
               {<a href=\hyper@quote//##2/\hyper@quote>}%
                  {##4}%
               {</a>}%
         \else%
            \hyper@special@reference%
               {<a href=\hyper@quote//##2/##3\hyper@quote>}%
                  {##4}%
               {</a>}%
         \fi\fi%
      \else\ifx\hyper@tmpb\@empty%
         \ifx\hyper@tmpc\@empty%
            {##4}%
         \else%
            \hyper@special@reference%
               {<a href=\hyper@quote##1:##3\hyper@quote>}%
                  {##4}%
               {</a>}%
         \fi%
      \else\ifx\hyper@tmpc\@empty%
        \hyper@special@reference%
           {<a href=\hyper@quote##1://##2/\hyper@quote>}%
              {##4}%
           {</a>}%
      \else%
        \hyper@special@reference%
           {<a href=\hyper@quote##1://##2/##3\hyper@quote>}%
              {##4}%
           {</a>}%
       \fi\fi\fi\fi%
    }%
  }
\egroup
\hyper
```

Sometimes we need this package without being allowed to insert the hypertext marks into the dvi–file. Note, thate `\hyper@fix` is defined for the sole purpose of having the same TEX-output behaviour regardless whether we create or do not create hypertext markups.

```
\def\nohyper{%
  \def\hyper@fix##1{%
     \ifx\hyper@unnested@special@reference\hyper@unnested@special@reference@nofix%
        ##1%
     \else%
        \hbox{##1}%
     \fi%
  }
  \def\fragilehyperreference##1##2{%
     \ifvmode\leavevmode\fi\hyper@fix{\hyper@ref@color{##2}}%
  }%
```

```
  \def\fragilehyperpagereference##1##2{%
     \ifvmode\leavevmode\fi\hyper@fix{\hyper@ref@color{##2}}%
  }%
  \def\fragilehyperanchor##1##2{%
     \ifvmode\leavevmode\fi\hyper@anchor@color{##2}%
  }%
  \def\fragileblindhyperanchor##1{}%
  \def\fragilehyperURL##1##2##3##4{%
     \ifvmode\leavevmode\fi\hyper@fix{\hyper@ref@color{##4}}%
  }%
}
```

Now let's protect the fragile commands.

```
\def\hyperreference{\protect\fragilehyperreference}
\def\hyperpagereference{\protect\fragilehyperpagereference}
\def\hyperanchor{\protect\fragilehyperanchor}
\def\blindhyperanchor{\protect\fragileblindhyperanchor}
\def\fragileChyperURL{%
  \bgroup%
     \catcode`\<12\catcode`\>12\catcode`\"12\relax%
     \catcode`\:12\catcode`\=12\catcode`\/12\relax%
     \catcode`\#12\catcode`\~12\relax%\catcode`\%12\relax%
     \finish@hyperURL%
}
\def\finish@hyperURL#1#2#3#4{%
    \fragilehyperURL{#1}{#2}{#3}{#4}%
  \egroup%
}
\def\hyperURL{\protect\fragileChyperURL}
```

8.4 Colored Anchors/References

Above we have used three macros `\hyper@ref@color`, `\hyper@undef@color`, and `\hyper@anchor@color` with which we can modify the text that is printed to the document. As their name indicates we want to use them to color the anchors resp. references. Hence we should define some variants of these macros.
The first variant prints the text in different colors.

```
\def\hyper@color{%
  \definecolor{refcolor}{rgb}{0,0,1}%
  \definecolor{undefrefcolor}{rgb}{1,0,0}%
  \definecolor{anchorcolor}{rgb}{0,0.75,0.75}%
  \def\hyper@ref@color##1{\textcolor{refcolor}{##1}}%
  \def\hyper@undef@color##1{\textcolor{undefrefcolor}{##1}}%
  \def\hyper@anchor@color##1{\textcolor{anchorcolor}{##1}}%
}
```

If we do not have colors we may use gray text instead.

```
\def\hyper@gray{%
  \definecolor{refcolor}{gray}{0.75}%
  \definecolor{undefrefcolor}{gray}{0.25}%
```

```
  \definecolor{anchorcolor}{gray}{0.5}%
  \def\hyper@ref@color##1{\textcolor{refcolor}{##1}}%
  \def\hyper@undef@color##1{\textcolor{undefrefcolor}{##1}}%
  \def\hyper@anchor@color##1{\textcolor{anchorcolor}{##1}}%
}
```

In ready to print documents we should not use these options but print the text in ordinary black. This is also the default definition.

```
\def\hyper@black{%
  \def\hyper@ref@color##1{##1}%
  \def\hyper@undef@color##1{##1}%
  \def\hyper@anchor@color##1{##1}%
}
\hyper@black
```

8.5 Automatic Generation of Anchor Names

As we want to insert hypertext marks automagically we need a service that provides new names for anchors. The simplest solution is to let the name be a natural number.
Thus we need an initialization for providing them.

```
\newcount\hypercount
\hypercount=0\relax
\def\@currenthyper{}
```

Now we can compute the next anchor from the last one generated.

```
\def\hyper@setcurrent{%
  \global\advance\hypercount1\relax%
  \edef\@currenthyper{\the\hypercount}%
}%
\def\hyper@settype#1{%
\edef\@currenthypertype{#1}%
}%
```

The automatic generation of anchor names leads to a little problem. We have to ensure that `\@currenthyper` is expanded at an appropriate time. Thus we define a macro that allow us to get an expanded hypertext reference that follows a not yet expanded token list.

```
\def\hyper@ref@toggle#1#2#3{#3[\hyperreference{#1}{#2}]}
\def\ref@by@expanded@hyper#1\end@hyper{{#1}}
\def\callwithexpandedhyperref#1#2{%
  \expandafter\expandafter\expandafter\hyper@ref@toggle%
    \expandafter\ref@by@expanded@hyper\@currenthyper\end@hyper%
  {#2}{#1}%
}
```

8.6 HyperText Cross–Referencing for LaTeX 2_ε

For a replacement of LaTeX 2_ε's cross–referencing features we need to redefine the commands `\label` and `\ref`.

Let us first define a label command for writing the current hypertext reference to the `.aux`–file. It must print four components of a label: the hypertext–type, the hypertext–anchor, the LaTeX 2_ε–anchor, and the LaTeX 2_ε–page. This is due to the fact that we need to know not only the stuff we reference to but also the internal name of the anchor.

```
\def\hyperlabel#1{\@bsphack
  \protected@write\hyper@auxout{}%
         {\string\newlabel{#1}%
           {{\@currenthypertype}{\@currenthyper}{\@currentlabel}{\thepage}}}%
  \@esphack}
```

Now we need some auxiliary macros to be able to select each of the three parts of the second argument of `\newlabel` that has been written to the `.aux`–file. Note, that the third component may contain informations about the URL of an external document (for cross referencing between documents) that has to be stripped of a page number before printing it.

```
\def\hyper@secondoffour#1#2#3#4{#2}
\def\hyper@thirdoffour#1#2#3#4{#3}
\def\hyper@forthoffour#1#2#3#4{#4}
\def\hyper@snd@forthoffour[#1][#2]\end@hyper{#2}
\def\hyper@this@forthoffour#1\end@hyper{#1}
\def\hyper@test@forthoffour{%
  \@ifnextchar[{\hyper@snd@forthoffour}{\hyper@this@forthoffour}%
}
\def\hyper@page@forthoffour#1#2#3#4{%
  \expandafter\hyper@test@forthoffour#4\end@hyper%
}
```

When setting a reference to an anchor we also have to add the corresponding hypertext link into the dvi-file.

```
\let\hyper@thepage\thepage
\def\hyper@setref#1#2#3#4{%
  \ifx#1\relax%
     \protect\G@refundefinedtrue%
     #4\nfss@text{\reset@font\bfseries ??}%
     \@latex@warning{Reference `#3' on page \hyper@thepage \space undefined}%
  \else%
    \edef\hyper@tmp{\expandafter\hyper@secondoffour#1}%
    \ifx\hyper@tmp\@empty%
       \ifx#2\hyper@secondoffour%
          #4\null%
       \else\ifx#2\hyper@thirdoffour%
         #4\expandafter#2#1\null%
       \else%
         #4\expandafter#2#1\null%
       \fi\fi%
    \else%
       \ifx#2\hyper@secondoffour%
          \hyperreference{\expandafter\hyper@secondoffour#1}{#4}\null%
       \else\ifx#2\hyper@thirdoffour%
```

```
          \hyperreference%
            {\expandafter\hyper@secondoffour#1}%
            {#4\expandafter#2#1\null}\null%
        \else%
          \hyperpagereference%
            {\expandafter\hyper@forthoffour#1}%
            {#4\expandafter#2#1\null}\null%
        \fi\fi%
    \fi%
  \fi%
}
```

Proceeding from this we can define three macros `\hypernoref`, `\hyperref`, and `\hyperpageref` that correspond to the same LaTeX 2_ε–macros where the hyper does not occur. But we want to do a little bit more. Thus an additional optional argument may be given to these macros to allow the user to reference from a whole text and not only from the number to the anchor.

```
\def\@@hypernoref[#1]#2{%
  \expandafter\hyper@setref\csname r@#2\endcsname%
    \hyper@secondoffour{#2}{#1}%
}
\def\@hypernoref[#1]{\@@hypernoref[#1]}
\def\hypernoref{\@ifnextchar[{\@hypernoref}{\@@hypernoref[]}}
\def\@@hyperref[#1]#2{%
  \expandafter\hyper@setref\csname r@#2\endcsname%
    \hyper@thirdoffour{#2}{#1}%
}
\def\@hyperref[#1]{\@@hyperref[#1~]}
\def\hyperref{\@ifnextchar[{\@hyperref}{\@@hyperref[]}}
\def\@@hyperpageref[#1]#2{%
   \expandafter\hyper@setref\csname r@#2\endcsname%
     \hyper@page@forthoffour{#2}{#1}%
}
\def\@hyperpageref[#1]{\@@hyperpageref[#1~]}
\def\hyperpageref{\@ifnextchar[{\@hyperpageref}{\@@hyperpageref[]}}
```

Now let's patch LaTeX 2_ε's ref/label-system:

```
\let\label\hyperlabel
\def\noref{\protect\hypernoref}
\def\ref{\protect\hyperref}
\def\pageref{\protect\hyperpageref}
```

Up to now we only can reference to anchors but haven't yet defined some. This will be done in many of the following subsections.

8.7 Other Cross–Referencing Features

Though LaTeX 2_ε has a very good reference mechanism this is not enough for hypertext documents. The user should be able to add an anchor to a text of his own choice.

```
\def\labeltext#1#2{%
  \bgroup%
    \hyper@setcurrent%
    \hyper@settype{text}%
    \def\@currentlabel{#2}%
    \label{#1}%
    \hyperanchor{\@currenthyper}{#2}%
  \egroup%
}
```

But that is not enough. Some of the macros of this package define anchors which cannot be caught by a `\label` command. But then it is the current or the next anchor generated. The following macros will allow us to reference to them:

```
\def\refcurrent#1{\hyperreference{\@currenthyper}{#1}}
\def\fragilerefnext#1#2{\bgroup%
  \hypercount=#1\relax\advance\hypercount1\relax%
  \hyperreference{\the\hypercount}{#2}%
\egroup}
\def\refnext#1{\protect\fragilerefnext{\the\hypercount}{#1}}
```

This is especially usefull for inserting links from the table of contents to an unnumbered section like e.g. the references of a document.
But wait, there is more. LaTeX 2_ε not only uses `\ref` and `\label` for it's referencing mechanism but also `\refstepcounter` to determine to what the next `\label` should reference. This has to be reflected for the hypertext stuff.

```
\let\hyper@refstepcounter\refstepcounter
\def\refstepcounter{\hyper@setcurrent\hyper@settype{counter}\hyper@refstepcounter}
```

As we will patch some latex internals below we also need a macro that allow us to forget the next `\refstepcounter`.

```
\def\ignore@next@refstepcounter{%
  \def\refstepcounter##1{%
    \def\refstepcounter{\hyper@setcurrent\hyper@settype{counter}\hyper@refstepcounter}%
  }%
}
```

8.8 Handling Page Numbers

We want to refer from the pages in the table of contents to the corresponding page. Thus we have to recall the necessary information when printing the table.

```
\let\hyper@contentsline\contentsline
\def\contentsline#1#2#3{%
  \hyper@contentsline{#1}{#2}{\hyperpagereference{#3}{#3}}%
}
```

The same is valid for indices and glossaries. But they are more problematic. Hence we will handle them in a subsection of its own.
So far the result is a couple of references from page numbers to pages. But we haven't defined the anchors they refer to.

To resolve this we have to modify headers and footers of a page. This can be done for an arbitrary page style when we change (misuse!) `\@begindvi`.
Let's provide to different styles for this purpose, one allowing jumps to the page number, and one allowing jumps to the top of the page. In the latter case we let the page numbers in the headers and footers refer to the top of the page.

```
\let\hyper@thepage\thepage
\def\hyper@anchorpage{%
  \fragilehyperanchor{page.\hyper@thepage}{\hyper@thepage}%
}
\def\hyper@referencepage{%
  \fragilehyperreference{page.\hyper@thepage}{\hyper@thepage}%
}
\def\hyper@empty{\@empty}
\def\hyper@evenhead{\@evenhead}
\def\hyper@oddhead{\@oddhead}
\def\hyper@evenfoot{\@evenfoot}
\def\hyper@oddfoot{\@oddfoot}
\def\hyper@modifyheadfoot@pagenumber{%
  \let\hyper@thehead\@thehead%
  \ifx\hyper@thehead\hyper@oddhead\let\hyper@thehead\@oddhead\fi%
  \ifx\hyper@thehead\hyper@evenhead\let\hyper@thehead\@evenhead\fi%
  \let\hyper@thefoot\@thefoot%
  \ifx\hyper@thefoot\hyper@oddfoot\let\hyper@thefoot\@oddfoot\fi%
  \ifx\hyper@thefoot\hyper@evenfoot\let\hyper@thefoot\@evenfoot\fi%
  \def\@thehead{%
      \ifnum\ifnum\ifx\hyper@thehead\@empty1\else0\fi%
                  \ifx\hyper@thehead\hyper@empty1\else0\fi%
                  >0 0\else1\fi%
            \ifnum\ifx\hyper@thefoot\@empty1\else0\fi%
                  \ifx\hyper@thefoot\hyper@empty1\else0\fi%
                  >0 0\else1\fi%
            >0\relax%
      \else%
         \blindhyperanchor{page.\thepage}%
      \fi%
      \let\hyper@thepage\thepage%
      \let\thepage\hyper@anchorpage%
      \ifx\hyper@thehead\@empty%
         \hfil%
      \else\ifx\hyper@thehead\hyper@empty%
         \hfil%
      \else%
        \hyper@thehead%
      \fi\fi%
  }%
  \def\@thefoot{%
      \let\hyper@thepage\thepage%
      \let\thepage\hyper@anchorpage%
      \ifx\hyper@thefoot\@empty%
```

```
          \hfil%
      \else\ifx\hyper@thefoot\hyper@empty%
          \hfil%
      \else%
          \hyper@thefoot%
      \fi\fi%
  }%
}
\def\hyper@modifyheadfoot@pagetop{%
  \let\hyper@thehead\@thehead%
  \ifx\hyper@thehead\hyper@oddhead\let\hyper@thehead\@oddhead\fi%
  \ifx\hyper@thehead\hyper@evenhead\let\hyper@thehead\@evenhead\fi%
  \let\hyper@thefoot\@thefoot%
  \ifx\hyper@thefoot\hyper@oddfoot\let\hyper@thefoot\@oddfoot\fi%
  \ifx\hyper@thefoot\hyper@evenfoot\let\hyper@thefoot\@evenfoot\fi%
  \def\@thehead{%
      \blindhyperanchor{page.\thepage}%
      \let\hyper@thepage\thepage%
      \let\thepage\hyper@referencepage%
      \ifx\hyper@thehead\@empty%
          \hfil%
      \else\ifx\hyper@thehead\hyper@empty%
          \hfil%
      \else%
          \hyper@thehead%
      \fi\fi%
  }%
  \def\@thefoot{%
      \let\hyper@thepage\thepage%
      \let\thepage\hyper@referencepage%
      \ifx\hyper@thefoot\@empty%
          \hfil%
      \else\ifx\hyper@thefoot\hyper@empty%
          \hfil%
      \else%
          \hyper@thefoot%
      \fi\fi%
    }%
}
\let\hyper@begindvi\@begindvi
\def\@begindvi{%
  \hyper@begindvi%
  \hyper@modifyheadfoot%
  \global\let\@begindvi\hyper@modifyheadfoot%
}
```

Hopefully we do not use a page number twice in headers or footers if we want to jump to the pagenumber.

We use pagenumbers as the default position for page anchors.

```
\let\hyper@modifyheadfoot\hyper@modifyheadfoot@pagenumber
```

8.9 Table of Contents

In the subsection “Handling of Pages” we already have inserted references from the page number to the corresponding page. Now we want to add further references from the title of an entry in the table of contents to the corresponding text within the document.

To do that we have to modify the corresponding sectioning commands.

```
\let\hyper@sect\@sect
\def\@sect#1#2#3#4#5#6[#7]#8{%
  \ifnum #2>\c@secnumdepth%
    \hyper@setcurrent%
  \else%
    \refstepcounter{#1}%
    \ignore@next@refstepcounter%
  \fi%
  \hyper@settype{#1}%
  \global\let\@currenthyper\@currenthyper%
  \global\let\@currenthypertype\@currenthypertype%
  \callwithexpandedhyperref%
    {\hyper@sect{#1}{#2}{#3}{#4}{#5}{#6}}%
    {#7}%
    {\hyperanchor{\@currenthyper}{#8}}%
}
\let\hyper@ssect\@ssect
\def\@ssect#1#2#3#4#5{%
  \hyper@setcurrent%
  \hyper@settype{#1}%
  \global\let\@currenthyper\@currenthyper%
  \global\let\@currenthypertype\@currenthypertype%
  \hyper@ssect{#1}{#2}{#3}{#4}{\hyperanchor{\@currenthyper}{#5}}%
}
⟨/hyper⟩
```

The classes `book` and `report` additionally define a `\chapter` command. Unfortunately they do it in a different way. But the differences are fairly small. Thus we will use nearly the same definition.

```
⟨*book, report⟩
\let\hyper@chapter\@chapter
\let\hyper@schapter\@schapter
\def\@chapter[#1]#2{%
  \ifnum\c@secnumdepth>\m@ne%
⟨/book, report⟩
⟨*book⟩
    \if@mainmatter%
⟨/book⟩
⟨*book, report⟩
      \refstepcounter{chapter}%
      \ignore@next@refstepcounter%
⟨/book, report⟩
⟨*book⟩
```

```
    \else%
      \hyper@setcurrent%
    \fi%
⟨/book⟩
⟨*book, report⟩
  \else%
    \hyper@setcurrent%
  \fi%
  \hyper@settype{chapter}%
  \global\let\@currenthyper\@currenthyper%
  \global\let\@currenthypertype\@currenthypertype%
  \callwithexpandedhyperref%
    {\hyper@chapter}%
    {#1}%
    {\hyperanchor{\@currenthyper}{#2}}%
}
\def\@schapter#1{%
  \hyper@setcurrent%
  \hyper@settype{chapter}%
  \global\let\@currenthyper\@currenthyper%
  \global\let\@currenthypertype\@currenthypertype%
  \hyper@schapter{\hyperanchor{\@currenthyper}{#1}}%
}
```

However, this is not sufficient. The classes `book` and `report` use a different mechanism for the index heading not using the macro `\chapter*`. So we have to fix this.

```
\let\hyper@theindex\theindex
\def\theindex{%
  \bgroup%
    \let\hyper@makeschapterhead\@makeschapterhead%
    \def\@makeschapterhead##1{%
      \hyper@setcurrent%
      \hyper@settype{chapter}%
      \global\let\@currenthyper\@currenthyper%
      \global\let\@currenthypertype\@currenthypertype%
      \hyper@makeschapterhead{\hyperanchor{\@currenthyper}{##1}}%
    }
    \hyper@theindex%
  \egroup%
  \let\item\@idxitem%
}
⟨/book, report⟩
```

There is also a `\part`–macro defined in the classes `article`, `book`, `ltnews`, `ltxdoc`, `ltxguide`, `proc`, and `report`. Unfortunately there are two different definitions we have to modify. But they differ only in a constant in a conditional expression. Thus we can use a nearly common definition.

```
⟨*article, book, ltnews, ltxdoc, ltxguide, proc, report⟩
\let\hyper@part\@part
```

```
\def\@part[#1]#2{%
  \ifnum\c@secnumdepth>%
⟨/article, book, ltnews, ltxdoc, ltxguide, proc, report⟩
⟨*article, ltnews, ltxdoc, ltxguide, proc⟩
-1\relax%
⟨/article, ltnews, ltxdoc, ltxguide, proc⟩
⟨*book, report⟩
-2\relax%
⟨/book, report⟩
⟨*article, book, ltnews, ltxdoc, ltxguide, proc, report⟩
      \refstepcounter{part}%
      \ignore@next@refstepcounter%
  \else%
    \hyper@setcurrent%
  \fi%
  \hyper@settype{part}%
  \global\let\@currenthyper\@currenthyper%
  \global\let\@currenthypertype\@currenthypertype%
  \callwithexpandedhyperref%
    {\hyper@part}%
    {#1}%
    {\hyperanchor{\@currenthyper}{#2}}%
}
\let\hyper@spart\@spart
\def\@spart#1{%
  \hyper@setcurrent%
  \hyper@settype{part}%
  \global\let\@currenthyper\@currenthyper%
  \global\let\@currenthypertype\@currenthypertype%
  \hyper@spart{\hyperanchor{\@currenthyper}{#1}}%
}
⟨/article, book, ltnews, ltxdoc, ltxguide, proc, report⟩
```

Now we do not only get references from the table of contents to the corresponding sections but also from the headers and footers to them. There is only one exception these references are not inserted: If we used the `*`–ed variants of the sectioning commands the marks are not inserted in the headers.
For bibliography, glossary, index, and table of contents this can be changed by modifying `\@mkboth`.

```
⟨*article, book, ltnews, ltxdoc, ltxguide, proc, report⟩
\def\hyper@mkboth@do[#1][#2]{%
  \markboth{#1}{#2}%
}
\def\hyper@mkboth#1#2{%
  \callwithexpandedhyperref%
    {\callwithexpandedhyperref{\hyper@mkboth@do}{#1}}%
    {#2}%
}
```

As marks are only inserted when using the pagestyle “headings”, the corresponding

macro has to be modified to get the desired result.

```
\let\hyper@ps@headings\ps@headings
\def\ps@headings{%
  \hyper@ps@headings%
  \let\@mkboth\hyper@mkboth%
}
```
⟨/article, book, ltnews, ltxdoc, ltxguide, proc, report⟩

Last but not least set the new page style.

```
⟨*book, report⟩
\pagestyle{headings}
⟨/book, report⟩
```

Unfortunately, the package `doc.sty` modifies the `theindex` environment in a way that the above changes do not work correctly with it. Hence, we have to modify this environment to resolve this.

```
⟨*doc⟩
\g@addto@macro\index@prologue{%
  \def\markboth#1#2{%
    \@mkboth{\refcurrent{#1}}{\refcurrent{#2}}%
  }%
}
⟨/doc⟩
```

8.10 Bibliography

We want to reference from citation points within the text, given by `\cite`, to the corresponding entry in the bibliography. To realize this we only have to modify the `\bibitem`–macro.

```
⟨*hyper⟩
\def\@lbibitem[#1]#2{%
  \hyper@setcurrent%
  \hyper@settype{citation}%
  \item[\@biblabel{\hyperanchor{\@currenthyper}{#1}}\hfill]%
  \if@filesw%
      {\let\protect\@unexpandable@protect%
       \immediate%
       \write\@auxout{%
         \string\bibcite{#2}{\hyperreference{\@currenthyper}{#1}}%
       }%
      }%
  \fi%
  \ignorespaces%
}
\def\@bibitem{%
  \stepcounter{\@listctr}%
  \hyper@settype{citation}%
  \@lbibitem[\the\value{\@listctr}]%
}
```

8.11 Equations

The goal is to reference to the equation number in equations and arrays of equations. This is really simple to do.

```
\def\@eqnnum{%
  \hyperanchor{\@currenthyper}{\normalfont\normalcolor(\theequation)}%
}
\let\hyper@eqnarray\eqnarray
\def\eqnarray{%
  \hyper@setcurrent%
  \def\@currenthyper{\the\hypercount}%
  \hyper@settype{equation}%
  \hyper@eqnarray%
}
\let\hyper@xeqncr\@xeqncr
\def\@xeqncr[#1]{%
  \hyper@xeqncr[#1]%
  \noalign{\hyper@setcurrent\hyper@settype{equation}}%
}
```

⟨/hyper⟩

There is a document class option `leqno` that has to be redefined for us.

```
⟨*leqno⟩
\def\@eqnnum{%
  \hbox to .01\p@{}%
  \rlap{\reset@font\rmfamily%
        \hskip -\displaywidth%
        \hyperanchor{\@currenthyper}{\reset@font\rmfamily (\theequation)}%
       }%
}
⟨/leqno⟩
```

8.12 Float Captions

What do you think we want to do here? Simply using `\caption` to define an anchor that may be used to refer to the current float.

```
⟨*hyper⟩
\long\def\@caption#1[#2]#3{\par%
  \addcontentsline%
    {\csname ext@#1\endcsname}%
    {#1}%
    {\protect\numberline{\csname the#1\endcsname}%
     {\ignorespaces \hyperreference{\@currenthyper}{#2}}%
    }%
  \begingroup%
    \@parboxrestore%
    \normalsize%
    \@makecaption{\csname fnum@#1\endcsname}{\ignorespaces #3}\par%
  \endgroup%
}
```

```
⟨/hyper⟩
```

Obviously we need to modify `\@makecaption` to define the anchor. As this macro is defined only for the classes `article`, `book`, `ltnews`, `ltxdoc`, `ltxguide`, `proc`, and `report` we redefine it only for them.

```
⟨*article, book, ltnews, ltxdoc, ltxguide, proc, report⟩
\let\hyper@makecaption\@makecaption
\long\def\@makecaption#1#2{%
  \hyper@makecaption{\hyperanchor{\@currenthyper}{#1}}{#2}%
}
⟨/article, book, ltnews, ltxdoc, ltxguide, proc, report⟩
```

8.13 Footnotes

Here we want to handle references from footnotemarks to footnotes at the bottom of the page.

At first modify the standard definition of `\@makefnmark` to refer to a footnote which is complicated by the fact that `\thepage` does not necessarily refer to the actual page when used. So we have to write the page to an auxiliary file and reread it afterwards. Let's not forget to check for changes of these entries to warn the user about possible changes.

```
⟨*hyper⟩
\newcount\hyper@fnmark@count
\hyper@fnmark@count0
\def\hyper@currentfnmark{%
   \global\advance\hyper@fnmark@count1\relax%
   \@bsphack%
      \protected@write\hyper@auxout%
         {}%
         {\string\hyperfnpage{\the\hyper@fnmark@count}{\thepage}}%
   \@esphack%
   \hb@xt@\z@{%
    \ifx\hyper@minipage@label\@empty%
      \global\edef\hyper@current@fnmark%
        {fn.\@arabic\c@footnote.%
           \expandafter%
              \ifx\csname hyper@fn@\the\hyper@fnmark@count\endcsname%
                  \relax%
              ?%
           \else%
              \csname hyper@fn@\the\hyper@fnmark@count\endcsname%
           \fi%
        }%
    \else\ifnum\hyper@minipage@label=0\relax%
      \global\edef\hyper@current@fnmark%
        {fn.\hyper@minipage@label.\@arabic\c@footnote.%
           \expandafter%
              \ifx\csname hyper@fn@\the\hyper@fnmark@count\endcsname%
                  \relax%
```

```
              ?%
           \else%
              \csname hyper@fn@\the\hyper@fnmark@count\endcsname%
           \fi%
        }%
    \else%
      \global\edef\hyper@current@fnmark%
        {fn.\hyper@minipage@label.\@arabic\c@mpfootnote.%
           \expandafter%
              \ifx\csname hyper@fn@\the\hyper@fnmark@count\endcsname%
                  \relax%
              ?%
           \else%
              \csname hyper@fn@\the\hyper@fnmark@count\endcsname%
           \fi%
        }%
  \fi\fi%
 }%
}
\def\hyperfnpage#1#2{%
  \expandafter\global\expandafter\def\csname hyper@fn@#1\endcsname{#2}%
}
\def\hyperfnpage@check#1#2{%
   \def\reserved@a{#2}%
   \expandafter\ifx\csname hyper@fn@#1\endcsname\reserved@a\else%
      \hyper@change4\relax%
   \fi%
}
\let\hyper@fn@enddocument\enddocument
\def\enddocument{%
  \let\hyperfnpage\hyperfnpage@check%
  \global\hyper@fnmark@count0\relax%
  \hyper@fn@enddocument%
}
\def\@makefnmark{%
  \hyper@currentfnmark%
  \hbox{\@textsuperscript{%
           \normalfont\hyperreference%
            {\hyper@current@fnmark}%
            {\@thefnmark}%
     }}%
}
\def\hyper@makefnmark@text{%
  \hyper@currentfnmark%
  \hbox{\@textsuperscript{%
           \normalfont\hyperanchor%
             {\hyper@current@fnmark}%
             {\@thefnmark}%
       }}%
}
```

```
884 ⟨/hyper⟩
```

Unfortunately, the definition of `\@makefntext` is dependend of the document class we use.

For `article`, `book`, `letter`, `ltnews`, `ltxdoc`, `ltxguide`, `proc`, `report`, and `slides` we have to use the following hypertext–variant.

```
885 ⟨*article, book, letter, ltnews, ltxdoc, ltxguide, proc, report, slides⟩
886 \let\hyper@makefntext\@makefntext%
887 \long\def\@makefntext#1{%
888   \bgroup%
889     \hyper@currentfnmark%
890     \edef\@currenthyper{\hyper@current@fnmark}%
891     \let\@makefnmark\hyper@makefnmark@text%
892     \hyper@makefntext{#1}%
893   \egroup%
894 }
895 ⟨/article, book, letter, ltnews, ltxdoc, ltxguide, proc, report, slides⟩
```

There are also footnotes within minipages. Therefore we should handle them.

```
896 ⟨*hyper⟩
897 \newcount\hyper@minipage@cnt
898 \hyper@minipage@cnt=0
899 \edef\hyper@minipage@label{}
900 \let\hyper@minipage\minipage
901 \let\hyper@endminipage\endminipage
902 \def\minipage{%
903   \bgroup%
904     \global\advance\hyper@minipage@cnt1\relax%
905     \edef\hyper@minipage@label{\the\hyper@minipage@cnt}%
906     \hyper@minipage%
907 }
908 \def\endminipage{%
909     \hyper@endminipage%
910   \egroup%
911 }
912 ⟨/hyper⟩
```

Note, that there exists only one level of minipages the footnotes are handled correctly by LaTeX 2_ε. Thus we haven't to do more.

Unfortunately there is another problem. The footnote–macros are redefined by the `\maketitle`–macro in some classes.

Thus we need the following changes for the classes `article`, `book`, `ltxdoc`, `ltxguide`, and `report`.

```
913 ⟨*article, book, ltxdoc, ltxguide, report⟩
914 \if@titlepage\else
915 \renewcommand\maketitle{\par
916   \begingroup
917     \renewcommand\thefootnote{\fnsymbol{footnote}}%
918     \def\@makefnmark{%
919       \hyper@currentfnmark%
```

```
      \rlap{\@textsuperscript{%
        \normalfont%
        \hyperreference{\hyper@current@fnmark}%
        {\@thefnmark}%
      }}%
    }%
    \long\def\@makefntext##1{%
      \hyper@currentfnmark%
      \bgroup%
        \edef\@currenthyper{\hyper@current@fnmark}%
        \parindent 1em\noindent
        \hb@xt@1.8em{%
          \hss\@textsuperscript{%
            \normalfont%
            \hyperanchor{\hyper@current@fnmark}{\@thefnmark}
          }%
        }%
        ##1%
      \egroup%
    }%
    \if@twocolumn
      \ifnum \col@number=\@ne
        \@maketitle
      \else
        \twocolumn[\@maketitle]%
      \fi
    \else
      \newpage
      \global\@topnum\z@
      \@maketitle
    \fi
    \thispagestyle{plain}\@thanks
  \endgroup
  \setcounter{footnote}{0}%
  \let\thanks\relax
  \let\maketitle\relax\let\@maketitle\relax
  \gdef\@thanks{}\gdef\@author{}\gdef\@title{}}
\fi
```
⟨/article, book, ltxdoc, ltxguide, report⟩

For the class `proc` another redefinition is needed.

```
⟨*proc⟩
\def\maketitle{\par
 \begingroup
   \renewcommand\thefootnote{\fnsymbol{footnote}}%
   \def\@makefnmark{%
      \hyper@currentfnmark%
      \hbox to\z@{%
      \@textsuperscript{%
        \normalfont%
```

```
        \hyperreference{\hyper@current@fnmark}%
        {\@thefnmark}%
      }%
  }}%
  \twocolumn[\@maketitle]%
  \@thanks
\endgroup
\setcounter{footnote}{0}%
\let\maketitle\relax
\let\@maketitle\relax
\gdef\@thanks{}\gdef\@author{}\gdef\@title{}\let\thanks\relax}
⟨/proc⟩
```

The package `doc.sty` also modifies `\maketitle` that has a redefinition of `\@makefnmark` and `\@makefntext`.

```
⟨*doc⟩
\def\maketitle{\par
      \begingroup \def \thefootnote {\fnsymbol {footnote}}%
      \setcounter {footnote}\z@
      \def\@makefnmark{%
        \hyper@currentfnmark%
        \hbox to\z@{%
        $\m@th^{%
          \hyperreference%
            {\hyper@current@fnmark}%
            {\@thefnmark}%
        }$\hss%
      }}%
      \long\def\@makefntext##1{%
        \hyper@currentfnmark%
        \bgroup
          \edef\@currenthyper{\hyper@current@fnmark}
          \parindent 1em\noindent
          \hbox to1.8em{%
            \hss$\m@th^{%
              \hyperanchor{\hyper@current@fnmark}{\@thefnmark}%
            }$%
          }%
          ##1%
        \egroup%
      }%
      \if@twocolumn \twocolumn [\@maketitle ]%
      \else \newpage \global \@topnum \z@ \@maketitle \fi
       \thispagestyle{titlepage}\@thanks \endgroup
      \setcounter {footnote}\z@
      \gdef\@date{\today}\gdef\@thanks{}%
      \gdef\@author{}\gdef\@title{}}
⟨/doc⟩
```

Shit, now we can get the same name for hyper anchors, one via maketitle and one for the following text. Let's pretend the titlepage being minipage 0. Note,

that the definition of `\hyper@currentfnmark` given above tests for this. (This is necessary!) Additionally we have to modify the macro `\thanks` to get the correct anchors in the footnote texts.

```
⟨*hyper⟩
\AtBeginDocument{%
   \let\hyper@maketitle\maketitle%
   \def\maketitle{%
     \edef\hyper@minipage@label{0}%
     \hyper@maketitle%
     \let\hyper@minipage@label\@empty%
   }%
}
\def\hyper@thanks@footnotetext#1[#2]#3{%
  \bgroup%
     \edef\hyper@current@fnmark{#1}%
     \let\hyper@currentfnmark\relax%
     \footnotetext[#2]{#3}%
  \egroup%
}
\def\thanks#1{\footnotemark%
    \expandafter\protected@xdef\expandafter\@thanks\expandafter{\expandafter\@thanks%
        \expandafter\protect%
           \expandafter\hyper@thanks@footnotetext%
              \expandafter{\hyper@current@fnmark}[\the\c@footnote]{#1}}%
}
⟨/hyper⟩
```

8.14 Lists

Some lists have enumerated items which may be referenced to by the label command. Hence we have to set the corresponding anchors.

```
⟨*hyper⟩
\let\hyper@item\@item
\def\@item[#1]{%
  \if@noitemarg%
    \if@nmbrlist%
      \hyper@item[\hyperanchor{\@currenthyper}{#1}]%
    \else%
      \hyper@item[{#1}]%
    \fi%
  \else%
    \hyper@item[{#1}]%
  \fi%
}
```

8.15 Index and Glossary

As already has been said, we don't write the page number together with a reference to `.idx`– resp. `.glo`–files. `makeindex` wouldn't accept such informations. But that

means that we have to think of a way to get back the references after `makeindex` has generated the index resp. glossary.
As this stuff needs an additional package we should include it only if it is necessary. Thus, let us at first save it in a macro.

```
\def\hyper@idxglo@cmds{
```

For the following definition we need the `defpattern`-package.

```
\RequirePackage{defpattern}
```

Now we can define hypertext variants of the macros `\index` and `\glossary`.
First of all we handle series of page numbers and ranges.

```
\def\hyper@ref@page##1{\hyperpagereference{##1}{##1}}
\defpattern\hyper@page@range[##2]{\hyper@ref@page{##2}}
\defpattern\hyper@page@range[##2--##3]{%
  \hyper@ref@page{##2}--\hyper@ref@page{##3}%
}
\defpattern\hyper@page@range[##2, ##3]{%
  \hyper@page@range[##2], \hyper@page@range[##3]%
}
```

Based on this we can define a macro `\hyperpage` with an optional executable macro as provided by the indexing system to surround a page number.

```
\def\hyper@page@cmd[##1]##2{##1{\hyper@page@range[##2]}}
\def\hyper@page@nocmd##1{\hyper@page@range[##1]}
\def\hyperpage{\@ifnextchar[{\hyper@page@cmd}{\hyper@page@nocmd}}
```

After saving the original meaning of `\index` and `\glossary`

```
\let\hyper@index\index
\let\hyper@glossary\glossary
```

we can insert the page number surrounding command for `makeindex` by

```
\defpattern\hyper@ig@pat[##2|##3]{##2{##3|hyperpage}}
\defpattern\hyper@ig@pat[##2|##3|##4]{%
  ##2{##3|hyperpage[\hyper@backslash##4]}%
}
\defpattern\hyper@ig@pat[##2|##3|(##4]{%
  ##2{##3|(hyperpage[\hyper@backslash##4]}%
}
\defpattern\hyper@ig@pat[##2|##3|)##4]{%
  ##2{##3|)hyperpage[\hyper@backslash##4]}%
}
\defpattern\hyper@ig@pat[##2|##3|(]{##2{##3|(hyperpage}}
\defpattern\hyper@ig@pat[##2|##3|)]{##2{##3|)hyperpage}}
```

and define the new `\index`– and `\glossary`–macros as follows.

```
\def\hyper@ig{%
  \@bsphack\begingroup%
    \catcode`\@=12\catcode`\!=12\catcode`\|=12\catcode`\"=12\relax%
    \@sanitize\hyper@ig@%
}
\def\hyper@ig@##1##2{%
```

```
    \hyper@ig@pat[##1|##2]%
  \endgroup\@esphack%
}
\def\index{\hyper@ig\hyper@index}
\def\glossary{\hyper@ig\hyper@glossary}
```

We have reached the end of the macro. But as we do not call its contents twice we just let the macro being a no-op before.

```
\let\hyper@idxglo@cmds\relax
}
```

Now let's call the stuff whenever an index or glossary has to be generated.

```
\ifnum%
  \ifx\@indexfile\@undefined0\else1\fi%
  \ifx\@glossaryfile\@undefined0\else1\fi%
  >0\relax
    \hyper@idxglo@cmds
\fi
\ifx\makeindex\@empty\else
  \let\hyper@makeindex\makeindex
  \def\makeindex{\hyper@makeindex\hyper@idxglo@cmds}
\fi
\ifx\makeglossary\@empty\else
  \let\hyper@makeglossary\makeglossary
  \def\makeglossary{\hyper@makeglossary\hyper@idxglo@cmds}
\fi
```

8.16 Theorems

Theorems, Lemmatas, Corollaries, Examples, etc. are often refered to. Hence they have to introduce an anchor for these references.

```
\let\hyper@begintheorem\@begintheorem%
\def\@begintheorem#1#2{\trivlist%
   \item[\hskip%
         \labelsep{\hyperanchor{\@currenthyper}{\bfseries #1\ #2}}%
        ]\itshape%
}
\def\@opargbegintheorem#1#2#3{\trivlist%
      \item[\hskip%
            \labelsep%
               {\hyperanchor{\@currenthyper}{\bfseries #1\ #2}\ (#3)}%
           ]\itshape%
}
```

⟨/hyper⟩

These definitions are changed by the theorem–package. Hence, we have to give hypertext definitions for them below.

8.17 Additional Patches

The HyperTEX–previewer for NeXTSTEP can't handle multiple pages with the same name correctly. It supposes that each link on a page number 1 is on the first page with the number one. This is a problem for the title page often having the same number as one of the following pages. Hence we patch the page number of the title page from 1 to -1 (if the next page also has number 1).

```
⟨*article, report⟩
\let\hyper@titlepage\titlepage
\def\titlepage{%
  \hyper@titlepage%
  \if@compatibility%
     \global\setcounter{page}{0}%
  \else%
     \global\setcounter{page}{-1}%
  \fi%
}
⟨/article, report⟩
```

We have to ignore the stuff that is written to the `.aux`–file by the extensional packages

```
⟨*hyper⟩
\def\hyperbackcite#1#2#3#4{}
⟨/hyper⟩
```

8.18 Handling Options

At first let us define some macros to collect and detect mutually excluding options.

```
⟨*hyper⟩
\def\hyper@set@option#1#2#3{%
  \ifx#1\@undefined%
    \def#1{#2}%
  \else%
    \PackageError{hyper}{#3}{}%
  \fi}
\def\set@hyper@class#1{%
  \hyper@set@option\hyper@class{#1}%
    {Only one class is allowed in option list}%
}
\def\set@hyper@do#1{%
  \hyper@set@option\hyper@do{#1}%
    {Excluding options 'yes' and 'no' in option list found}%
}
\def\set@hyper@pageanchor#1{%
  \hyper@set@option\hyper@pageanchor{#1}%
    {Excluding options 'pagenumber' and 'pagetop' in option list found}%
}
\def\set@hyper@color#1{%
  \hyper@set@option\hyper@this@color{#1}%
```

```
    {Multiple color options in option list found}%
}
\def\set@hyper@idxglo{%
  \let\hyper@idxglo\hyper@idxglo@cmds%
}
```

We suppose each other option given being an additional package. They are collected without regarding multiple occurrences.

```
\def\hyper@packages{}
\def\add@hyper@package#1{%
  \edef\hyper@packages{\hyper@packages(#1)}%
}
\def\hyper@extensions{}
\def\add@hyper@extension#1{%
  \edef\hyper@extensions{\hyper@extensions(#1)}%
}
```

Now we define the options known to distribute them between the macros given above.

The document classes known by the package are the following.

```
\DeclareOption{article}{\set@hyper@class{article}}
\DeclareOption{book}{\set@hyper@class{book}}
\DeclareOption{letter}{\set@hyper@class{letter}}
\DeclareOption{ltxdoc}{\set@hyper@class{ltxdoc}}
\DeclareOption{ltxguide}{\set@hyper@class{ltxguide}}
\DeclareOption{ltnews}{\set@hyper@class{ltnews}}
\DeclareOption{proc}{\set@hyper@class{proc}}
\DeclareOption{report}{\set@hyper@class{report}}
\DeclareOption{slides}{\set@hyper@class{slides}}
\DeclareOption{amsart}{\set@hyper@class{amsart}}
\DeclareOption{amsproc}{\set@hyper@class{amsproc}}
\DeclareOption{amsbook}{\set@hyper@class{amsbook}}
\DeclareOption{amsdtx}{\set@hyper@class{amsdtx}}
\DeclareOption{amsldoc}{\set@hyper@class{amsldoc}}
\DeclareOption{cweb}{\set@hyper@class{cweb}}
```

There are two options determining whether we want to insert the hypertext–marks into the dvi–file.

```
\DeclareOption{yes}{\set@hyper@do{\hyper}}
\DeclareOption{no}{\set@hyper@do{\nohyper}}
```

We should not forget that we have an optional behaviour for fixing the bounding box of a hyper reference. So we have to introduce and handle an option for it.

```
\DeclareOption{fixhyperbox}{%
  \AtBeginDocument{%
     \let\hyper@unnested@special@reference\hyper@unnested@special@reference@fix%
     \let\hyper@unnested@special@anchor\hyper@unnested@special@anchor@fix%
  }%
}
% In the subsection ``Colored Anchors/References'' we have introduced
% three variants of colors the anchors resp.\ references may be printed in.
```

```
%     \begin{macrocode}
\DeclareOption{color}{\set@hyper@color{\hyper@color}}
\DeclareOption{gray}{\set@hyper@color{\hyper@gray}}
\DeclareOption{black}{\set@hyper@color{\hyper@black}}
```

We additionally have to choose whether a hyperlink to a page always jumps to the page number or to the top of the page.

```
\DeclareOption{pagenumber}{\set@hyper@pageanchor{\hyper@modifyheadfoot@pagebottom}}
\DeclareOption{pagetop}{\set@hyper@pageanchor{\hyper@modifyheadfoot@pagetop}}
```

If the user want to have the index and glossary commands, e.g. when including an index or glossary without using `\makeindex` respectively `\makeglossary` he may give the option `indexcmds`.

```
\DeclareOption{indexcmds}{\set@hyper@idxglo}
```

Additionally we have to pass the options for the extensional packages

```
\DeclareOption{backcitepages}{%
  \PassOptionsToPackage{pages}{hxt-bc}%
  \add@hyper@extension{hxt-bc}%
}
\DeclareOption{backcitesections}{%
  \PassOptionsToPackage{sections}{hxt-bc}%
  \add@hyper@extension{hxt-bc}%
}
```

All other options to be given are considered as packages.

```
\DeclareOption*{\add@hyper@package{\CurrentOption}}
```

Now let's collect the options given.

```
\ProcessOptions
```

So far now we know the options the user has send to us.
If no option determining a document class has been given we should try to determine which class the document is of.

```
\ifx\hyper@class\@undefined
  \@ifclassloaded{slides}{\def\hyper@class{slides}}{}
  \@ifclassloaded{report}{\def\hyper@class{report}}{}
  \@ifclassloaded{letter}{\def\hyper@class{letter}}{}
  \@ifclassloaded{book}{\def\hyper@class{book}}{}
  \@ifclassloaded{article}{\def\hyper@class{article}}{}
  \@ifclassloaded{proc}{\def\hyper@class{proc}}{}
  \@ifclassloaded{ltnews}{\def\hyper@class{ltnews}}{}
  \@ifclassloaded{ltxguide}{\def\hyper@class{ltxguide}}{}
  \@ifclassloaded{ltxdoc}{\def\hyper@class{ltxdoc}}{}
  \@ifclassloaded{amsart}{\def\hyper@class{amsart}}{}
  \@ifclassloaded{amsproc}{\def\hyper@class{amsproc}}{}
  \@ifclassloaded{amsbook}{\def\hyper@class{amsbook}}{}
  \@ifclassloaded{amsdtx}{\def\hyper@class{amsdtx}}{}
  \@ifclassloaded{amsldoc}{\def\hyper@class{amsldoc}}{}
  \@ifclassloaded{cweb}{\def\hyper@class{cweb}}{}
\fi
```

If there is a document class load the corresponding `.hyp`–file otherwise give an error message.

```
\ifx\hyper@class\@undefined
  \PackageError{hyper}{Document class can't be determined.\MessageBreak
              Please add one to the option list%
             }{}
\else
  \InputIfFileExists{\hyper@class.hyp}{}%
    {\PackageError{hyper}{\hyper@class.hyp not found.\MessageBreak
                 Please reinstall the complete package%
                }{}%
    }%
\fi
```

If we explicitely want to have the commands for index and glossary we have to introduce them by calling the macro holding the stuff. Note, that the macro is a nop when the stuff already has been added.

```
\ifx\hyper@idxglo\@undefined\else
  \hyper@idxglo@cmds
\fi
```

If we want to print the anchors resp. references in colors we have to load the `color`-package and defined the appropriate macros.

```
\ifx\hyper@this@color\@undefined
\else
  \expandafter\ifx\hyper@this@color\hyper@gray
    \RequirePackage{color}
  \else\expandafter\ifx\hyper@this@color\hyper@color
    \RequirePackage{color}
  \else\expandafter\ifx\hyper@this@color\hyper@black
  \else
    \PackageError{hyper}{Implementation error:\MessageBreak
                Case for reference/anchor color definition not defined}{}
  \fi\fi\fi
  \hyper@this@color
\fi
```

Afterwards we have to load modifications.
At first we just handle the document class option `leqno` if it can be found in the option list.

```
\@ifclasswith\hyper@class{leqno}%
  {\InputIfFileExists{leqno.hyp}{}%
     {\PackageError{hyper}{leqno.hyp not found.\MessageBreak
                  Please reinstall the complete package}{}%
     }%
  }%
  {}
```

We may have to handle some known packages, i.e. we need to load some modifications for them.

As there is a common way to do this let us first define a generic macro.

```
\def\hyper@loadpackage#1{%
  \@ifpackageloaded{#1}%
    {\InputIfFileExists{#1.hyp}%
       {\expandafter\edef\csname hyper@loaded@#1\endcsname{#1.hyp}}%
       {\PackageError{hyper}{#1.hyp not found.\MessageBreak
                    Please reinstall the complete package}{}%
       }%
    }%
    {}
}
```

Now we can call this macro for each package known.

```
\hyper@loadpackage{amsmath}
\hyper@loadpackage{amstex}
\hyper@loadpackage{amsthm}
\hyper@loadpackage{doc}
\hyper@loadpackage{fancyheadings}
\hyper@loadpackage{ftnright}
\hyper@loadpackage{harvard}
\hyper@loadpackage{longtable}
\hyper@loadpackage{natbib}
\hyper@loadpackage{subeqnarray}
\hyper@loadpackage{theorem}
\hyper@loadpackage{upref}
\hyper@loadpackage{xr}
```

Afterwards we add each package the user has told us to do.

```
\def\@hyper@load@pkg(#1){%
  \expandafter\ifx\csname hyper@loaded@#1\endcsname\relax%
    \IfFileExists{#1.hyp}%
      {\IfFileExists{#1.sty}{\RequirePackage{#1}}{}%
       \input{#1.hyp}%
       \expandafter\edef\csname hyper@loaded@#1\endcsname{#1.hyp}%
      }%
      {\PackageError{hyper}{Modification file #1.hyp not found}{}}%
  \fi%
  \hyper@loadpackage%
}
\def\hyper@loadpackage{\@ifnextchar({\@hyper@load@pkg}{}}
\expandafter\hyper@loadpackage\hyper@packages\relax
```

Additionally, we have to load some extensions of the hyper package.

```
\def\@hyper@load@ext(#1){%
  \expandafter\ifx\csname hyper@loaded@ext@#1\endcsname\relax%
    \IfFileExists{#1.sty}%
      {\RequirePackage{#1}%
       \expandafter\edef\csname hyper@loaded@ext@#1\endcsname{#1.sty}%
      }%
      {\PackageError{hyper}{Extension file #1.sty not found}{}}%
  \fi%
```

```
  \hyper@loadpackage%
}
\def\hyper@load@extension{\@ifnextchar({\@hyper@load@ext}{}}
\expandafter\hyper@load@extension\hyper@extensions\relax
```

Now we have to activate the (nondefault) decision for placing the anchors on pages (top of page or pagenumber)

```
\ifx\hyper@pageanchor\@undefined
\else
  \expandafter\let\expandafter\hyper@modifyheadfoot\hyper@pageanchor
\fi
```

Last but not least we have to decide whether we really want the hypertext–marks being inserted into the dvi–file.

```
\ifx\hyper@do\@undefined\else\hyper@do\fi
⟨/hyper⟩
```

8.19 Compatibility with Ordinary LaTeX

The package redefines the notion of a label. Thus, to be able to add the package to an exising LaTeX-file without having trouble with an existing `.aux`-file we have to be able to handle the old as well as the new definition:

```
⟨*hyper⟩
\def\hyper@end@newlabel{\relax}
\let\hyper@orig@newlabel\newlabel
\def\hyper@newlabel#1#2#3#4#5{%
   \ifx|#4|%
      \hyper@orig@newlabel{#1}{{}{}{#2}{#3}}%
   \else%
      \hyper@orig@newlabel{#1}{{#2}{#3}{#4}{#5}}%
   \fi%
}
\def\newlabel#1#2{\hyper@newlabel{#1}#2\hyper@end@newlabel\hyper@end@newlabel}
```

The package leaves traces for intermediate informations in several auxiliary files. To be able to remove the package without deleting these auxiliary files, certain definitions have to remain to exist. The following code ensures, that these definitions are availlable, by adding them to the subsequently generated `.aux`-files.

```
\begingroup
  \catcode`\<=\catcode`\{
  \catcode`\>=\catcode`\}
  \catcode`\{=12\catcode`\}=12
  \catcode`\%=12
  \gdef\hyper@open<{>
  \gdef\hyper@close<}>
  \gdef\hyper@comment<%>
\endgroup
\def\hyper@nl{^^J}%
\long\def\hyper@protected@write#1{%
   \begingroup%
```

```
      \let\thepage\relax%
      \let\protect\@unexpandable@protect%
      \edef\reserved@a{\immediate\write\@auxout{#1}}%
      \reserved@a%
   \endgroup%
   \if@nobreak\ifvmode\nobreak\fi\fi%
}
\gdef\hyper@aux@write{
   \hyper@protected@write{\hyper@comment@potential%
      \string\ifx\string\newhyper\string\@undefined%
   }
   \hyper@protected@write{\hyper@comment@potential%
      \string\gdef\string\newhyper\hyper@hash1\hyper@hash2{}\hyper@nl
      \string\gdef\string\hyperfnpage\hyper@hash1\hyper@hash2{}\hyper@nl
      \string\global\string\let\string\@hyper@newlabel\string\newlabel\hyper@nl
      \string\gdef\string\hyper@end@newlabel{\string\relax}\hyper@nl
      \string\gdef\string\hyper@newlabel\hyper@hash1\hyper@hash2\hyper@hash3\hyper@hash4\hyp
                     {\hyper@comment@potential%
        \string\ifx\string|\hyper@hash4\string|\string\hyper@end@newlabel\hyper@comment@pote
          \string\@hyper@newlabel{\hyper@hash1}{{\hyper@hash2}{\hyper@hash3}}%
                     \hyper@comment@potential%
        \string\else\hyper@comment@potential%
          \string\@hyper@newlabel{\hyper@hash1}{{\hyper@hash4}{\hyper@hash5}}%
                     \hyper@comment@potential%
        \string\fi\hyper@comment@potential%
      }\hyper@nl
      \string\gdef\string\newlabel\hyper@hash1\hyper@hash2%
                     {\string\hyper@newlabel{\hyper@hash1}\hyper@hash2%
                     \string\hyper@end@newlabel\string\hyper@end@newlabel}\hyper@nl
      \string\gdef\string\@@hyperpage[\hyper@hash1]{\hyper@hash1}\hyper@nl
      \string\gdef\string\@hyperpage\hyper@hash1{\hyper@hash1}\hyper@nl
      \string\gdef\string\hyperpage%
                     {\string\@ifnextchar[\string\@@hyperpage\string\@hyperpage}\hyper@nl
      \string\global\string\let\string\fragilehyperreference\string\@gobble\hyper@nl
      \string\global\string\let\string\fragilehyperpagereference\string\@gobble\hyper@nl
      \string\global\string\let\string\fragilehyperanchor\string\@gobble\hyper@nl
      \string\global\string\let\string\fragileblindhyperanchor\string\@gobble\hyper@nl
      \string\global\string\let\string\fragilehyperURL\string\@gobble\hyper@nl
      \string\gdef\string\hyperbackcite\hyper@hash1\hyper@hash2\hyper@hash3\hyper@hash4%
                     {}\hyper@nl
      \string\global\string\let\string\hyper@setref\string\@setref\hyper@nl
      \string\gdef\string\hyper@thirdoffour\hyper@hash1\hyper@hash2\hyper@hash3%
                     {\hyper@hash2}\hyper@nl
      \string\gdef\string\hyper@forthoffour\hyper@hash1\hyper@hash2\hyper@hash3%
                     {\hyper@hash3}\hyper@nl
      \string\gdef\string\hyper@end@forthoffour{\string\relax}\hyper@nl
      \string\gdef\string\@setref\hyper@hash1{\hyper@comment@real\hyper@nl
        \string\ifx\hyper@hash1\string\relax\hyper@comment@real\hyper@nl
           \string\def\string\hyper@next{\string\hyper@setref{\hyper@hash1}}%
                     \hyper@comment@real\hyper@nl
```

```
      \string\else\hyper@comment@real\hyper@nl
        \string\edef\string\hyper@tmp%
                    {\string\expandafter\string\hyper@forthoffour\hyper@hash1%
                    \string\hyper@end@forthoffour}\hyper@comment@real\hyper@nl
        \string\ifx\string\hyper@tmp\string\hyper@end@forthoffour%
                    \hyper@comment@real\hyper@nl
          \string\def\string\hyper@next{\string\hyper@setref{\hyper@hash1}}%
                    \hyper@comment@real\hyper@nl
        \string\else\hyper@comment@real\hyper@nl
          \string\edef\string\hyper@tmp%
                    {{\string\expandafter\string\hyper@thirdoffour\hyper@hash1}%
                    {\string\expandafter\string\hyper@forthoffour\hyper@hash1}}%
                    \hyper@comment@real\hyper@nl
          \string\def\string\hyper@next{\string\hyper@setref{\string\hyper@tmp}}%
                    \hyper@comment@real\hyper@nl
        \string\fi\hyper@comment@real\hyper@nl
      \string\fi\hyper@comment@real\hyper@nl
      \string\hyper@next\hyper@comment@real\hyper@nl
    }
}
\hyper@protected@write{\hyper@comment@potential%
    \string\begingroup\hyper@nl
      \string\catcode\string`\string\<\string=\string\catcode\string`\string\{\hyper@nl
      \string\catcode\string`\string\>\string=\string\catcode\string`\string\}\hyper@nl
      \string\catcode\string`\string\{\string=12%
      \string\catcode\string`\string\}\string=12\hyper@nl
      \string\catcode\string`\string\%\string=12\hyper@nl
      \string\gdef\string\hyper@open<{>\hyper@nl
      \string\gdef\string\hyper@close<}>\hyper@nl
      \string\gdef\string\hyper@comment<\hyper@comment@real>\hyper@nl
    \string\endgroup
}
\hyper@protected@write{\hyper@comment@potential%
    \string\bgroup\hyper@nl
      \string\global\string\edef\string\hyper@hash{\string\string\hyper@hash}\hyper@nl
    \string\egroup
}
\hyper@protected@write{\hyper@comment@potential%
    \string\gdef\string\hyper@nl{\string^\string^J}
}
\hyper@protected@write{\hyper@comment@potential%
    \string\def\string\hyper@hash@four{\string\hyper@hash\string\hyper@hash%
                    \string\hyper@hash\string\hyper@hash}
}
\hyper@protected@write{\hyper@comment@potential%
    \string\global\string\long\string\def\string\hyper@protected@write\hyper@hash1%
                    {\hyper@nl
      \string\begingroup\hyper@nl
        \string\let\string\thepage\string\relax\hyper@nl
        \string\let\string\protect\string\@unexpandable@protect\hyper@nl
```

```
            \string\edef\string\reserved@a{\string\immediate\string\write\string\@auxout%
                      {\hyper@hash1}}\hyper@nl
            \string\reserved@a\hyper@nl
         \string\endgroup\hyper@nl
      \string\if@nobreak\string\ifvmode\string\nobreak\string\fi\string\fi\hyper@nl
      }
   }
   \hyper@protected@write{\hyper@comment@potential%
      \string\gdef\string\hyper@aux@write\hyper@open
   }%
   \hyper@second@write{\hyper@comment@potential%
      \string\hyper@write\hyper@open\hyper@nl
         \string\begingroup\hyper@nl
            \string\let\string\@hyper@protected@write\string\hyper@protected@write\hyper@nl
            \string\def\string\hyper@protected@write@do\hyper@hash\hyper@hash1%
                      \hyper@hash\hyper@hash2{\hyper@nl
               \string\begingroup\hyper@nl
                  \string\let\string\hyper@string\string\string\hyper@nl
                  \string\def\string\string%
                      {\string\hyper@string\string\string\string\hyper@string}\hyper@nl
                  \string\def\string\hyper@open%
                      {\string\hyper@string\string\hyper@open}\hyper@nl
                  \string\def\string\hyper@close%
                      {\string\hyper@string\string\hyper@close}\hyper@nl
                  \string\def\string\hyper@nl%
                      {\string\hyper@string\string\hyper@nl\string^\string^J}\hyper@nl
                  \string\def\string\hyper@comment@real%
                      {\string\hyper@string\string\hyper@comment@real}\hyper@nl
                  \string\def\string\hyper@comment@potential%
                      {\string\hyper@string\string\hyper@comment@potential%
                      \string\hyper@comment\string^\string^J}\hyper@nl
                  \string\def\string\hyper@hash%
                      {\string\hyper@string\string\hyper@hash}\hyper@nl
                  \string\@hyper@protected@write%
                      {\string\hyper@string\hyper@hash\hyper@hash1%
                      {\hyper@hash\hyper@hash2\string^\string^J}}\hyper@nl
               \string\endgroup\hyper@nl
            }\hyper@nl
            \string\def\string\hyper@protected@write%
                      {\string\hyper@protected@write@do\string\hyper@protected@write}%
                      \hyper@nl
            \string\def\string\hyper@second@write\hyper@hash\hyper@hash1{\hyper@nl
               \string\hyper@protected@write@do\string\hyper@second@write%
                      {\hyper@hash\hyper@hash1}\hyper@nl
               \string\@hyper@protected@write{\hyper@hash\hyper@hash1}\hyper@nl
            }\hyper@nl
            \string\def\string\hyper@write{\string\@gobble}\hyper@nl
            \string\hyper@aux@write\hyper@nl
         \string\endgroup\hyper@nl
      \hyper@close
```

```
  }
  \hyper@write{
    \begingroup
      \let\@hyper@protected@write\hyper@protected@write
      \def\hyper@protected@write@do##1##2{
        \begingroup
          \let\hyper@string\string
          \def\string{\hyper@string\string\hyper@string}
          \def\hyper@open{\hyper@string\hyper@open}
          \def\hyper@close{\hyper@string\hyper@close}
          \def\hyper@nl{\hyper@string\hyper@nl^^J}
          \def\hyper@comment@real{\hyper@string\hyper@comment@real}
          \def\hyper@comment@potential%
                 {\hyper@string\hyper@comment@potential\hyper@comment^^J}
          \def\hyper@hash{\hyper@string\hyper@hash}
          \@hyper@protected@write{\hyper@string##1{##2^^J}}
        \endgroup
      }
      \def\hyper@protected@write{\hyper@protected@write@do\hyper@protected@write}
      \def\hyper@second@write##1{
        \hyper@protected@write@do\hyper@second@write{##1}
        \@hyper@protected@write{##1}
      }
      \def\hyper@write{\@gobble}
      \hyper@aux@write
    \endgroup
  }
  \hyper@protected@write{\hyper@comment@potential%
    \hyper@close
  }
  \hyper@protected@write{\hyper@comment@potential%
    \string\AtBeginDocument{\hyper@comment@real\hyper@nl%
      \string\let\string\hyper@write\string\relax%
                  \hyper@comment@real\hyper@nl%
      \string\let\string\hyper@second@write\string\@gobble%
                  \hyper@comment@real\hyper@nl%
      \string\let\string\hyper@comment@potential\string\@empty%
                  \hyper@comment@real\hyper@nl%
      \string\let\string\hyper@comment@real\string\hyper@comment%
                  \hyper@comment@real\hyper@nl%
      \string\hyper@aux@write\hyper@comment@real\hyper@nl%
    }
  }
  \hyper@protected@write{\hyper@comment@potential%
    \string\fi
  }
 \relax
}
\AtBeginDocument{%
  \let\hyper@write\relax%
```

```
    \let\hyper@second@write\@gobble%
    \let\hyper@comment@potential\@empty%
    \let\hyper@comment@real\hyper@comment%
    \hyper@aux@write%
}
⟨/hyper⟩
```

9 Supported Packages

9.1 $\mathcal{AMS}$-LaTeX 2$_\varepsilon$

9.1.1 The Classes

First of all let us modify the $\mathcal{AMS}$-LaTeX 2$_\varepsilon$–classes.
We change `amsart.cls`, `amsproc.cls`, and `amsbook.cls` in the following way.

```
⟨*amsart, amsproc, amsbook⟩
\let\hyper@makecaption\@makecaption
\def\@makecaption#1#2{%
  \hyper@makecaption{\hyperanchor{\@currenthyper}{#1}}{#2}%
}
\def\@makefnmark{%
  \hyper@currentfnmark%
  \hbox{%
      \@textsuperscript{%
        \normalfont%
        \hyperreference{\hyper@current@fnmark}%
        {\@thefnmark}%
      }%
    }%
}
\long\def\@makefntext#1{\indent%
  \hyper@currentfnmark%
  \bgroup%
    \edef\@currenthyper{\hyper@current@fnmark}%
    \parindent 1em\noindent
    \hbox{%
      \hss\@textsuperscript{%
        \normalfont%
        \hyperanchor{\hyper@current@fnmark}{\@thefnmark}%
      }%
    }%
    #1
  \egroup%
}
\let\hyper@tocwriteb\@tocwriteb
\def\hyper@tocwriteb@def[#1]{%
    \def\@tocwriteb##1##2##3{%
       \hyper@tocwriteb{##1}{##2}{#1}%
       \let\@tocwriteb\hyper@tocwriteb%
    }%
}
\def\@sect#1#2#3#4#5#6[#7]#8{%
  \ifnum#2>\c@secnumdepth%
    \hyper@setcurrent%
  \else%
    \refstepcounter{#1}%
    \ignore@next@refstepcounter%
```

```
  \fi%
  \hyper@settype{#1}%
  \global\let\@currenthyper\@currenthyper%
  \global\let\@currenthypertype\@currenthypertype%
  \ifnum#2>\@m\else%
    \callwithexpandedhyperref{\hyper@tocwriteb@def}{#8}%
  \fi%
  \callwithexpandedhyperref%
    {\hyper@sect{#1}{#2}{#3}{#4}{#5}{#6}}%
    {#7}%
    {\hyperanchor{\@currenthyper}{#8}}%
}
```
⟨/amsart, amsproc, amsbook⟩

For `amsbook.cls` we need some additional modifications for parts and chapters.

```
⟨*amsbook⟩
\let\hyper@chapter\@chapter
\def\@chapter[#1]#2{%
  \refstepcounter{chapter}%
  \ignore@next@refstepcounter%
  \hyper@settype{chapter}%
  \global\let\@currenthyper\@currenthyper%
  \global\let\@currenthypertype\@currenthypertype%
  \callwithexpandedhyperref{\hyper@tocwriteb@def}{#2}%
  \hyper@chapter[#1]{\hyperanchor{\@currenthyper}{#2}}%
}
\let\hyper@chaptermark\chaptermark
\def\hyper@chaptermark@def[#1]{%
    \def\chaptermark##1{%
       \hyper@chaptermark{#1}%
       \let\chaptermark\hyper@chaptermark%
    }%
}
\let\hyper@schapter\@schapter
\def\@schapter#1{%
  \hyper@setcurrent%
  \hyper@settype{chapter}%
  \global\let\@currenthyper\@currenthyper%
  \global\let\@currenthypertype\@currenthypertype%
  \callwithexpandedhyperref{\hyper@tocwriteb@def}{#1}%
  \callwithexpandedhyperref{\hyper@chaptermark@def}{#1}%
  \hyper@schapter{\hyperanchor{\@currenthyper}{#1}}%
}
\let\hyper@part\@part
\def\@part[#1]#2{%
  \ifnum\c@secnumdepth>-2\relax%
    \refstepcounter{part}%
    \ignore@next@refstepcounter%
  \else%
    \hyper@setcurrent%
```

```
  \fi%
  \hyper@settype{part}%
  \global\let\@currenthyper\@currenthyper%
  \global\let\@currenthypertype\@currenthypertype%
  \callwithexpandedhyperref%
    {\hyper@part}%
    {#1}%
    {\hyperanchor{\@currenthyper}{#2}}%
}
\def\hyper@add@part[#1]{%
  \addcontentsline{toc}{part}{\protect\noindent#1}%
}
\def\@spart#1{%
  \hyper@setcurrent%
  \hyper@settype{part}%
  \global\let\@currenthyper\@currenthyper%
  \global\let\@currenthypertype\@currenthypertype%
  \callwithexpandedhyperref{\hyper@add@part}{#1}%
  \begingroup\centering
  \fontsize{\@xxpt}{25}\bfseries
     \hyperanchor{\@currenthyper}{#1}%
     \vfil\vfil\endgroup \newpage\thispagestyle{empty}}
⟨/amsbook⟩
```

`amsdtx.cls` has to be modified as follows.

```
⟨*amsdtx⟩
\input{book.hyp}
\renewcommand\maketitle{\par
  \begingroup
    \renewcommand\thefootnote{\fnsymbol{footnote}}%
    \def\@makefnmark{%
      \hyper@currentfnmark%
      \hbox to\z@{%
      \@textsuperscript{%
        \normalfont%
        \hyperreference%
          {\hyper@current@fnmark}%
          {\@thefnmark}%
      }%
    }}%
    \long\def\@makefntext##1{%
      \hyper@currentfnmark%
      \bgroup%
        \edef\@currenthyper{\hyper@current@fnmark}%
        \parindent 1em%
        \noindent%
        \hbox to1.8em%
          {\hss$\m@th^{%
            \hyperanchor{\hyper@current@fnmark}{\@thefnmark}%
          }$}##1%
```

```
      \egroup%
    }%
    \if@twocolumn
      \ifnum \col@number=\@ne
        \@maketitle
      \else
        \twocolumn[\@maketitle]%
      \fi
    \else
      \newpage
      \global\@topnum\z@
      \@maketitle
    \fi
    \thispagestyle{plain}\@thanks
  \endgroup
  \setcounter{footnote}{0}%
  \let\thanks\relax
  \let\maketitle\relax\let\@maketitle\relax
  \gdef\@thanks{}\gdef\@author{}\gdef\@title{}}
⟨/amsdtx⟩
```

For `amsldoc.cls` we need the following changes.

```
⟨*amsldoc⟩
\input{book.hyp}
\let\hyper@theindex@ams\theindex%fetch modified index from book.hyp
\def\theindex{%
  \hyper@theindex@ams%
  \let\autoindex\@gobble%
}
⟨/amsldoc⟩
```

9.1.2 The Packages

To add the hypertext–capability to `amsmath` respectively `amstex` some macros of them have to be modified.
As we have redefined `\@eqnnum` and we need another definition for `amsmath` and `amstex` let us set the macro to its default.

```
⟨*amsmath, amstex⟩
\iftagsleft@
  \def\@eqnnum{\hbox to1sp{}\rlap{\normalfont\normalcolor
    \hskip -\displaywidth\tagform@\theequation}}
\else
  \def\@eqnnum{{\normalfont\normalcolor \tagform@\theequation}}
\fi
⟨/amsmath, amstex⟩
```

`amsmath` temporary redefines `\label` but needs the original definition that is hold in `\ltx@label`.

```
⟨*amsmath⟩
\let\ltx@label\label
```

1716 ⟨/amsmath⟩

Now let us define a blind anchor for referencing a couple of equations bound together.

1717 ⟨*amsmath, amstex⟩
```
\let\hyper@subequations\subequations
\def\subequations{%
  \hyper@setcurrent%
  \hyper@settype{equation}%
  \blindhyperanchor{\@currenthyper}%
  \hyper@subequations%
}
```

To allow the references pointing to an equation number we have to define an appropriate anchor.

```
\let\hyper@tagform@\tagform@
\def\tagform@#1{%
  \maketag@@@{\hyperanchor{\@currenthyper}{(\ignorespaces#1\unskip)}}%
}
```
1729 ⟨/amsmath, amstex⟩

For user defined tags it is necessary to generate a new hypertext number in `amsmath`.

1730 ⟨*amsmath⟩
```
\let\hyper@make@display@tag\make@display@tag
\def\make@display@tag{%
  \if@eqnsw\else\iftag@%
    \hyper@setcurrent%
    \hyper@settype{equation}%
  \fi\fi%
  \hyper@make@display@tag%
}
```
1739 ⟨/amsmath⟩

For `amstex` a similar result cannot be provided with an as simple changing. This is due to `\@seteqlabel` being called when introducing a new tag. Supposing `\@seteqlabel` defining the correct `\@currenthyper` we therefore have to modify `\make@df@tag` as follows.

1740 ⟨*amstex⟩
```
\def\make@df@tag@@@#1{%
  \@seteqlabel{#1}%
  \global\let\ams@currenthyper\@currenthyper%
  \gdef\df@tag{\let\@currenthyper\ams@currenthyper\tagform@{#1}}%
}
```

Now we just have to ensure `\@seteqlabel` defining the correct `\@currenthyper`.

```
\def\@seteqlabel#1{%
  \toks@\@xp{\p@equation{#1}}%
  \hyper@setcurrent%
  \hyper@settype{equation}%
  \edef\@currenthyper{\@currenthyper.\the\toks@}%
```

```
  \edef\@currentlabel{\the\toks@}%
}
```
⟨/amstex⟩

We should not use an anchor when using `\eqref`

```
⟨*amsmath, amstex⟩
\def\eqref#1{\textup{\hyper@tagform@{\ref{#1}}}}
⟨/amsmath, amstex⟩
```

Damned `amstex` redefines the macro `\label`. We have to ensure that the correct stuff is written into the `.aux`-file when this macro is called.

```
⟨*amstex⟩
\def\hyperlabel#1{%
   \@bsphack%
      \iffirstchoice@\if@filesw%
         {\let\thepage\relax%
          \def\protect{\noexpand\noexpand\noexpand}%
          \xdef\@gtempa{%
             \write\@auxout{%
                \string\newlabel{#1}{{\@currenthypertype}{\@currenthyper}{\@currentlabel}{\
             }%
          }%
         }%
         \@gtempa%
         \if@nobreak\ifvmode\nobreak\fi\fi%
      \fi\fi%
   \@esphack%
}
\let\label\hyperlabel
⟨/amstex⟩
```

To get hypertext references to theorems, lemmas, etc. `amsthm` has to be modified.

```
⟨*amsthm⟩
\let\@begintheorem\hyper@begintheorem
\def\thmhead@plain#1#2#3{%
  \hyperanchor{\@currenthyper}{\thmname{#1}\thmnumber{ #2}}%
  \thmnote{ {\the\thm@notefont(#3)}}%
}
\let\thmhead\thmhead@plain
\def\swappedhead#1#2#3{%
  \hyperanchor{\@currenthyper}{\thmnumber{#2}\thmname{. #1}}%
  \thmnote{ {\the\thm@notefont(#3)}}%
}
⟨/amsthm⟩
```

For `upref` working correct it is sufficient to modify `\hyper@setref`.

```
⟨*upref⟩
\def\hyper@setref#1#2#3#4{%
  \ifx#1\relax%
     \protect\G@refundefinedtrue%
     #4\nfss@text{\reset@font\bfseries ??}%
```

```
    \@latex@warning{Reference `#3' on page \thepage \space undefined}%
  \else%
    \edef\hyper@tmp{\expandafter\hyper@secondoffour#1}%
    \ifx\hyper@tmp\@empty%
       \ifx#2\hyper@secondoffour%
          #4\null%
        \else\ifx#2\hyper@thirdoffour%
          #4\protect\textup{\expandafter#2#1\hbox{}}\null%
        \else%
          #4\protect\textup{\expandafter#2#1\hbox{}}\null%
        \fi\fi%
    \else%
       \ifx#2\hyper@secondoffour%
          \hyperreference{\expandafter\hyper@secondoffour#1}{#4}\null%
        \else\ifx#2\hyper@thirdoffour%
          \hyperreference%
            {\expandafter\hyper@secondoffour#1}%
            {#4\protect\textup{\expandafter#2#1\hbox{}}}\null%
        \else%
          \hyperpagereference%
            {\expandafter\hyper@forthoffour#1}%
            {#4\protect\textup{\expandafter#2#1\hbox{}}}\null%
        \fi\fi%
    \fi%
  \fi%
}
⟨/upref⟩
```

9.2 Cross References between Documents

The package `xr` adds the capability of generating cross–references between different LaTeX 2ε–documents. It is a nice feature to support this by hypertext links. Thus we have to modify `xr` appropriately.

At first let us provide an additional parameter to `\externaldocument` giving the URL–address of the document we use references to. It has to be given with surrounding `()`. The default value is given by `documentname.dvi`.

```
⟨*xr⟩
\def\externaldocument{%
  \@ifnextchar(%
    {\hyper@externaldocument}%
    {\hyper@externaldocument()}%
}
\def\hyper@externaldocument(#1){%
  \@ifnextchar[%
    {\hyper@@externaldocument(#1)}%
    {\hyper@@externaldocument(#1)[]}%
}
\def\hyper@@externaldocument(#1)[#2]#3{%
  \def\hyper@XR@docprefix{#1}%
```

```
  \ifx\hyper@XR@docprefix\@empty%
    \def\hyper@XR@docprefix{#3.dvi}%
  \fi%
  \XR@[#2]{#3}%
}
```

Now we have to modify the anchors we refer to from their local definition in the documents `.aux`–file to its external URL–definitions.

```
\def\hyper@xr@end@newlabel{\relax}
\def\hyper@xr@newlabel#1#2#3#4#5{%
   \ifx#4\hyper@xr@end@newlabel%
      \newlabel%
         {\XR@prefix#1}%
         {{}%
          {}%
          {#2}%
          {[file:\hyper@XR@docprefix][#3]}%
         }%
   \else%
      \newlabel%
         {\XR@prefix#1}%
         {{#2}%
          {[file:\hyper@XR@docprefix][#3]}%
          {#4}%
          {[file:\hyper@XR@docprefix][#5]}%
         }%
   \fi
}
\long\def\XR@test#1#2#3#4\XR@{%
  \ifx#1\newlabel%
    \expandafter\hyper@xr@newlabel{#2}#3\hyper@xr@end@newlabel\hyper@xr@end@newlabel%
  \else\ifx#1\newhyper%
     \newhyper{\XR@prefix#2}{#3}%
  \else\ifx#1\@input%
     \edef\XR@list{\XR@list#2\relax}%
  \fi\fi\fi%
  \ifeof%
    \@inputcheck\expandafter\XR@aux%
  \else%
    \expandafter\XR@read%
  \fi%
}
```

⟨/xr⟩

9.3 Fancy Headings

The package `fancyheadings` uses a different way to express headings. This gives us trouble on pages with an “empty” page style via the (default) settings for headers and footers using the macro `\fancyplain`. To get the page number if all the parts for the heads and foots are empty demands a fairly complicated

mechanism to implement if we want to refer to the page number as we do have to detect whether we really have a page number on the page. For sake of simplicity of processing we assume that any time there is a non-empty text for the head or the foot there also is a page number printed in either the head or the foot.

```
⟨*fancyheadings⟩
\def\hyper@fancy@oddhead{\@fancyhead\@lodd\@olhead\@ochead\@orhead\@rodd}
\def\hyper@fancy@oddfoot{\@fancyfoot\@lodd\@olfoot\@ocfoot\@orfoot\@rodd}
\def\hyper@fancy@evenhead{\@fancyhead\@rodd\@elhead\@echead\@erhead\@lodd}
\def\hyper@fancy@evenfoot{\@fancyfoot\@rodd\@elfoot\@ecfoot\@erfoot\@lodd}
\def\hyper@fancy@empty{{\hyper@empty\hyper@empty}}
\def\hyper@iffancyplain@empty#1#2#3#4#5\hyper@iffancyplain@empty{%
  \ifx#4\hyper@fancy@empty%
     \ifx#1\fancyplain%
        \if@fancyplain%
           \ifx\\#2\\1\else0\fi%
        \else%
           \ifx\\#3\\1\else0\fi%
        \fi%
     \else%
        0%
     \fi%
  \else%
     0%
  \fi%
}
\def\hyper@iffancy@empty#1{%
   \ifnum\ifx#1\@empty1\else0\fi%
         \ifx#1\hyper@empty1\else0\fi%
         \expandafter%
            \hyper@iffancyplain@empty%
               #1\hyper@fancy@empty%
                 \hyper@fancy@empty\hyper@fancy@empty%
                 \hyper@fancy@empty\hyper@fancy@empty%
            \hyper@iffancyplain@empty%
         >0 0\else1\fi%
}
\def\hyper@modifyheadfoot@pagenumber{%
  \let\hyper@thehead\@thehead%
  \ifx\hyper@thehead\hyper@oddhead\let\hyper@thehead\@oddhead\fi%
  \ifx\hyper@thehead\hyper@evenhead\let\hyper@thehead\@evenhead\fi%
  \let\hyper@thefoot\@thefoot%
  \ifx\hyper@thefoot\hyper@oddfoot\let\hyper@thefoot\@oddfoot\fi%
  \ifx\hyper@thefoot\hyper@evenfoot\let\hyper@thefoot\@evenfoot\fi%
  \def\@thehead{%
      \ifnum\ifnum\ifx\hyper@thehead\@empty1\else0\fi%
                  \ifx\hyper@thehead\hyper@empty1\else0\fi%
                  \ifx\hyper@thehead\relax1\else0\fi%
                  >0 0\else1\fi%
            \ifnum\ifx\hyper@thefoot\@empty1\else0\fi%
```

```
                \ifx\hyper@thefoot\hyper@empty1\else0\fi%
                \ifx\hyper@thefoot\relax1\else0\fi%
                >0 0\else1\fi%
          >0\relax%
        \ifnum\ifnum\ifx\hyper@thehead\hyper@fancy@oddhead1\else0\fi%
                    \ifx\hyper@thehead\hyper@fancy@evenhead1\else0\fi%
                    >0 0\else1\fi%
              \ifnum\ifx\hyper@thefoot\hyper@fancy@oddfoot1\else0\fi%
                    \ifx\hyper@thefoot\hyper@fancy@evenfoot1\else0\fi%
                    >0 0\else1\fi%
              >0\relax%
        \else%
          \ifnum\ifnum\hyper@iffancy@empty\@olhead%
                      \hyper@iffancy@empty\@ochead%
                      \hyper@iffancy@empty\@orhead%
                      >0 1\else0\fi%
                \ifnum\hyper@iffancy@empty\@olfoot%
                      \hyper@iffancy@empty\@ocfoot%
                      \hyper@iffancy@empty\@orfoot%
                      >0 1\else0\fi%
                >0\relax%
          \else%
            \blindhyperanchor{page.\thepage}%
          \fi%
        \fi%
      \else%
        \blindhyperanchor{page.\thepage}%
      \fi%
      \let\hyper@thepage\thepage%
      \let\thepage\hyper@anchorpage%
      \ifx\hyper@thehead\@empty%
        \hfil%
      \else\ifx\hyper@thehead\hyper@empty%
        \hfil%
      \else%
        \hyper@thehead%
      \fi\fi%
  }%
  \def\@thefoot{%
      \let\hyper@thepage\thepage%
      \let\thepage\hyper@anchorpage%
      \ifx\hyper@thefoot\@empty%
        \hfil%
      \else\ifx\hyper@thefoot\hyper@empty%
        \hfil%
      \else%
        \hyper@thefoot%
      \fi\fi%
  }%
}
```

```
\let\hyper@modifyheadfoot\hyper@modifyheadfoot@pagenumber
⟨/fancyheadings⟩
```

9.4 Long Tables

The package `longtable` uses a definition of `\caption` for it's own. Thus we have to modify this to reflect the hypertext needs.

```
⟨*longtable⟩
\let\hyper@LT@array\LT@array
\def\LT@array{%
  \refstepcounter{table}\ignore@next@refstepcounter%
  \def\@currenthyper{\the\hypercount}%
  \hyper@LT@array%
}
\def\LT@c@ption#1[#2]#3{%
  \LT@makecaption#1\fnum@table{#3}%
  \def\@tempa{#2}\ifx\@tempa\@empty\else
     {\let\\\space%
      \edef\@currenthyper{\the\hypercount}%
      \addcontentsline%
        {lot}%
        {table}%
        {\protect\numberline{\thetable}{\hyperreference{\@currenthyper}{#2}}}%
     }%
  \fi}
\def\LT@makecaption#1#2#3{%
  \LT@mcol\LT@cols c{\hbox to\z@{\hss\parbox[t]\LTcapwidth{%
    \hyper@setcurrent%
    \hyper@settype{caption}%
    \sbox\@tempboxa{\hyperanchor{\@currenthyper}{#1{#2}}: #3}%
    \ifdim\wd\@tempboxa>\hsize
      \hyperanchor{\@currenthyper}{#1{#2}}: #3%
    \else
      \hbox to\hsize{\hfil\box\@tempboxa\hfil}%
    \fi
    \endgraf\vskip\baselineskip}%
  \hss}}%
}
⟨/longtable⟩
```

9.5 Right Column Footnotes in Double Column Documents

`ftnright.sty` redefines the macro `\@makefntext`. Thus we have to modify it's definition when needed.

```
⟨*ftnright⟩
\long\def\@makefntext#1{%
  \hyper@currentfnmark%
  \bgroup%
    \edef\@currenthyper{\hyper@current@fnmark}%
```

```
    \parindent 1em%
    \noindent\hbox to 2em{}%
    \llap{${\hyperanchor{\hyper@current@fnmark}{\@thefnmark}}.\;\;$}#1%
  \egroup%
}
```
⟨/ftnright⟩

9.6 The natbib-Package

Unfortunately, the bibliography stuff is changed by the natbib-package. So we have to provide a special macrocode fragment for it which is complicated by the fact, that the package scans parts of the \bibitem parameters from the *.aux-file. Let's start with adding an anchor to the bibliographic entries.

⟨*natbib⟩
```
\def\@lbibitem[#1]#2{%
   \hyper@setcurrent%
   \hyper@settype{citation}%
   \@ifundefined{b@#2\@extra@b@citeb}{\def\NAT@num{}}{\NAT@parse{#2}}%
   \item[\hfil\hyperanchor{\@currenthyper}{\@biblabel{\NAT@num}}]%
    \NAT@ifcmd#1()()\@nil{#2}%
}
```

To be able to associate the correct hyperlinks from citations to the respectively bibliographic entries, we have to save the hyper-addresses into the .aux-file and provide a macro to read them. Note, that we cannot use the same technique as in standard LaTeX 2ε as the natbib-package scans parts of the arguments of \bibitem and we have to ensure, that we do not introduce conflicts by surrounding the entries with a hyperlink. To avoid that we store the hyperlink in another macro.

```
\renewcommand\NAT@wrout[5]{%
  \if@filesw%
    {\let\protect\noexpand\let~\relax%
     \immediate%
     \write\@auxout%
       {\string\bibcite{#5}{{#1}{#2}{{#3}}{{#4}}}{\@currenthyper}}%
    }%
  \fi%
  \ignorespaces%
}
\renewcommand\bibcite[3]{%
   \@ifundefined{b@#1\@extra@binfo}\relax
     {\NAT@citemultiple%
      \PackageWarningNoLine{natbib}{Citation `#1' multiply defined}%
     }%
   \global\@namedef{b@#1\@extra@binfo}{#2}%
   \global\@namedef{hyper@b@#1\@extra@binfo}{#3}%
}
\AtEndDocument{\NAT@swatrue\renewcommand\bibcite[3]{\NAT@testdef{#1}{#2}}}%
```

Now comes the crucial part. We have to invoke the hyperlinks at appropriate points in the citation macros. Fortunately `natbib` supports `hyperref` by adding macros at appropriate places that can be redefined for introducing the links.

```
\def\hyper@natlinkstart#1#2\hyper@natlinkend{%
  \hyperreference{\csname hyper@b@#1\@extra@b@citeb\endcsname}{#2}%
}
\def\hyper@natlinkend{\relax}
```

But we do not like their solution for citations with author name and year. We can do better by not including the separators into the links.

```
\def\NAT@citex%
  [#1][#2]#3{\let\@citea\@empty%
  \@cite{\let\NAT@nm\@empty\let\NAT@year\@empty%
    \@for\@citeb:=#3\do%
    {\edef\@citeb{\expandafter\@firstofone\@citeb}%
     \if@filesw\immediate\write\@auxout{\string\citation{\@citeb}}\fi%
     \@ifundefined{b@\@citeb\@extra@b@citeb}{\@citea%
       {\reset@font\bfseries ?}\NAT@citeundefined%
                  \PackageWarning{natbib}%
       {Citation `\@citeb' on page \thepage \space undefined}}%
     {\let\NAT@last@nm=\NAT@nm\let\NAT@last@yr=\NAT@year%
     \NAT@parse{\@citeb}\ifNAT@full\let\NAT@nm\NAT@all@names\else%
       \let\NAT@nm\NAT@name\fi%
     \ifNAT@swa%
       \ifx\NAT@last@nm\NAT@nm\NAT@yrsep%
         \ifx\NAT@last@yr\NAT@year%
           \hyper@natlinkstart{\@citeb}{\NAT@exlab}\hyper@natlinkend%
         \else%
           \unskip\ %
           \hyper@natlinkstart{\@citeb}{\NAT@date}\hyper@natlinkend%
         \fi%
       \else\@citea%
          \hyper@natlinkstart{\@citeb}{{\NAT@nm}}\hyper@natlinkend%
          \NAT@aysep\ %
          \hyper@natlinkstart{\@citeb}{\NAT@date}\hyper@natlinkend%
       \fi%
       \def\@citea{\NAT@sep\ }%
     \else%
       \ifx\NAT@last@nm\NAT@nm\NAT@yrsep%
         \ifx\NAT@last@yr\NAT@year%
           \hyper@natlinkstart{\@citeb}{\NAT@exlab}\hyper@natlinkend%
         \else%
            \unskip\ %
            \hyper@natlinkstart{\@citeb}{\NAT@date}\hyper@natlinkend%
         \fi%
       \else\@citea%
         \hyper@natlinkstart{\@citeb}{{\NAT@nm}}\hyper@natlinkend%
         \ \NAT@open%
         \hyper@natlinkstart{\@citeb}{\NAT@date}\hyper@natlinkend%
       \fi%
```

```
      \def\@citea{\NAT@close\NAT@sep\ }%
    \fi}}\ifNAT@swa\else\NAT@close\fi}{#1}{#2}}
```

Damned, `natbib` accesses this macros through `\@citex` using a `\let`-assignment. We have to recall this assignment to define it. Fortunately, the package provides a macro to achieve this.

```
\NAT@set@cites
```

Bad news, `natbib` does not provide dummies for inserting hypertext-markups into ranges. Thus we have to patch the sorting macros of the package.

```
\ifnum\NAT@sort=1
\begingroup \catcode`\_=8
\gdef\@make@cite@list{%
    \edef\@citeb{\expandafter\@firstofone\@citeb}%
     \@ifundefined{b@\@citeb\@extra@b@citeb}{%
      \@citea{\reset@font\bfseries?}%
      \def\@citea{\NAT@sep\penalty\@m\NAT@space}%
      \NAT@citeundefined\PackageWarning{natcite}%
      {Citation `\@citeb' on page \thepage\space undefined}}%
    {\NAT@parse{\@citeb}%
      \ifcat_\ifnum\z@<0\NAT@num_\else A\fi%
       \@tempcnta\NAT@num\relax%
       \ifnum\@tempcnta>\@tempcntb%
          \edef\@cite@list{\@cite@list \@celt{{\NAT@num}{\@citeb}}}%
          \@tempcntb\@tempcnta%
       \else%
          \edef\@cite@list{\expandafter\@sort@celt\@cite@list\@gobble @}%
       \fi%
    \else%
       \@citea\hyper@natlinkstart{\@citeb}{\NAT@num}\hyper@natlinkend%
       \def\@citea{\NAT@sep\penalty\@m\NAT@space}%
 \fi}}
\endgroup
\def\@sort@celt#1#2{%
   \ifx \@celt #1%
      \hyper@sort@celt#2%
   \fi%
}%
\def\hyper@sort@celt#1#2{%
   \ifnum #1<\@tempcnta%
      \@celt{{#1}{#2}}%
      \expandafter\expandafter\expandafter\@sort@celt%
   \else%
      \@celt{{\NAT@num}{\@citeb}}\@celt{{#1}{#2}}%
  \fi%
}
\def\@compress@cite#1{\hyper@compress@cite#1}
\def\hyper@compress@cite#1#2{%
  \advance\@tempcnta\@ne%
  \ifnum #1=\@tempcnta%
```

```
      \ifx\@h@ld\relax%
         \edef\@h@ld{%
            \@citea%
            \noexpand\hyper@natlinkstart{#2}{#1}\noexpand\hyper@natlinkend%
         }%
      \else%
         \def\@h@ld{%
            \hbox{--}%
            \hyper@natlinkstart{#2}{#1}\hyper@natlinkend%
         }%
      \fi%
   \else%
      \@h@ld\@citea%
      \hyper@natlinkstart{#2}{#1}\hyper@natlinkend%
      \let\@h@ld\relax%
   \fi%
   \@tempcnta#1\def\@citea{\NAT@sep\penalty\@m\NAT@space}%
}
\fi
⟨/natbib⟩
```

9.7 The Subequationarray Package

First of all we have to set some anchors in the `subeqnarray`-environment we can refer to.

```
⟨*subeqnarray⟩
\def\hyper@subeqnnum@leqno{%
   \hbox to .01\p@{}%
   \rlap{%
      \reset@font\rmfamily%
      \hskip-\displaywidth\hyperanchor{\@currenthyper}{(\thesubequation)}%
   }%
}
\def\hyper@subeqnnum@reqno{%
   {\reset@font\rmfamily \hyperanchor{\@currenthyper}{(\thesubequation)}}%
}
\let\@subeqnnum\hyper@subeqnnum@reqno
\@ifpackagewith{subeqnarray}{leqno}
  {\let\@subeqnnum\hyper@subeqnnum@leqno}
  {\let\@subeqnnum\hyper@subeqnnum@reqno}
\let\hyper@subeqnarray\subeqnarray
\def\subeqnarray{%
   \hyper@setcurrent%
   \hyper@settype{equation}%
   \let\label@currenthyper\@currenthyper%
   \let\label@currenthypertype\@currenthypertype%
   \def\label##1{%
      \let\@currenthyper\label@currenthyper%
      \let\@currenthypertype\label@currenthypertype%
```

```
      \hyperlabel{##1}%
      \blindhyperanchor{\label@currenthyper}%
      \def\@currenthyper{\the\hypercount}%
   }%
   \hyper@setcurrent%
   \hyper@settype{equation}%
   \def\@currenthyper{\the\hypercount}%
   \hyper@subeqnarray%
}
```

The subeqnarray package defines a new label command called `\slabel`. Thus, we have to redefine it in order to ensure that the hyper reference is added to the label when written into the `.aux`-file.

```
\def\slabel#1{%
  \@bsphack
  \if@filesw
    {\let\thepage\relax
     \def\protect{\noexpand\noexpand\noexpand}%
     \edef\@tempa{\write\@auxout{\string
        \newlabel{#1}{{\@currenthypertype}{\@currenthyper}{\thesubequation}{\thepage}}}}%
     \expandafter}\@tempa
     \if@nobreak \ifvmode\nobreak\fi\fi
  \fi\@esphack}
⟨/subeqnarray⟩
```

9.8 The Theorem Package

Analoguous to the theorem environment of LaTeX 2_ε we have to modify the different theorem styles of the theorem package.

```
⟨*theorem⟩
%plain
\gdef\th@plain{\normalfont\itshape%
  \def\@begintheorem##1##2{%
     \item[\hskip\labelsep%
           \hyperanchor{\@currenthyper}{\theorem@headerfont ##1\ ##2}%
          ]%
  }%
  \def\@opargbegintheorem##1##2##3{%
     \item[\hskip\labelsep%
           \hyperanchor%
             {\@currenthyper}%
             {\theorem@headerfont ##1\ ##2}\ (##3)%
          ]%
  }%
}
%break
\gdef\th@break{\normalfont\slshape%
  \def\@begintheorem##1##2{%
     \item[\rlap{\vbox{\hbox{\hskip \labelsep%
```

```
              \hyperanchor{\@currenthyper}{\theorem@headerfont ##1\ ##2}%
           }\hbox{\strut}}}%
         ]%
  }%
  \def\@opargbegintheorem##1##2##3{%
    \item[\rlap{\vbox{\hbox{\hskip \labelsep%
             \hyperanchor%
               {\@currenthyper}%
               {\theorem@headerfont ##1\ ##2}\ (##3)%
          }\hbox{\strut}}}%
         ]%
  }%
}
%marginbreak
\gdef\th@marginbreak{\normalfont\slshape%
  \def\@begintheorem##1##2{%
    \item[\rlap{\vbox{\theorem@headerfont%
             \hbox{\llap{##2}\hskip\labelsep%
                   \hyperanchor{\@currenthyper}{##1}%
                  }%
          \hbox{\strut}}}%
         ]%
  }%
  \def\@opargbegintheorem##1##2##3{%
    \item[\rlap{\vbox{\theorem@headerfont%
             \hbox{\llap{##2}\hskip\labelsep%
                   \hyperanchor{\@currenthyper}{##1}\ (##3)
                  }%
          \hbox{\strut}}}%
         ]%
  }%
}
%changebreak
\gdef\th@changebreak{\normalfont\slshape%
  \def\@begintheorem##1##2{%
    \item[\rlap{\vbox{\hbox{\hskip\labelsep%
             \hyperanchor{\@currenthyper}{\theorem@headerfont ##2\ ##1}%
          }\hbox{\strut}}}%
         ]%
  }%
  \def\@opargbegintheorem##1##2##3{%
    \item[\rlap{\vbox{\hbox{\hskip\labelsep%
             \hyperanchor%
               {\@currenthyper}%
               {\theorem@headerfont ##2\ ##1}\ (##3)%
          }\hbox{\strut}}}%
         ]%
  }%
}
%change
```

```
\gdef\th@change{\normalfont\slshape%
  \def\@begintheorem##1##2{%
    \item[\hskip\labelsep%
          \hyperanchor{\@currenthyper}{\theorem@headerfont ##2\ ##1}%
         ]%
  }%
  \def\@opargbegintheorem##1##2##3{%
    \item[\hskip\labelsep%
          \hyperanchor%
            {\@currenthyper}%
            {\theorem@headerfont ##2\ ##1}\ (##3)%
         ]%
  }%
}
%margin
\gdef\th@margin{\normalfont\slshape%
  \def\@begintheorem##1##2{%
    \item[\theorem@headerfont \llap{##2}\hskip\labelsep%
          \hyperanchor{\@currenthyper}{##1}%
         ]%
  }%
  \def\@opargbegintheorem##1##2##3{%
    \item[\theorem@headerfont \llap{##2}\hskip\labelsep%
          \hyperanchor{\@currenthyper}{##1}\ (##3)%
         ]%
  }%
}
⟨/theorem⟩
```

9.9 The CWEB Document Class

For CWEB there exists a LaTeX 2_ε document class that defined a reference mechanism for literate programming using latex and CWEB.
First of all it is based on another document class. Thus we have to load the modifications for this class, too.

```
⟨*cweb⟩
\InputIfFileExists{\CwebBaseClass.hyp}{}%
  {\PackageError{hyper}{\CwebBaseClass.hyp not found.\MessageBreak
                Please choose another base document class for cweb\MessageBreak
                or redefine \string\CwebBaseClass to point to a\MessageBreak
                modification document class for the base document class
               }{}%
  }%
```

As we use pattern–like definitions for some stuff following below an additiional package has to be loaded.

```
\RequirePackage{defpattern}
```

`cweb.cls` uses the underscore character as a letter for some macro names we have to redefine. Thus we set the category code of _ correspondingley.

```
\chardef\hyper@CatUsCode=\catcode‘\_
\catcode‘\_=\CatLetter
```

Why the hell must the class use a redefinition of `\refstepcounter` for its own? This means that we have to redefine it another time.

```
\let\hyper@cweb@refstepcounter=\hyper@refstepcounter
\def\refstepcounter#1{%
    \def\@tempa{#1}%
    \ifx \@tempa\cweb@string@chunk%
       \protected@edef\@currenthyper{cweb.\cweb@refchunk}%
       \hyper@settype{chunk}%
       \protected@edef\@currentlabel{\cweb@refchunk}%
    \else%
       \hyper@setcurrent%
       \hyper@settype{chunk}%
       \hyper@cweb@refstepcounter{#1}%
    \fi%
}
```

Naturally, we want to use the chunk numbers as links to the corresponding chunks. This means that we have to redefine `\CwebRefName`. Don't ask why it's that complicated.

```
\let\hyper@CwebRefName\CwebRefName
\def\CwebRefName#1:#2\X{%
    \ifmmode  \gdef\cwbb@toggle_text{\null$\null}%
    \else  \let\cwbb@toggle_text\relax%
    \fi%
    \cwbb@toggle_text%
    \expandafter\ifx\csname hyper@cweb.#1\endcsname\relax%
       \expandafter\ifx\csname hyper@new@cweb.#1\endcsname\relax%
          \PackageWarning{hyper}%
                   {Hyper reference for ‘cweb.#1’ on page \hyper@thepage\space undefined}%
          \hyper@change1\relax%
          \hyper@undef@color{%
             $\langle\,${\cwbb@tex \cwbb@check_dot{#2}\CwebRefNumber{#1}}$\,\rangle$%
          }%
       \else%
          \hyperreference{cweb.#1}{%
             $\langle\,${\cwbb@tex \cwbb@check_dot{#2}\CwebRefNumber{#1}}$\,\rangle$%
          }%
       \fi%
    \else%
       \hyperreference{cweb.#1}{%
          $\langle\,${\cwbb@tex \cwbb@check_dot{#2}\CwebRefNumber{#1}}$\,\rangle$%
       }%
    \fi%
    \cwbb@toggle_text%
}
```

However, there has to exist anchors for these links to the chunks.
Well, for a hierarchical structure the chunk numbers are written into the margin

whereas for a flat structure they are written at the beginning of the chunk using the chunk begin macro \M. Therefore we need the following modifications of the original code.

```
\ifcase \cweb@structure
    %% hierarchic
    \let\hyper@cwbb@marginal_chunkno\cwbb@marginal_chunkno%
    \def\cwbb@marginal_chunkno{%
      \let\hyper@thechunk\thechunk%
      \def\thechunk{\hyperanchor{cweb.\arabic{chunk}}{\hyper@thechunk}}%
      \hyper@cwbb@marginal_chunkno%
      \let\thechunk\hyper@thechunk%
    }
  \or
    %% flat
    \let\hyper@M\M%
    \def\M#1{%
      \let\hyper@thechunk\thechunk%
      \def\thechunk{\hyperanchor{cweb.\arabic{chunk}}{\hyper@thechunk}}%
      \hyper@M{#1}%
      \let\thechunk\hyper@thechunk%
    }
\fi
```

Unfortunately, this is not sufficient. The class uses an additional cross referencing mechanism.

Damned, it uses seperators for a list of cross references that cannot be used for the pattern-like definition we need to seperate the different references. Thus we have to redefinie the seperators and reinvoke them after splitting.

```
\let\hyper@CwebCREt\CwebCREt
\let\hyper@CwebCRsEt\CwebCRsEt
\def\CwebCREt{!}
\def\CwebCRsEt{?}
%
\defpattern\hyper@split@CwebCrossRef[#2]{\hyperreference{cweb.#2}{#2}}
\defpattern\hyper@split@CwebCrossRef[ #2]{\hyper@split@CwebCrossRef[#2]}
\defpattern\hyper@split@CwebCrossRef[#2,#3]{%
  \hyper@split@CwebCrossRef[#2], %
  \hyper@split@CwebCrossRef[#3]%
}
\defpattern\hyper@split@CwebCrossRef[#2!#3]{%
  \hyper@split@CwebCrossRef[#2]\hyper@CwebCREt%
  \hyper@split@CwebCrossRef[#3]%
}
\defpattern\hyper@split@CwebCrossRef[#2?#3]{%
  \hyper@split@CwebCrossRef[#2]\hyper@CwebCRsEt%
  \hyper@split@CwebCrossRef[#3]%
}
\def\hypersplit@CwebCrossRef[#1]{%
  \edef\hyper@tmp{#1}%
```

```
  \expandafter\hyper@split@CwebCrossRef\expandafter[\hyper@tmp]%
}
%
\let\hyper@CwebCrossRef\CwebCrossRef
\def\CwebCrossRef#1#2.{%
  \hyper@CwebCrossRef{#1}{\hypersplit@CwebCrossRef[#2]}.%
}
```

As you might have expected, this even does not resolve all problems. The list of references may contain multiple entries pointing to different chunks containing code for the same literate. Therefore we have to redefine the literates to allow links to different occurrences.

```
\let\hyper@CwebRefList\CwebRefList
\def\hyper@CwebRefName@RefList#1:#2\X{%
  \hyper@CwebRefName\hypersplit@CwebCrossRef[#1]:#2\X%
}
\def\CwebRefList{%
  \let\hyper@CwebReadPPList\CwebReadPPList%
  \let\CwebReadPPList\relax%
  \hyper@CwebRefList%
  \let\X\hyper@CwebRefName@RefList
  \def\CwebCrossRef##1##2.{%
    \quad {\reset@font\footnotesize ##1~\hypersplit@CwebCrossRef[##2].}%
  }%
  \let\CwebReadPPList\hyper@CwebReadPPList%
  \CwebReadPPList%
}
```

Last but not least we have to handle the index referencing from variables to the chunks they occur in. The modifications below are just a little bit complicated as we have to split the list of occurrences to several parts each of which has to be handled sepeartely without being allowed to use the original list that may contain the character] that cannot be used in pattern–like definitions we need here.

```
\let\hyper@CwebIndexEntry\CwebIndexEntry
\let\hyper@CwebIndexDeclared\CwebIndexDeclared
\def\CwebIndexDeclared#1]{|#1|}
\defpattern\hyper@cwebindex[#2]{\hyperreference{cweb.#2}{#2}}
\defpattern\hyper@cwebindex[|#2|]{%
  \hyperreference{cweb.#2}{\hyper@CwebIndexDeclared#2]}%
}
\defpattern\hyper@cwebindex[#2, #3]{%
  \hyper@cwebindex[#2], \hyper@cwebindex[#3]%
}
\def\hyper@cweb@index#1{%
  \edef\hyper@tmp{#1}%
  \expandafter\hyper@cwebindex\expandafter[\hyper@tmp]%
}
\def\CwebIndexEntry#1, #2.{%
  \hyper@CwebIndexEntry#1, \hyper@cweb@index{#2}.%
}
```

Now it just remains to reset the category code for _ to the one we had before the modifications started.

```
\catcode`\_=\hyper@CatUsCode
```

⟨/cweb⟩

10 Needed Packages (Part of this Distribution)

10.1 Pattern–Like Definition of Macros

For the index and glossary definitions we have used the package `defpattern` that is already part of the fp–package on `CTAN:macros/latex/contrib/other/fp`. This is a very usefull macro allowing the definition of other macros by pattern matching rules.

The package has been adapted from Alan Jeffrey's `\howto` that can be found in "TEXand TUG NEWS 2(2)".

```
⟨*defpattern⟩
\ProvidesPackage{defpattern}
\message{%
  `\string\defpattern-macro %
   (adapted from \string\howto\space%
    (Alan Jeffrey in TeX and TUG NEWS 2(2))%
   )%
  '%
}
\def\xcs#1#2{\expandafter#1\csname#2\endcsname}
\newcount\actioncount
\def\defpattern#1[#2]#3{%
  \xcs\ifx{\expandafter\gobble\string#1}\relax
  \def#1{\erroraction#1}\fi
  \advance\actioncount by 1\relax
  \expandafter\defaction\expandafter{#1}{#3}{#2}%
  \def\temp##1##2##3##4##5##6##7##8##9{\def\temp{[#2]}}%
  \temp\empty\empty\empty\empty\empty\empty\empty\empty\empty
  \edef#1{\noexpand\doaction\xcs\noexpand
    {action-\the\actioncount}\temp}}
\def\defaction#1#2#3{%
  \xcs\def{action-\the\actioncount}##1[#3]{\applyto{#1}{#2}}}
\def\gobble#1{}
\def\applyto#1#2#3{#3{#1}{#2}}
\def\doaction#1[#2][#3]{#1[#3]\success[#2]\failure[#3]}
\def\success#1#2[#3]\failure[#4]{#2}
\def\failure#1#2{#1}
\def\erroraction#1[#2]{%
   \PackageError{defpattern}{I don't know how to \string#1[#2]}{}}
⟨/defpattern⟩
```

11 Extensions

Currently the following extensions exist for this package.

- Back references from the bibliography to the citations (described in `backcite.dtx`)