

1. Introduction

This package¹ currently supports generation of PDF/X-, PDF/A- and PDF/E-compliant documents, using pdfTeX, in most of their variants; see the complete list in Section 2.1 below. As of TeX Live 2016 it now also works with LuaTeX and XeTeX, when using appropriate command-line options², but with some limitations — see Sections 3.1.1 and 3.1.2. By ‘supports’, we mean that the package provides correct and sufficient means to declare that a document conforms with a stated PDF variant (PDF/X, PDF/A, PDF/E, PDF/VT, etc.) along with the version and/or level of conformance. This package also allows appropriate metadata and color profile to be specified, according to the requirements of the PDF variant.

Metadata elements, most of which must ultimately be written as XML using the UTF-8 encoding, is provided via a file named `\jobname.xmpdata`, for the running TeX job. Without such a file, providing some required information as well as a large range of optional data, a fully validating PDF file cannot be achieved. The PDF can be created, having the correct visual appearance on all pages, but it will not pass validation checks. Sections 2.2 and 4.1 describe how this file should be constructed.

What this package *does not* do is to check for all the details of document structure and type of content that may be required (or restricted) within a PDF variant. For example, PDF/VT [11] requires well-structure parts, using Form XObject sections tagged as ‘/DPart’. Similarly PDF/A-1a (and 2a and 3a) [3, 4, 5] require a fully ‘Tagged PDF’, including a detailed structure tagging which envelops the complete contents of the document. This is beyond the current version of pdfTeX, as commonly shipped. So while this package provides enough to meet the declaration, metadata and font-handling aspects for these PDF/A variants, it is not sufficient to produce fully conforming PDFs. However, with extra pdfTeX-based software that is capable of producing ‘Tagged PDF’, this package can be used as part of the overall workflow to produce fully conforming documents.

1.1. PDF standards

PDF/X and PDF/A are umbrella terms used to denote several ISO standards [12, 13, 14, 16, 17, 3, 4, 5] that define different subsets of the PDF standard [1, 6]. The objective of PDF/X is to facilitate graphics exchange between document creator and printer and therefore, has all requirements related to printing. For instance, in PDF/X, all fonts need to be embedded and all images need to be CMYK or spot colors. PDF/X-2 and PDF/X-3 accept calibrated RGB and CIELAB colors along with all other specifications of PDF/X. Since 2005 other variants of PDF/X have emerged, as extra effects (such as layering and transparency) have been supported within the PDF standard itself. The full range of versions and conformance supported in this package is discussed below in Section 2.1.

PDF/A defines a profile for archiving PDF documents, which ensures the documents can be reproduced in the exact same way in years to come. A key element to achieving this is that PDF/A documents are 100% self-contained. All the information needed to display the document in the same manner every time is embedded in the file. A PDF/A document is not permitted to be reliant on information from external sources. Other restrictions include avoidance of audio/video content, JavaScript and encryption. Mandatory inclusion of fonts, color profile and standards-based metadata are absolutely essential for PDF/A. Later versions allow for use of image compression and file attachments.

PDF/E is an ISO standard [8] intended for documents used in engineering workflows. PDF/VT [11] allows for high-volume customised form printing, such as utility bills. PDF/UA

¹A slightly earlier version of this documentation was published as [21]. All the changes since then have been developed and coded by the 3rd-listed author.

² The required invocation is: `xelatex --shell-escape -output-driver="xdvipdfmx -z 0" <filename>.tex`

(‘Universal Accessibility’) is emerging as a standard [10, 9] supporting Assistive Technologies, incorporating web-accessibility guidelines (WCAG) for electronic documents. In future, PDF/H may emerge for health records and medical-related documents. Other applications can be envisaged. Declarations and Metadata are supported for the first two of these. The others are the subject of further work; revised versions of this package can be expected in later years.

More complete descriptions of these standards and their usage can be found on Wikipedia pages [22]. These pages also include comprehensive links to web resources, guides, commentaries, discussions and whatever else is relevant to how the standards have been established and how they can be used.

2. Usage

The package can be loaded with the command:

```
\usepackage[<option>]{pdfx}
```

where the options are as follows.

2.1. Options

2.1.1. PDF/A options

PDF/A is an ISO standard [3, 4, 5] intended for long-term archiving of electronic documents. It therefore emphasizes self-containedness and reproducibility, as well as machine-readable metadata. The PDF/A standard has three conformance levels ‘a’, ‘b’, and ‘u’. Level ‘a’ is the strictest, but is not yet fully implemented by the pdfx package. Conformance level ‘u’ has the same requirements as level ‘b’, but with the additional requirement that all text in the document must have a Unicode mapping. However, the pdfx package produces such Unicode mappings even in level ‘b’ files. The standard also has three different versions 1, 2, and 3, which were standardized in 2005, 2011 and 2012, respectively. Earlier versions contain a subset of the features of later versions, so for maximum portability, it is preferable to use a lower-numbered version. There is no conformance level ‘u’ in version 1 of the standard. For many typical uses of PDF/A, it is sufficient to use PDF/A-1b.

- a-1a: generate PDF/A-1a. Experimental, not fully implemented.
- a-1b: generate PDF/A-1b.
- a-2a: generate PDF/A-2a. Experimental, not fully implemented.
- a-2b: generate PDF/A-2b.
- a-2u: generate PDF/A-2u.
- a-3a: generate PDF/A-3a. Experimental, not fully implemented.
- a-3b: generate PDF/A-3b.
- a-3u: generate PDF/A-3u.

By ‘Experimental, not fully implemented’ here we mean primarily that the document structure, as required for ‘Tagged PDF’, is not handled by this package. Using other pdfTeX-based software that is capable of producing such complete tagging, conforming documents can indeed be produced.

2.1.2. PDF/E options

PDF/E is an ISO standard intended for documents used in engineering workflows. There is only one version of the PDF/E standard so far, and it is called PDF/E-1.

- `e-1`: generate PDF/E-1.

2.1.3. PDF/VT options

PDF/VT is an ISO standard intended as an exchange format for variable and transactional printing, and is an extension of the PDF/X-4 standard. The standard specifies three PDF/VT conformance levels. Level 1 is for single-file exchange, level 2 is for multi-file exchange, and level 2s is for streamed delivery. Currently, none of the PDF/VT conformance levels are fully implemented by the pdfx package.

- `vt-1`: generate PDF/VT-1. Experimental, not fully implemented.
- `vt-2`: generate PDF/VT-2. Experimental, not fully implemented.
- `vt-2s`: generate PDF/VT-2s. Experimental, not fully implemented.

By ‘Experimental, not fully implemented’ here we mean primarily that the structuring of a document into ‘DPart’ sections, as Form XObjects, is not handled by this package. This is possible with current pdfTeX software, but not yet in a way that lends itself easily to full automation, due to requirements of knowing the internal object number of certain internal PDF constructs. All the other aspects: PDFInfo declaration, Metadata and Color Profile, of the PDF/VT variants are correctly handled.

2.1.4. PDF/X options

PDF/X is an ISO standard intended for graphics interchange. It emphasizes printing-related requirements, such as embedded fonts and color profiles. The PDF/X standard has a large number of variants and conformance levels. The basic variants are X-1, X-1a, X-3, X-4, and X-5. (Note that a revised version of the X-2 standard was published in 2003 but withdrawn as an ISO standard in 2011, basically due to lack of interest in using it). The PDF/X-1a standard exists in revisions of 2001 and 2003, the PDF/X-3 standard exists in revisions of 2002 and 2003, and the PDF/X-4 and PDF/X-5 standards exist in revisions of 2008 and 2010. Moreover, some of these standards have a ‘p’ version, which permits the use of an externally supplied color profile (instead of an embedded one), and/or a ‘g’ version, which permits the use of external graphical content. Moreover, PDF/X-5 has an ‘n’ version, which extends PDF/X-4p by permitting additional color spaces other than Grayscale, RGB, and CMYK. For many typical uses of PDF/X, it is sufficient to use PDF/X-1a.

- `x-1`: generate PDF/X-1.
- `x-1a`: generate PDF/X-1a. Options `x-1a1` and `x-1a3` are also available to specify PDF/X-1a:2001 or PDF/X-1a:2003 explicitly.
- `x-3`: generate PDF/X-3. Options `x-302` and `x-303` are also available to specify PDF/X-3:2002 or PDF/X-3:2003 explicitly.
- `x-4`: generate PDF/X-4. Options `x-408` and `x-410` are also available to specify PDF/X-4:2008 or PDF/X-4:2010 explicitly.
- `x-4p`: generate PDF/X-4p. Options `x-4p08` and `x-4p10` are also available to specify PDF/X-4p:2008 or PDF/X-4p:2010 explicitly.
- `x-5g`: generate PDF/X-5g. Options `x-5g08` and `x-5g10` are also available to specify PDF/X-5g:2008 or PDF/X-5g:2010 explicitly.

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- `x-5n`: generate PDF/X-5n. Options `x-5n08` and `x-5n10` are also available to specify PDF/X-5n:2008 or PDF/X-5n:2010 explicitly. Experimental, not fully implemented.
- `x-5pg`: generate PDF/X-5pg. Options `x-5pg08` and `x-5pg10` are also available to specify PDF/X-5pg:2008 or PDF/X-5pg:2010 explicitly.

2.1.5. Other options

These options are experimental and should not normally be used.

- `useBOM`: generate an explicit UTF-8 byte-order marker in the embedded XMP metadata, and make the XMP packet writable. Neither of these features are required by the PDF/A standard, but there exist some PDF/A validators (reportedly validatepdfa.com) that seem to require them. Note: the implementation of this feature is experimental and may break with future updates to the `xmptoincl` package.
- `noBOM`: do not generate the optional byte-order marker. (default)
- `noerr`: avoids stopping when making PDF/X with an RGB profile, and at other unusual situations.
- `pdf13`: use PDF 1.3, overriding the version specified by the applicable standard. This may produce a non-standard-conforming PDF file.
- `pdf14`: use PDF 1.4, overriding the version specified by the applicable standard. This may produce a non-standard-conforming PDF file.
- `pdf15`: use PDF 1.5, overriding the version specified by the applicable standard. This may produce a non-standard-conforming PDF file.
- `pdf16`: use PDF 1.6, overriding the version specified by the applicable standard. This may produce a non-standard-conforming PDF file.
- `pdf17`: use PDF 1.7, overriding the version specified by the applicable standard. This may produce a non-standard-conforming PDF file.

2.1.6. XMP language options

These options allow for characters in alphabets other than those used for English and Western European languages to be used within the `.xmldata` file (see Section 2.2), supported through \TeX character representation macros.

- `latxmp`: extended Latin blocks, `Ux0180–Ux024F` and `Ux1E00–Ux1EFF`
- `armxmp`: armenian letters and ligatures, `Ux0530–Ux058F`, via macros `\armyba`, `\armfe`, `\armcomma`, etc.
- `cyrxmp`: cyrillic letters and accents, `Ux0400–Ux04FF` and `Ux0500–Ux0527` via macros `\cyra`, `\CYRN`, etc.
- `grxmp`: greek letters and diacritics, `Ux0370–Ux03FF` and `Ux1F00–Ux1FFF` via macros `\textalpha`, `\textPi`, etc.
- `hebxmp`: some hebrew letters and marks, `Ux05C0–Ux05F4` via macros `\hebalef`, `\hebtav`, `\doubleyod`, etc.
- `arbxmp`: some arabic letters and marks, `Ux0600–Ux06FF` via macros `\hamza`, `\alef`, `\sukun`, etc.
- `vnmxmp`: vietnamese letters and accents, `Ux1EA0–Ux1EFF` via macros `\abreve`, `\uhorn`, `\ECIRCUMFLEX`, etc.
- `ipaxmp`: phonetic extensions, `Ux0250–Ux02AF` and `Ux1D00–Ux1DFF`

Generation of PDF/X- and PDF/A-compliant PDFs with pdfT_EX — pdfx.sty

C. V. Radhakrishnan, Hàn Thế Thành, Ross Moore and Peter Selinger

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- `mathxmp`: mathematical letters, symbols, operators arrows, alphanumeric forms.
- `allxmp`: all of the above, as well as those listed next.

The characters supported by these options include those supported by `hyperref.sty` via the PDFdoc encodings (PD1 and PU) for inclusion in PDF files. Extra supported is provided for math alphabets. For Armenian, the macros defined by ArmT_EX are supported.

Further options allow direct (enclosed) input of upper 8-bit characters, from encodings such as Latin-1–Latin-9, KOI8-R, LGR (Greek), ArmSCII8, and a few more. Use of these requires a carefully controlled parsing regime. Here we list the package options that declare such content may be present in the `.xmpdata` file. A detailed account of how these are used is given in Section 4.1 (“Multilingual Metadata”).

- `LATxmp`: support for direct use of the upper-range characters (byte codes 160–255) for input encodings Latin1–Latin9, for Latin-based alphabets as used in European countries and elsewhere. This defines parser macros `\textLAT`, `\textLII`, ..., `\textLIX`. All support from `latxmp` is loaded also.
- `KOIxmp`: support for direct use of cyrillic letters by use of upper-range characters (byte codes 148–255) under input encodings KOI8-R and KOI8-RU, using `\textKOI` as parser macro. All support from `cyrxmp` is loaded also.
- `LGRxmp`: support for greek letters entered using either the LGR input transliteration of ASCII characters, or the ISO-8859-7 encoding of upper-range characters (byte codes 160–255), or a combination of both, using `\textLGR` as parser macro. All support from `grkxmp` is loaded also.
- `AR8xmp`: support for armenian letters entered using the ArmT_EX 2.0 input transliteration of ASCII characters, or the ArmSCII8 encoding of upper-range characters (byte codes 160–255), or a combination of both, using `\textARM` as parser macro. All support from `armxmp` is loaded also.

These ‘parser’ options have received limited testing, so please report any mistakes in the UTF-8 output that you may encounter.

2.2. Data file for metadata

As mentioned above, standards-compliant PDF documents require metadata to be included. The pdfx package expects metadata be supplied in a special data file called `\jobname.xmpdata`. Here, `\jobname` is usually the basename of the document’s main `.tex` file. For example, if your document source is in the file `main.tex`, then the metadata must be in a file called `main.xmpdata`. None of the individual metadata fields are mandatory, but for most documents, it makes sense to define at least the title and the author. For more technical aspects of metadata and its uses, consult the work of the Dublin Core Initiative [2] and PRISM [19].

Here is a short `.xmpdata` file:

```
\Title{Baking through the ages}
\Author{A. Baker\sep C. Kneader}
\Keywords{cookies\sep muffins\sep cakes}
\Publisher{Baking International}
```

You should note that multiple authors and keywords have been separated by `\sep`. This `\sep` macro serves a technical purpose and is only permitted within the `\Author`, `\Keywords`, and `\Publisher` fields.

After processing, the local directory contains a file named such as `pdfa.xmpi` or `pdfx.xmpi` according to the PDF variant required. This file is the complete XMP Metadata packet. It can be checked for validity, using an online validator, such as at www.pdflib.com.

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Warning: The `\jobname.xmpdata` file may be included in the main document source, within a `{filecontents*}` environment, provided this comes *before* the `\documentclass` command, as follows.

```
\begin{filecontents*}{\jobname.xmpdata}
  \Title{Baking through the ages}
  \Author{A. Baker\sep C. Kneader}
  \Keywords{cookies\sep muffins\sep cakes}
  \Publisher{Baking International}
\end{filecontents*}
\documentclass[11pt,a4paper]{article}
...
```

Including the metadata with the \TeX source is very convenient. Having it at the top of the file also brings attention to it, placing emphasis on the desirability of including metadata, and keeping it accurate while the main content of the document is subject to changes or revision. Macro definitions can also occur prior to the `\documentclass` command, including any that may be needed within the metadata. An example of this is apparent in Figure 2 occurring later.

However, this ordering is also extremely important, else any non-ascii UTF-8 byte sequences can become active characters and expand upon data being written out, rather than remaining as inactive bytes. If you edit the metadata supplied this way, remember to remove the existing copy of `\jobname.xmpdata` file before the next processing run, as \TeX does not write a new copy of the file when it exists on disk already, within the current working directory or elsewhere that \TeX may find. In development or testing situations the filename may need to be given as `./\jobname.xmpdata`, else an older version may be loaded in error.

Experienced users/programmers can employ the `\write18` mechanism³, together with the `--shell-escape` command-line option, to automatically execute a shell command that removes `\jobname.xmpdata` on every (or on selected) processing runs. This is only useful when the metadata changes, for whatever reason.

Other places for the `{filecontents*}` environment can work, but *only* when it contains *no* non-ascii UTF-8 byte sequences. See Section 2.4 below for more information on the macros that can be safely used within `.xmpdata` metadata files.

2.3. List of supported metadata fields

Here is a complete list of user-definable metadata fields currently supported, and the kind of information they convey. More may be added in the future. These commands can *only* be used within the `.xmpdata` file.

2.3.1. General information:

- `\Author`: the document's human author. Separate multiple authors with `\sep`.
- `\Title`: the document's title.
- `\Keywords`: list of keywords, separated with `\sep`.
- `\Subject`: the abstract.
- `\Publisher`: the publisher. Multiple pieces in a publishing chain should be separated with `\sep`.

³If you don't already know what this is, they you probably should not try using it :-).

2.3.2. Copyright information:

- `\Copyright`: a copyright statement.
- `\CopyrightURL`: location of a web page describing the owner and/or rights statement for this document.
- `\Copyrighted`: ‘True’ if the document is copyrighted, and ‘False’ if it isn’t. This is automatically set to ‘True’ if either `\Copyright` or `\CopyrightURL` is specified, but this can be overridden. For example, if the copyright statement is ‘Public Domain’, then specify also `\Copyrighted{False}`.

2.3.3. Publication information:

The following macros allow for inclusion of metadata fields, as specified by the Dublin Core Initiative [2] and by PRISM [19] to meet publishing requirements.

- `\PublicationType`: The type of publication. If defined, must be one of ‘book’, ‘catalog’, ‘feed’, ‘journal’, ‘magazine’, ‘manual’, ‘newsletter’, ‘pamphlet’. This is automatically set to ‘journal’ if `\Journaltitle` is specified, but can be overridden.
- `\Journaltitle`: The title of the journal in which the document was published.
- `\Journalnumber`: The ISSN for the publication in which the document was published.
- `\Volume`: Journal volume.
- `\Issue`: Journal issue/number.
- `\Firstpage`: First page number of the published version of the document.
- `\Lastpage`: Last page number of the published version of the document.
- `\Doi` : Digital Object Identifier (DOI) for the document, without the leading ‘doi:’.
- `\CoverDisplayDate`: Date on the cover of the journal issue, as a human-readable text string.
- `\CoverDate`: Date on the cover of the journal issue, in a format suitable for storing in a database field with a ‘date’ data type; e.g. YYYY-MM, or YYYY-MM-DD.

This is an area which can be expanded, to deal with more kinds of publication.

2.3.4. Backward Compatibility

The following macros are also recognised, for backward compatibility with earlier versions of the package.

- `\Creator`: synonymous with `\CreatorTool` which is usually handled automatically anyway, but can be over-ridden.
- `\Org`: synonymous with `\Publisher`.
- `\WebStatement`: synonymous with `\CopyrightURL`.

2.4. Symbols permitted in metadata

Within the metadata, all printable ASCII characters except `\`, `{`, `}` and `%` represent themselves. Also, all printable Unicode characters from the basic multilingual plane (i.e., up to code point U+FFFF) can be used directly with the UTF-8 encoding. (Please note: encodings other than UTF-8 are not currently supported in the metadata). Consecutive whitespace characters are combined into a single space. Whitespace after a macro such as `\copyright`, `\backslash`, or `\sep` is ignored. Blank lines are not permitted. Moreover, the following markup can be used:

Generation of PDF/X- and PDF/A-compliant PDFs with pdfTeX — pdfx.sty

C. V. Radhakrishnan, Hàn Thế Thành, Ross Moore and Peter Selinger

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- “\ ”: a literal space (for example after a macro)
- \%: a literal %
- \{: a literal {
- \}: a literal }
- \backslash: a literal backslash \
- \copyright: the copyright symbol ©

The macro `\sep` is only permitted within `\Author`, `\Keywords`, and `\Publisher`. It’s purpose is to separate multiple authors, keywords, etc. appropriately and consistently in the different ways that such information is represented within the PDF file. The package takes care of this when `\sep` is used.

Other TeX macros actually can be used, provided the author is very careful and not ask for too-complicated TeX or L^AT_EX expansions into internal commands or non-character primitives; basically just accents, macros for Latin-based special characters, and simple textual replacements, perhaps with a simple parameter. A special macro `\pdfxEnableCommands{...}` is provided to help resolve difficulties that may arise.

Here is an example⁴ of the use of `\pdfxEnableCommands`, which occurs with the name of one of our authors (Hàn Thế Thành) due to the doubly-accented letter ê. It is usual to define a macro such as: `\def\thanh{H\`an Th\`{\`e} Thanh}`. In previous versions of the pdfx package, use of such a macro within the `.xmpdata` file, in the Copyright information say, could result in the accent macros expanding into internal primitives, such as

```
H\unhbox \voidb@x \bgroup \let \unhbox \voidb@x \setbox \@tempboxa ...
```

going on for many lines. This clearly has no place within the XMP Metadata. To get around this, one could try using simplified macro definitions

```
\pdfxEnableCommands{
  \def\`#1{#1^cc^80}\def\'#1{#1^cc^81}\def\^#1{#1^cc^82}}
```

where the `^cc^80`, `^cc^81`, `^cc^82` cause TeX to generate the correct UTF-8 bytes for ‘combining accent’ characters.

This works fine for metadata fields that appear just in the XMP packet. However, it is not sufficient for the PDF `/Author` key, which must exactly match with the `dc:creator` Metadata element. What is needed instead is

```
\pdfxEnableCommands{
  \def\thanh{H^c3^a0n Th^ee Thanh}\def\^ee{^c3^aa^cc^81 }}
```

or the above with ‘à’ typed directly as UTF-8 instead of `^c3^a0` and ‘ê’ in UTF-8 for `^c3^aa`. The reason for this is due to the `\pdfstringdef` command, which constructs the accented latin letters as single combined characters à and ê, without resorting to combining accents, wherever possible. If the Metadata does not have the same, irrespective of Unicode normalisation, then validation fails.

With version (1.5.6) of the pdfx package, such difficulties have been overcome, at least for characters used in Western European, Latin-based languages. The input encoding used when reading the `.xmpdata` file now includes interpretations of TeX’s usual accent commands to produce the required UTF-8 byte sequences.

This current version (1.5.8) now extends this input encoding to include macro definitions covering L^AT_EX’s internal character representation of other alphabets (e.g., extended Latin,

⁴ Other use cases are discussed with regard to Figures 12 and 15.

Cyrillic, Greek, etc.). However this can become memory intensive, requiring a large number of macro definitions, most of which will never be used. So loading options are provided, enabling a document author to choose only those that may be relevant. Currently these are as in Section 2.1.6.

A significant portion of the Unicode Basic Plane characters can be covered this way. Modules could even be provided for CJK character sets and mathematical symbols, etc. However, as this can become memory intensive, significant testing will be required before these become a standard part of the pdfx package.

2.5. Color profiles

Most standards compliant PDF documents require a *color profile* to be embedded within the file. In a nutshell, such a profile determines precisely how the colors used in the document will be rendered when printed to a physical medium. This can be used to ensure that the document will look exactly the same, even when it is printed on different printers, with different paper types, etc. The inclusion of a color profile is necessary to make the document completely self-contained.

Since most T_EX users are not graphics professionals and are not particularly picky about colors, the pdfx package includes default profiles that will be included when nothing else is specified. Therefore, the average user doesn't have to do anything special about color.

For users who have a specific color profile they wish to use, it is possible to do so by including a `\setRGBcolorprofile` or `\setCMYKcolorprofile` command in the `.xmpdata` file. Note that PDF/A and PDF/E require a profile of type 'mnrt' (monitor) which is usually an RGB color profile, while PDF/X and PDF/VT require type 'prtr' (printer) which is usually a CMYK color profile; but valid documents can be created with the correct type designed for the other color space. Use the following commands to specify an RGB or CMYK color profile, respectively:

```
\setRGBcolorprofile{<filename>}{<identifier>}{<info string>}{<registry URL>}
\setCMYKcolorprofile{<filename>}{<output intent>}{<identifier>}{<registry URL>}
```

Within the arguments of these macros, the characters `<`, `>`, `&`, `^`, `_`, `#`, `$`, and `~` can be used as themselves, but `%` must be escaped as `\%`. The defaults are:

```
\setRGBcolorprofile{sRGB_IEC61966-2-1_black_scaled.icc}
{ sRGB_IEC61966-2-1_black_scaled }
{ sRGB IEC61966 v2.1 with black scaling }
{ http://www.color.org }

\setCMYKcolorprofile{coated_FOGRA39L_arg1.icc}
{ Coated FOGRA39 }
{ FOGRA39 (ISO Coated v2 300% (ECI)) }
{ http://www.argyllcms.com/ }
```

Some color profile files may be obtained from the International Color Consortium. Please take a look at <http://www.color.org/iccprofile.xalter>.

Alternatively, color profiles are shipped with many Adobe software applications; these are then available for use also with non-Adobe software. Now the pdfx package includes coding to streamline inclusion of these profiles in PDF documents, or to specify them as 'external' profiles, with PDF/X-4p and PDF/X-5pg variants. Two files `AdobeColorProfiles.tex` and `AdobeExternalProfiles.tex` are distributed with the pdfx package. The latter is for use with PDF/X-4p and PDF/X-5pg, which do not require color profiles to be embedded, while the former can be used with other PDF/X variants. Both define commands to use Color Profiles as follows.

Generation of PDF/X- and PDF/A-compliant PDFs with pdfT_EX — pdfx.sty

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\JapanColorMMIcoated	Japan Color 2001 Coated
\JapanColorMMIUncoated	Japan Color 2001 Uncoated
\JapanColorMMIINewspaper	Japan Color 2002 Newspaper
\JapanWebCoatedAd	Japan Web Coated (Ad)
\CoatedGRACoL	Coated GRACoL 2006 (ISO 12647-2:2004)
\SNAPCGATSII	CGATS TR 002
\SWOPCGATSIII	CGATS TR 003
\SWOPCGATSV	CGATS TR 005
\ISOWebCoated	Web Coated FOGRA28 (ISO 12647-2:2004)
\ISOCoatedECI	ISO Coated v2 (ECI)
\CoatedFOGRA	Coated FOGRA27 (ISO 12647-2:2004)
\WebCoatedFOGRA	Web Coated FOGRA28 (ISO 12647-2:2004)
\UncoatedFOGRA	Uncoated FOGRA29 (ISO 12647-2:2004)
\IFRAXXVI	ISOnewspaper26v4 ISO/DIS 12647-3:2004
\IFRAXXX	ISOnewspaper30v4 ISO/DIS 12647-3:2004

As of the time of writing, only the first six of these result in PDFs which can validate with external profiles (i.e., for PDF/X-4p and PDF/X-5pg) using current versions of Adobe Acrobat Pro software. It is unclear whether the others (incl. \IFRAXXVI and \IFRAXXX) fail due to incorrect data or problems in the validation software. All but those last two can be used for valid embedded profiles, providing the corresponding files can be found. The following macro is used to set the (absolute or relative) path, on the local operating system, to the location of color profile files.

```
\pdfxSetRGBcolorProfileDir{<path to RGB color profiles>}  
\pdfxSetCMYKcolorProfileDir{<path to CMYK profiles>}
```

On a Macintosh, one uses either a macro \MacOSColordir which expands into the path for system-provided profiles:

```
/System/Library/ColorSync/Profiles/
```

or \AdobeMacOSdir which expands into the path:

```
/Library/Application Support/Adobe/Color/Profiles/Recommended/
```

Under Windows the macro is \WindowsColordir which expands:

```
C:\Windows\System32\Spool\Drivers\Color\
```

being the common location for color profiles. Use these within the .xmpdata file as, e.g.,

```
\pdfxSetCMYKcolorProfileDir{\AdobeMacOSdir}
```

Authors may change the paths to suit their own circumstances, either *before* loading pdfx.sty or within the .xmpdata file.

PDF/A and PDF/E usually need an RGB profile, while PDF/X and PDF/VT require a CMYK profile. It is possible to use a CMYK profile with PDF/A or PDF/E by specifying \setRGBcolorprofile{ }{ }{ }{ } in the .xmpdata file. Beware however, that with PDF/A any coloured hyperlink annotations can cause a validation problem, as these are interpreted as RGB colours even when 4 components are given. This may be a bug in validators, as PDF specifies that the number of components should match the color space.

2.6. Notes on the internal representation of metadata

Within the PDF file, metadata is deposited in two places: some data goes into the native PDF `/Info` dictionary, and some data goes into an XMP packet stored separately within the file. XMP is Adobe's Extensible Metadata Platform, and is an XML-based format. See [Adobe XMP Development Center](#) for more exhaustive information about XMP. An XMP Toolkit SDK which supports the GNU/Linux, Macintosh and Windows operating systems is also provided under modified BSD licence.

Some of the metadata, such as the author, title, and keywords, are stored *both* in the XMP packet and in the `/Info` dictionary. For the resulting file to be standards-compliant, the two copies of the data must be identical. All of this is taken care of automatically by the pdfx package.

In principle, users can resort to alternate ways to create an XMP file for inclusion in PDF. In this case, users should create a file `pdfa.xmp` or `pdfx.xmp` (etc., depending on the PDF flavor) containing the pre-defined data. However, this is an error-prone process and is not recommended for most users. If there is a particular field of metadata that you need and that is not currently supported, please contact the package authors.

pdfx makes use of the `xmpincl` package to include XMP data into the PDF. The documentation of `xmpincl` package may help interested users to understand the process of XMP data inclusion.

2.7. Tutorials and technical notes

A tutorial with step-by-step instructions for generating PDF/A files can be found at: <http://www.mathstat.dal.ca/~selinger/pdfa/>.

Some technical notes about production problems the authors have encountered while generating PDF/A compliant documents are available here: http://support.river-valley.com/wiki/index.php?title=Generating_PDF/A_compliant_PDFs_from_pdftex.

3. Installing

The `pdfx.dtx` package is available on CTAN as usual, via <http://ctan.org/pkg/pdfx>. It is also included in TeX distributions such as MacTeX, TeX Live and MiKTeX. Thus most users will not need to handle installation at all.

For those wishing to do a manual installation, here are some notes. The file `pdfx.dtx` is a composite document of program code and documentation in \LaTeX format, in the tradition of *literate programming*. After having installed the package, to get the documentation that you are reading now, run (PDF) \LaTeX on the file `pdfx.dtx`. The resulting PDF should be valid as PDF/A-2u. Or better, use the included `Makefile`, which will also regenerate the index.

To install the package, first extract the program code; i.e., the file `pdfx.sty`, by running \LaTeX or TeX on the file `pdfx.ins`. Create a directory named `pdfx` under `$TEXMF/tex/latex` and copy the files `pdfx.sty`, `8bit.def`, `glyptounicode-cmr.tex`, as well as the other `*.tex`, `l8u*.def`, `*.icc` and `*.xmp` files, into it. Then update TeX's file database using the appropriate command for your distribution and operating system (such as `texhash` or `mktextlsr`, or similar).

3.1. Limitations and dependencies

The `pdfx.sty` package works with PDFTeX and also LuaTeX and XeTeX with some limitations. It further depends on the following other packages.

1. `xmpincl` for insertion of metadata into PDF.
2. `inputenc` to establish input-encoding infrastructure — see Section 4.2.

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3. `hyperref` for ensuring data is correctly encoded when being written into the PDF file, and supporting features such as hyperlinking, bookmarks, etc.
4. `xcolor` for ensuring consistent use of the color model appropriate the PDF variant, within text and hyperlinks (when allowed).
5. `glyphtounicode.tex` (PDF_{TeX} only) maps glyph names to corresponding Unicode code-points.
6. `ifluatex` allowing coding specific to Lua_{TeX}.
7. `ifxetex` allowing coding specific to Xe_{TeX}.
8. `luatex85` or `pdftexcmds` (Lua_{TeX} only) for access to primitive commands using PDF_{TeX} macro names.
9. `stringenc` used to help generate proper bookmarks with transliterated input; e.g., with `\textLGR` or `\textARM` — see Section 4.1.4.

Other files and packages are loaded as sub-packages or as configuration files for these. Since some of these packages may be loaded by existing documents we provide here advice on how to deal with potential loading and option conflicts.

Firstly, it is best if `pdfx` is the first package loaded; e.g., directly after the `\documentclass` line. This is not a strict requirement, but it is worthwhile to deal with the metadata at the top of your _{TeX} source, allowing correct options to be loaded to cope with validation aspects.

Secondly, replace `\usepackage[<options>]{hyperref}` with `\hypersetup{<options>}`. This deals with most loading issues with the `hyperref` package. Note that PDF/X is a format intended for printing. It forbids inclusion of hyperlinks and other actions, including via bookmarks. To produce a validating PDF/X document, `pdfx` overrides internal macros while keeping colors associated with link anchors. To inhibit these colors also, you could specify options as follows.

```
\hypersetup{colorlinks,allcolors=black}
```

Furthermore, options to set metadata components (such as `pdfauthor`, `pdftitle`, `pdfsubject`, `pdfkeywords`, etc.) are disabled, since `pdfx` has already taken care of this information.

Thirdly, conflicts with other packages may be dealt with by simply changing `\usepackage` to `\RequirePackage` within the document's preamble. But this may not be possible when the `\usepackage` or `\RequirePackage` command occurs within another package, or with a specific set of options, thereby causing processing to stop. Few packages have a command analogous to `\hypersetup`. Instead `\PassOptionsToPackage{<options>}{<package>}` can help. For `<options>` specify the ones associated with the loading yet to come. This can give a smooth processing run, but you'll need to check whether the results from those options have actually taken effect. Some examples of this can be seen later, in Figures 2 and 8.

3.1.1. Limitations using Xe_{TeX}

To process a file using Xe_{TeX}, to produce a document that can validate to a particular PDF standard, one need to use a command to run the _{TeX} engine, as follows.

```
xelatex -shell-escape -output-driver="xdvipdfmx -z 0" <filename>.tex
```

The `-shell-escape` option allows a command-line task to be run, which writes the creation-date & time of the running job into a small file on disk. This data, written in a specific format, is then read by the job for inclusion into several metadata fields. This emulates the result of PDF_{TeX}'s `\pdfcreationdate` primitive. As there are security implications in allowing arbitrary commands to be run, this need for `-shell-escape` must be viewed as imposing a limitation on the work-flows in which this can be safely used.

More severe is the need for the `-z 0` output-driver option, which disables all compression in the final PDF output. This is needed since all the PDF standards require the XMP metadata packet to be present as uncompressed plain text, in UTF-8 format. The only way to achieve this with Xe \TeX is for no compression being used at all by the `xdvipdfmx` driver program. The result can be file sizes more than $10\times$ what is produced by \TeX engines using compression.

Xe \TeX is designed for processing UTF-8 input only. When presented with a \TeX source using a legacy encoding, such as `latin2` or `koi8-r`, the input is accepted and a PDF produced. Yet there will be garbage characters corresponding to each character entered from the upper range (128–255). This is evident in the PDF content and bookmarks; yet `pdfx` produces the correct XMP metadata packet. So while the techniques explained later in Section 4.1 are valid, the PDF itself does not contain correct content.

Not all fonts, in particular Open-Type fonts (OTF), naturally come with mappings of the glyphs to Unicode code points. This is a requirement with PDF/A and PDF/E standards. Use of such fonts can result in validation errors, such as:

- CIDset in subset font is incomplete (font contains glyphs that are not listed).
- Type 2 CID font: CIDToGID map is invalid or missing.

If one has access to Adobe’s **Acrobat Pro** software, then its **Preflight** utility can rewrite the uncompressed output from Xe \TeX into a valid PDF standard, using compression of the contents but not of the XMP packet. Similarly **Preflight** can fix the missing font information.

3.1.2. Limitations using Lua \TeX

Lua \TeX can handle the OTF font issues mentioned for Xe \TeX , so can produce valid PDF/A documents where Xe \TeX fails. However, since Lua \TeX expects all input source to be UTF-8 encoded, it cannot work at all with documents using older legacy encodings. Instead one gets error messages such as:

```
! String contains an invalid utf-8 sequence.
1.5 \Copyright{\textLII{UWAGA dla recenzent
                                     i{fiw/t{sumaczy}}
?
```

from a document using `latin2` encoded characters. Thus most of Section 4.1 is just not applicable for Lua \TeX , whereas it is for pdf \TeX . This is essentially the same problem as described above for Xe \TeX , but here Lua \TeX advises that there are problems as soon as it encounters an invalid (for UTF-8) character. Some would regard this as better than having the job run to completion, only to later discover garbage content within the PDF.

3.2. Files included

The following files are included in the package. Some can be created from `pdfx.dtx`, using the `Makefile`.

3.2.1. Package files

- `pdfx.sty` — main package file generated from `pdfx.dtx`.
- `pdfa.xmp` — specimen `xmp` template for PDF/A.
- `pdfe.xmp` — specimen `xmp` template for PDF/E.
- `pdfvt.xmp` — specimen `xmp` template for PDF/VT.
- `pdfx.xmp` — specimen `xmp` template for PDF/X.

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- `8bit.def` — custom input encoding.
- `l8uenc.def` — input encoding macro declarations.
- `l8uarb.def` — input macro declarations for Arabic.
- `l8uarm.def` — input macro declarations for Armenian.
- `armglyphs.dfu` — Unicode mapping for Armenian letters.
- `l8ucyr.def` — input macro declarations for Cyrillic alphabet.
- `l8udev.def` — input macro declarations for Devanagari.
- `l8ugrk.def` — input macro declarations for Greek alphabet.
- `l8ulat.def` — input macro declarations for Latin 1–9 encodings.
- `l8umath.def` — input macro declarations for mathematical symbols.
- `glyphtounicode-cmr.tex` — maps glyph names to corresponding Unicode for Computer Modern and other T_EX-specific fonts.
- `coated_FOGRA39L_arg1.icc` — CMYK color profile (freely distributable).
- `sRGB_IEC61966-2-1_black_scaled.icc` — RGB color profile freely distributable.
- `ICC_LICENSE.txt` — license for the color profiles.
- `AdobeColorProfiles.tex` — macros for inclusion of Adobe-supplied color profiles.
- `AdobeExternalProfiles.tex` — macros for use of external color profiles.

3.2.2. Documentation & Examples

- `README` — usual top-level information.
- `manifest.txt` — file list.
- `pdfx.pdf` — package documentation.
- `sample.tex`, `sample.xmpdata` — a sample file with sample metadata.
- `small2e-pdfx.tex` — sample file with included metadata.

3.2.3. Sources

- `src/pdfx.dtx` — composite package and documentation.
- `src/pdfx.ins` — installer batch file.
- `src/pdfx.xmpdata` — metadata for the documentation.
- `src/rvdtx.sty` — used by `pdfx.dtx`.
- `src/Makefile` — a Makefile for building the documentation.
- `src/{arm-start,koi8-example,koi8-example2,latin2-example}.tex` — used in the documentation with figures showing example coding.
- `src/{TL-POL-meta,TL-RU-LICRs,TL-RU-metadata,TL-RU-toc,armtex-meta,usage-meta,math-assign5}.png` — screenshot images showing multilingual and other metadata.

3.3. Miscellaneous information

The package is released under the L^AT_EX Project Public Licence. Bug reports, suggestions, feature requests, etc., may be sent to the original authors at cvr@river-valley.org and/or thanh@river-valley.org, or to the more recent contributors at ross.moore@mq.edu.au and/or selinger@mathstat.dal.ca.

4. Multilingual and Technical Considerations

TeX and \LaTeX have an on-going practice of including metadata within the source files and package documentation. Usually this is done as comments at the beginning of the file; such as the following from the English language version of the 2015 TeX Live documentation⁵.

```
$Id: texlive-en.tex 37205 2015-05-05 21:36:33Z karl $
TeX Live documentation. Originally written by Sebastian Rahtz and
Michel Goossens, now maintained by Karl Berry and others.
Public domain.
```

This provides information, ideally suited for copyright metadata fields, as in Section 2.3.2, as well as for `\Subject` and `\CoverDate` from Section 2.3.3.

Also near the top of the file one finds front-matter content

```
\title{%
  {\huge \textit{The \TeX\ Live Guide---2015}}
}
\author{Karl Berry, editor \[\[3mm]
        \url{http://tug.org/texlive/}
}
\date{May 2015}
```

which supplies metadata information for the commands `\Title`, `\Author`, `\CoverDisplayDate` also from Section 2.3.3, and `\CopyrightURL`.

Most of the hundreds of thousands, if not millions of documents prepared using TeX, \LaTeX and other TeX-based formats, include similar metadata information, much of which currently does not accompany the resulting PDF. It is becoming increasingly common, if not yet a legal requirement, for PDFs to satisfy a standard that includes inclusion of metadata. This is especially so for government agencies and institutions receiving government funding, in several countries around the world.

It is an aim of the pdfx to simplify the process of capturing and including metadata within \LaTeX -produced PDFs, from both the author's view and that of archivists. The extra features introduced with version 1.5.8 take a large step in that direction. This includes the ability, described in the next subsection, to reliably include data presented in different text encodings, rather than being restricted to UTF-8 only. It is a role of the software to make the conversion, rather than rely on some 3rd party for a translation.

4.1. Multilingual Metadata

A cursory search of the documentation (`../texmf-dist/doc`) subtree of the forthcoming TeX Live 2016 release reveals more than 730 different `.tex` or `.dtx` document sources which specify an input encoding, via the `\usepackage[...]{inputenc}` command. Roughly 380 (a bit more than half) declare UTF-8 as the input encoding. Of the remainder there are ≈ 20 other encodings specified, covering a range of languages for at least part of their content. At some point in time, these documents may be required to have accurate accompanying metadata, as part of conformance to a designated PDF (or other) standard. There are libraries and archives that already must meet such standards.

We have shown above, in Section 2.2, how the `.xmpdata` file can be inserted into the document source, which then ensures that metadata is reliably transferred along with the source itself. This seems a good strategy, but are there any problems with it, especially in a multilingual context?

⁵ found at `/usr/local/texlive/2016/texmf-dist/doc/texlive/texlive-en/`.

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Modern editing software can require an encoding to be associated with each file. This is what allows the correct characters to be shown, from what is otherwise just a sequence of 8-bit bytes. The flip-side is that arbitrary editing is not permitted. Add some UTF-8 data into a file that is encoded as Latin-2 then try to save it. You may be asked to specify a new encoding, or the application may even crash out entirely. Maybe this happens *accidentally*. It is not hard for a curly quote (') or endash (–) to be included; many editors have settings which can do this with normal ascii input. Turn *off* such settings.

The approach that we advocate is that when editing to add metadata, best is to:

1. use the *same encoding* as is specified for the file itself, if known (as is usually the case);
2. even if 1. is not possible, use Copy/Paste *within* the document source (e.g., for authors' names, addresses, affiliations, etc.) and from comments, as in Section 4 above;
3. avoid typing new characters, especially quotes and dashes, and be extra careful with back-spacing to preserve the real meaning of copied content.

Even if the original encoding is not known, use of Copy/Paste from other parts of the document is normally not going to change its encoding. This should not cause the file to become invalid due to mixed content. In some situations it may be necessary to use an ASCII-only representation, such as \TeX 's LICR⁶ macros [18, § 7.11].

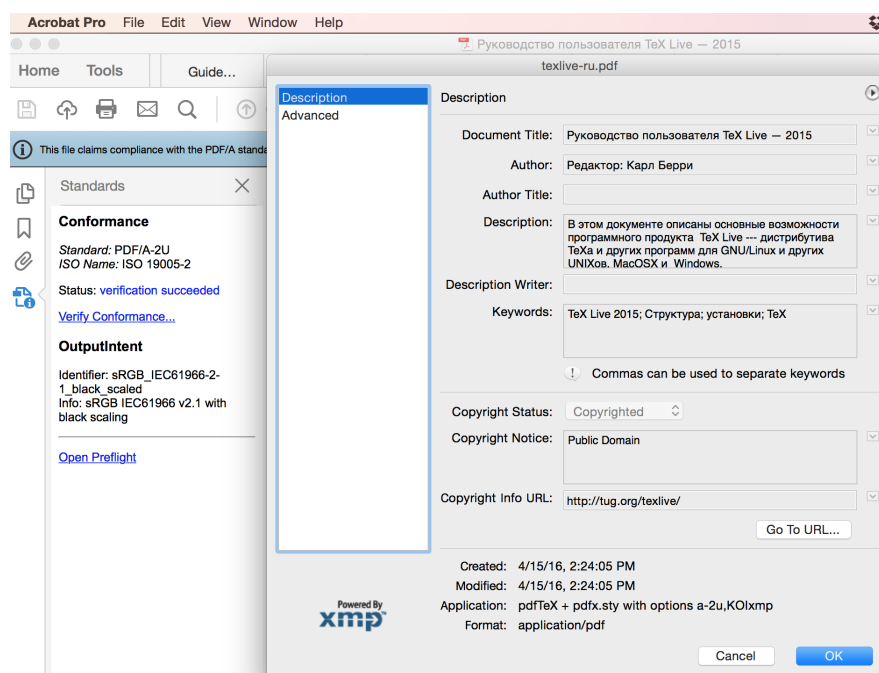


Figure 1: Metadata generated from the coding shown in Figure 2, viewed using Acrobat Pro's 'Additional Metadata ...' panel.

4.1.1. Metadata with Cyrillics

Here is a 'real-world' example, with Figure 1 showing the metadata as could be produced for the Russian language version of the \TeX Live documentation, from coding as shown in Figure 2. The source file itself is actually encoded for KOI8-R, as indicated by

⁶LICR: \TeX Internal Character Representation; or think 'I = Interchange'.

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`\usepackage[koi8-r]{inputenc}`, but is deliberately shown here encoded as T1 [18, p. 449]. This difference is immaterial for checking the validity of the metadata. For example, the stream of upper (accents, etc.) characters within `\Title{\textKOI{ ... }}` is the same as within `\title{... \textit{ ... }}`. Similarly for `\Author{\textKOI{...}}` and `\author{...}`, and `\CoverDate` and `\date`. Strings for the `\Subject` and `\Keywords` are taken from the first actual paragraph in the document, and from early subsection titles.

```
% $Id: texlive-ru.tex 34060 2014-05-16 19:52:41Z boris $
%
%\def\Status{1}
\providecommand{\pdfxopts}{a-2u,KOIxmp}
\providecommand{\thisyear}{2015}
%\immediate\write18{rm \jobname.xmpdata}%  uncomment for Unix-based systems
\begin{filecontents*}{\jobname.xmpdata}
\Title{\textKOI{òÕĚĪĒĪÁÓŎĒĪ ĎĪĪŮĪĒÁŎĀĪŇ} TeX Live \textemdash \thisyear}
\Author{\textKOI{òĀĀĀĒŎĪŎ: ěĀŎĪ áĀŎŎĒ}}
\Subject{\textKOI{ĕ ŮŎĪĪ ĀĪĒŎĪĀŎĀ ĪĎĒŎĀĪŮ ĪŎĪĪĒĪŮĀ ĒĪŮĪĪŎĪĪŎŎĒ ĎŎĪĈŎĀĪĪĪĪĪĪ ĎŎĪĀŎĒŎĀ }
TeX Live \textKOI{--- ĀĒŎŎŎĒĀŎŎĒĒ }TeX\textKOI{Ā Ē ĀŎŎĈĒĒ ĎŎĪĈŎĀĪĪ ĀĪŇ} GNU/Linux
\textKOI{Ē ĀŎŎĈĒĒ }UNIX\textKOI{ĪĒ}, MacOSX\textKOI{Ē Windows.}}
\Keywords{TeX Live \thisyear\sep \textKOI{ŏŎŎŎĒŎŎŎĀ}\sep \textKOI{ŎŎŎĀĪĪĒĒĒ}\sep \TeX}
\CoverDisplayDate{\textKOI{ĪĒĒ} \thisyear}
\CoverDate{2015-05-06}
\Copyrighted{False}
\Copyright{Public Domain}
\CopyrightURL{http://tug.org/texlive/}
\Creator{pdfTeX + pdfx.sty with options \pdfxopts }
\end{filecontents*}
\documentclass{article}
\usepackage[\pdfxopts]{pdfx}[2016/03/09]
\PassOptionsToPackage{obeyspaces}{url}
\let\tldocrussian=1 % for live4ht.cfg
\usepackage{cmap}
\usepackage{tex-live}
\usepackage[koi8-r]{inputenc}
\usepackage[russian]{babel}
...
\begin{document}
\title{%
  {\huge \textit{òÕĚĪĒĪÁÓŎĒĪ ĎĪĪŮĪĒÁŎĀĪŇ} \protect\TL{} "--- \thisyear}}%
}
\author{\textKOI{òĀĀĀĒŎĪŎ: ěĀŎĪ áĀŎŎĒ}\[3mm]
  \url{http://tug.org/texlive/}}
\date{ĪĒĒ \thisyear}
```

Figure 2: Example of cyrillics in metadata, shown as if T1-encoded. See Figure 1 for the actual result.

It is the ‘parser’ command/macro `\textKOI{ ... }` that indicates that the upper range characters (having byte codes 128–255) are to be treated as KOI8-R characters, rather than as part of UTF-8 byte sequences. It works by examining each byte in sequence, and returning the appropriate UTF-8 2-byte sequence for the required cyrillic character. This happens during the processing of data from `\jobname.xmpdata` for fleshing-out the XMP metadata packet to be included within the final PDF/A document.

The ‘parser’ macros defined for various encodings, are given in figure 3. In Section 2.1.6 the package options are given for loading the appropriate support for desired languages or

alphabets. Support for other encodings can be added, if there proves to be a need.

macro	encodings	bytes 128–255 with languages
<code>\textLAT</code>	Latin-1	Western European
<code>\textLII</code>	Latin-2	Middle European
<code>\textLIII</code>	Latin-3	South European
<code>\textLIV</code>	Latin-4	North European
<code>\textLTV</code>	Latin-5	Turkish
<code>\textLVI</code>	Latin-6	Nordic
<code>\textLVII</code>	Latin-7	Baltic Rim
<code>\textLIIIX</code>	Latin-8	Celtic
<code>\textLIX</code>	Latin-9	Western European, incl. €
<code>\textKOI</code>	KOI8-R, KOI8-RU	cyrillic alphabets
<code>\textLGR</code>	LGR, ISO-8859-7	Greek & Polytonic Greek
<code>\textARM</code>	ArmTeX, ArmSCII8	Armenian
<code>\(...\)</code>	parses simple mathematical expressions	

Figure 3: Parser macros, defined for specific types of input.

With encoded characters marked in this way with a ‘parser’ macro, it is actually possible to mix UTF-8 metadata with other bytes; provided, of course, you have an editor that allows such a file to be created and saved. On the other hand, if you are unhappy with mixing content having different encodings, then there is another way, based upon \LaTeX ’s LICR macros [18, § 7.11] for representing accented and non-latin characters. These are normally hidden away (‘I = Internal’) but in fact can be seen within auxiliary files, such as `.aux` and `.toc`, `.lof` and `.lot`. This is how \LaTeX stores the knowledge of such characters for use in a part of the document processing which may not have the same encoding as the document as a whole, or may require characters generated using several different encodings. Thus LICRs allow for a reliable representation passed to a different context; think ‘I = Interchange’.

```
(/usr/local/texlive/2014/texmf-dist/tex/latex/oberdiek/grfext.sty)
(/usr/local/texlive/2014/texmf-dist/tex/latex/latexconfig/epstopdf-sys.cfg)
> \LICRs=macro:
->\IeC {\CYRR } \IeC {\cyru } \IeC {\cyrk } \IeC {\cyro } \IeC {\cyrv } \IeC {\cyro
} \IeC {\cyrd } \IeC {\cyrS } \IeC {\cyrt } \IeC {\cyrv } \IeC {\cyro } \IeC {\cyrp
} \IeC {\cyro } \IeC {\cyrL } \IeC {\cyrSftsn } \IeC {\cyrz } \IeC {\cyro } \IeC {\cy
rv } \IeC {\cyra } \IeC {\cyrt } \IeC {\cyre } \IeC {\cyrL } \IeC {\cyrya } \protect
\TL {} "---- 2015.
\showLICRs ...otect \edef \LICRs {#1}\show \LICRs
1.45 ...???? ?????????? \protect\TL{} "---- 2015}
? █
43 \begin{document}
44
45 \showLICRs(Руководство пользователя \protect\TL{} "---- 2015)
46 \title{%
47 \huge \textit{Руководство пользователя \protect\TL{} "---- 2015}}%
48 }
49
50 \author{Редактор: Карл Берри\3mm}
51 \url{http://tuo.ora/texlive/}
```

Figure 4: How to see LICRs in the `.log` window.

Figure 4 shows how to see this. The document source in the lower portion clearly shows the cyrillic input, whereas the `.log` messages in a command-line window above reveal the LICR representation. A command `\showLICRs` is available with `pdfx.sty` version 1.5.8, specifically to allow this. Now the LICR representation can be copied directly from the `.log` file, modulo

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```
% $Id: texlive-ru.tex 34060 2014-05-16 19:52:41Z boris $
%
%\def\Status{1}
\providecommand{\pdfxopts}{a-2u,KOIxmp}
\providecommand{\thisyear}{2015}
%\immediate\write18{rm \jobname.xmpdata}% uncomment for Unix-based systems
\begin{filecontents*}{\jobname.xmpdata}
\Title{\IeC {\CYRR } \IeC {\cyru } \IeC {\cyrk } \IeC {\cyro } \IeC {\cyrv } \IeC {\cyro }
\IeC {\cyrd } \IeC {\cyrS } \IeC {\cyrt } \IeC {\cyrv } \IeC {\cyro } \IeC {\cyrp } \IeC {\cyro }
\IeC {\cyr1 } \IeC {\cyrSftsn } \IeC {\cyrz } \IeC {\cyro } \IeC {\cyrv } \IeC {\cyra } \IeC {\cyrt }
\IeC {\cyre } \IeC {\cyr1 } \IeC {\cyra } TeX Live \textemdash \thisyear}
\Author{\IeC {\CYRR } \IeC {\cyre } \IeC {\cyrd } \IeC {\cyra } \IeC {\cyrk } \IeC {\cyrt }
\IeC {\cyro } \IeC {\cyrr } : \IeC {\CYRK } \IeC {\cyra } \IeC {\cyrr } \IeC {\cyr1 }
\IeC {\CYRB } \IeC {\cyre } \IeC {\cyrr } \IeC {\cyrr } \IeC {\cyri }}
\Keywords{TeX Live \thisyear\sep \IeC {\CYRS } \IeC {\cyrt } \IeC {\cyrv } \IeC {\cyru }
\IeC {\cyrk } \IeC {\cyrt } \IeC {\cyru } \IeC {\cyrr } \IeC {\cyra } \IeC {\cyrr } \IeC {\cyru }
\IeC {\cyrS } \IeC {\cyrt } \IeC {\cyra } \IeC {\cyrn } \IeC {\cyro } \IeC {\cyrv } \IeC {\cyrk }
\IeC {\cyri } \sep TeX}
\Subject{\IeC {\CYRV } \IeC {\cyrev } \IeC {\cyrt } \IeC {\cyro } \IeC {\cyrm } \IeC {\cyrd }
\IeC {\cyro } \IeC {\cyrk } \IeC {\cyru } ...
...
\CoverDisplayDate{\IeC {\CYRM } \IeC {\cyra } \IeC {\cyrishrt } 2015}
\CoverDate{2015-05-06}
\Copyrighted{False}
```

Figure 5: Example of cyrillics in metadata, using LICRs.

slight difficulties due to the way long lines are broken. As this representation is entirely with ASCII characters, it should not cause any conflict with any UTF-8 metadata that you want within the same file. The .xmpdata file might now look as in Figure 5. Although very verbose, this should be resistant to any corruption due to character encodings, and produces the same result within the PDF, as in Figure koi8-meta.

Alternatively one can exploit the .toc file, using \TeX 's command `\addtocontents`, as shown in Figure 6. After processing the file, you can copy the LICR representations out of the .toc file, taking care to remove anything of a non-character nature (e.g., implementing the size and spacing of the letters in \TeX).

```
43 \begin{document}
44
45 \addcontentsline{toc}{title}{Руководство пользователя \protect\TL{} "---- 2015}
46 \title{%
47 \huge \textit{Руководство пользователя \protect\TL{} "---- 2015}}%
48 }
49 \addcontentsline{toc}{author}{Редактор: Карл Берри}
50 \author{Редактор: Карл Берри\3mm]
51 \url{http://tug.org/texlive/}}
52 \date{Май \thisyear}
53 \addcontentsline{toc}{date}{Май \thisyear}
54 \addcontentsline{toc}{docs}{Структура}
55 \addcontentsline{toc}{install}{Установки}
56 \addcontentsline{toc}{Subject}{В этом документе описаны основные возможности программного продукта
57 \TL{} "---- дистрибутива \TeX{}а и других программ для \acro{GNU}/Linux и других UNIXов, \MacOSX и Windows.}
58 \makeatitle
59
```

Figure 6: How to get desired LICRs into the .toc file.

Of course once you have harvested the metadata in this format, remove or comment-out

those extra `\showLICRs` to get uninterrupted processing. Similarly comment-out the extra `\addtocontents` lines, else the real Table-of-Contents will become corrupted with unwanted entries. A couple more \TeX processing runs should restore the PDF to the way you want it.

4.1.2. Metadata with Polish

The next example has upper-range bytes intended to represent Latin-2 encoded characters, as used in Polish. With the \TeX source starting as in Figure 8, the resulting metadata is shown in Figure 7.

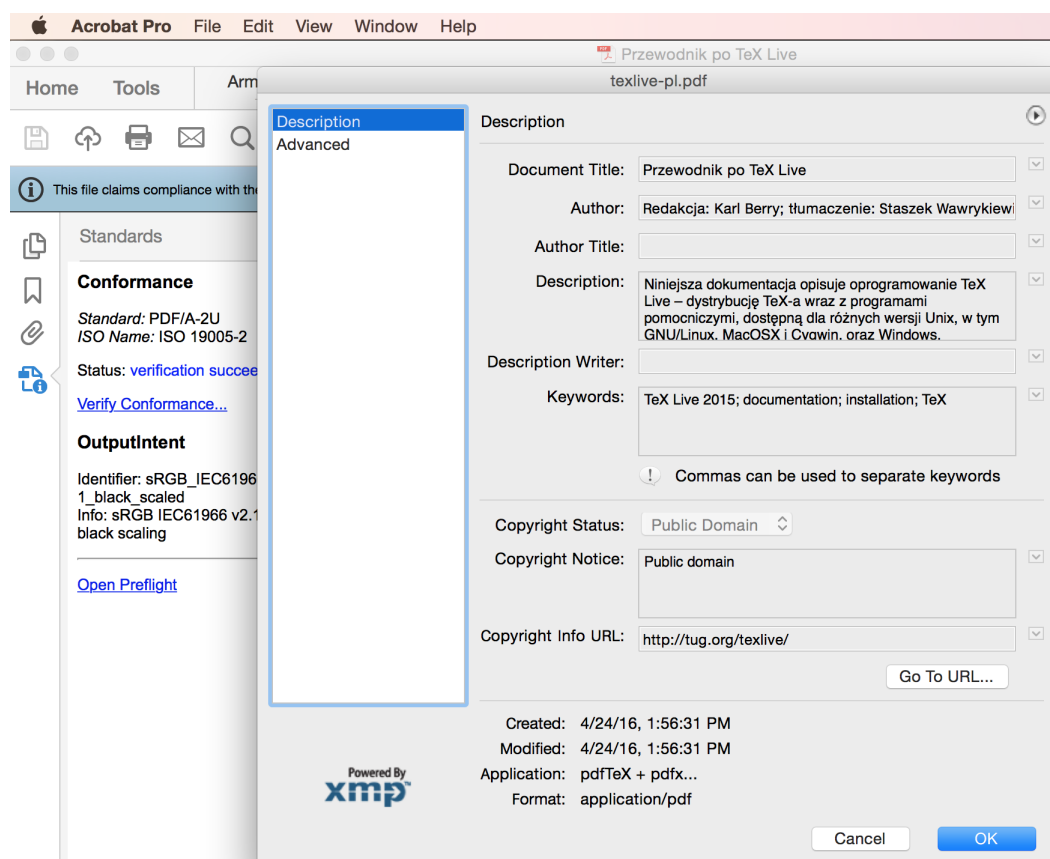


Figure 7: Metadata generated from the coding shown in Figure 8 for the Polish version of \TeX Live 2015 documentation, showing Latin-2 encoded characters. The document is valid for PDF/A-2, after having been processed with pdf- \TeX .

Here the ‘parser macro’ is `\textLII`, which can be seen in Figure 8 to surround either complete metadata entries, or just those parts containing polish accented (or other) characters in entries that also contain english words. The macro `\textLF` provides a line-feed character for the UTF-8 output.

As a technical note, the `\jobname.xmpdata` file is read with `\obeyspaces` in effect. This causes space runs in the input to be replaced by a single ‘active space’ character, which ultimately expands into a normal space upon output. This is needed to preserve inter-word spaces, which would otherwise get lost during parsing, due to \TeX ’s pattern matching when reading macro arguments. Each byte is examined individually, with normal letters `a-zA-Z` and most punctuation characters passed through unchanged.

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```
% iso8859-2
% $Id: texlive-pl.tex, v. 53 2015/05/17
% TeX Live documentation.
% Originally written by Sebastian Rahtz and Michel Goossens,
% now maintained by Karl Berry and others.
% Polish translation and additions by Staszek Wawrykiewicz
% (with a little help from my friends, while my guitar gently weeps ;-))
% Public domain.
% ----
% UWAGA dla recenzentów/tłumaczy: %! to moje komentarze (StaW)
%
\providecommand{\pdfxopts}{a-2u,LATxmp}
\providecommand{\thisyear}{2015}
\begin{filecontents*}{\jobname.xmpdata}
\Title{Przewodnik po TeX Live \thisyear}
\Author{Redakcja: Karl Berry\sep \textLII{tłumaczenie: Staszek Wawrykiewicz}}
\Subject{\textLII{Niniejsza dokumentacja opisuje oprogramowanie \TeX\ Live
-- dystrybucję \TeX-a wraz z~programami pomocniczymi, dostępna dla różnych wersji Unix,
w~tym GNU/Linux, MacOSX i~Cygwin, oraz Windows.}\textLF\textLF Documentation originally
written by Sebastian Rahtz and Michel Goossens, now maintained by Karl Berry and others.}
\Keywords{TeX Live \thisyear\sep documentation\sep installation\sep \TeX}
\Copyright{Public domain}\Copyrighted{False}
\CopyrightURL{http://tug.org/texlive/}
\CoverDisplayDate{Maj \thisyear}
\CoverDate{\thisyear-05-17}
\Creator{pdfTeX + pdfx.sty with options \pdfxopts, from TeX Live 2016}
\end{filecontents*}
%
\documentclass{article}
\let\tldocenglish=0 % for live4ht.cfg
\let\textsl\textit
\usepackage[\pdfxopts]{pdfx}[2016/04/13]
\PassOptionsToPackage{obeyspaces}{url}
\PassOptionsToPackage{breaklinks,colorlinks,linkcolor=hypercolor,citecolor=hypercolor,%
urlcolor=hypercolor,filecolor=hypercolor,bookmarksopen,hyperindex}{hyperref}
\hypersetup{breaklinks,colorlinks,allcolors=hypercolor}
\usepackage{tex-live}
\usepackage{polski} % for PL
\usepackage[latin2]{inputenc} % for PL
\usepackage[T1]{fontenc}
...
\begin{document}
\title{\huge \textit{Przewodnik po \protect\TL{}} 2015}}
\author{Redakcja: Karl Berry; tłumaczenie: Staszek Wawrykiewicz \ll[3mm]
\url{http://tug.org/texlive/}}
\date{Maj 2015}
```

Figure 8: Start of the \TeX source for the Polish version of \TeX Live documentation. Although Latin-2 encoded, the bytes are shown here using \TeX 's T1 encoding [18, p. 449].

Let's understand better how this example was created. There are three files involved.

- pdfx.dtx, the source for this documentation, open in an editor with encoding declared as UTF-8;

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- `texlive-pl.tex` the Polish documentation for T_EX Live, open in the same editor with Latin-2 encoding;
- `latin2-example.tex` which starts life as an empty file on disk.

This latter file must be opened in the editor, with encoding declared as Latin-2 (ISO-8859-2). Next the preamble is copied from `texlive-pl.tex` and pasted into `latin2-example.tex` which is then saved to disk. Further editing is done to `latin2-example.tex` to add verbatim markers (`|...|`) and adjust line lengths for display within Figure 8. This file's contents is included as part of the documentation via `\input{latin2-example}` within an environment that handles presentation aspects.

What *cannot* be done is to paste the preamble content directly into `pdfx.dtx`. Consider what would then happen, using 'thumaczy' ('translators', on line 10 following 'UWAGA'). This word shows correctly in the Latin-2 encoded files. It was typeset here using `\l` for the 'l' letter, having Unicode code-point `Ux0142` (so UTF-8 byte pair "C5 "82). However, it occurs at slot "B3 within Latin-2 encoding. In the T1 font encoding [18, p. 449] the character glyph name for slot "B3 is `/scedilla`, which is what shows in Figure 8. When the 'l' is pasted directly into a UTF-8 file and shown verbatim, the result is the pair of glyphs "C5 (`/Aring`) and "82 (`/Cacute`); viz. `tĀćumaczy`.

As with Figure 2 it is not important that the correct characters are shown here, but that the metadata in `\jobname.xmpdata` corresponds to what is used on the titlepage of the PDF; e.g., the contents of `\Title` and `\title`, `\Author` and `\author`, etc.

4.1.3. Metadata with Greek

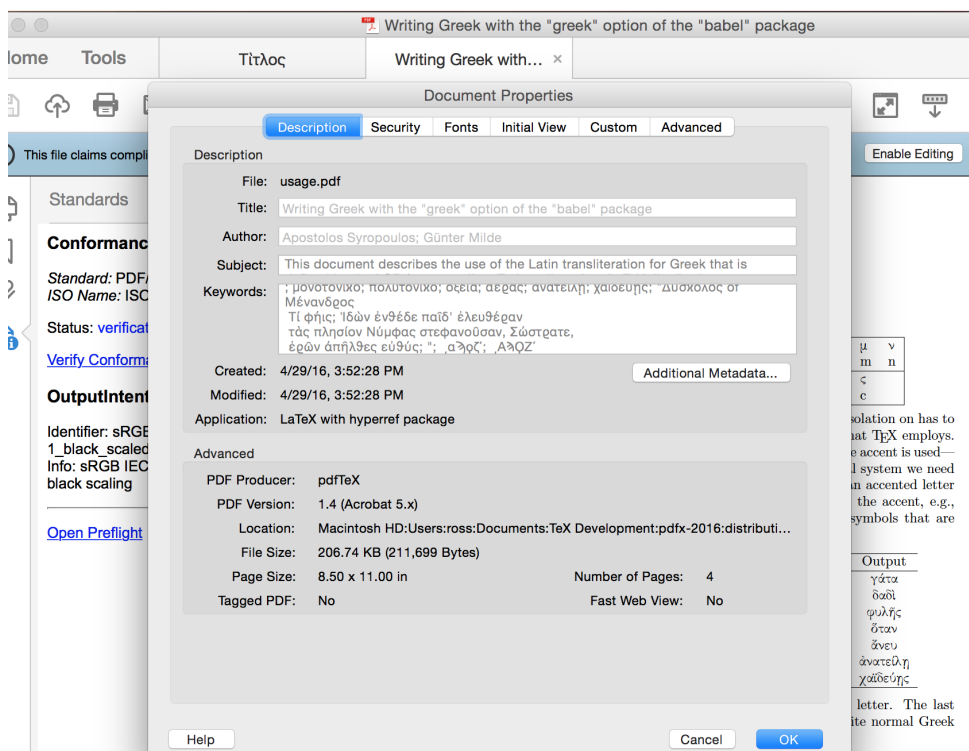


Figure 9: Metadata generated from the coding shown in Figure 10 using the greek language specified via the LGR encoding.

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```
% ...
% This file is part of the Babel system.
% -----
%
% It may be distributed and/or modified under the
% conditions of the LaTeX Project Public License, either version 1.3
% ...
% The Current Maintainer of this work is Günter Milde.
% ...

\providecommand{\pdfxopts}{a-2u,LGRxmp,LATxmp}
\begin{filecontents*}{\jobname.xmpdata}
\Title{Writing Greek with the "greek" option of the "babel" package}
\Author{Apostolos Syropoulos\sep Günter Milde}
\Subject{This document describes the use of the Latin transliteration for Greek that is
defined by the LGR font encoding. Today, all modern LaTeX distributions support literal
input of Greek, which is the preferred method for new documents. [G. Milde 2013/12/02]}
\Keywords{\textLGR{monotonik'o}\sep \textLGR{polutonik'o}\sep \textgreek{oxe'ia} \sep
\textgreek{>a'erac}\sep \textgreek{>anate'ilh|}\sep \textgreek{qa"ide'uh|c}} \sep
\textgreek{D'uskoloc} of \textgreek{M'enandroc}\textLF \textLGR{T'i f'hic? <Id'wn
>enj'ede pa'id'' >eleuj'eran\textLF t'ac plhs'ion N'umfac stefano~usan, S'wstrate,
\textLF >er~wn 'ap~hljec e>uj'uc? \sep
\textaristerikeraia\textalpha\textsampi\textqoppa\textzeta\textdexiakeraia\sep
\textaristerikeraia\textAlpha\textSampi\textQoppa\textZeta\textdexiakeraia}}
\CoverDate{1997-10-15}
\CoverDisplayDate{October 15, 1997}
\Copyright{This file is part of the Babel system.\textLF This file may be distributed and/or
modified under the conditions of the LaTeX Project Public License, either version 1.3
of this license or (at your option) any later version.}
\CopyrightURL{http://www.latex-project.org/lppl.txt}
\end{filecontents*}
%
\documentclass[11pt]{article}
\usepackage[\pdfxopts]{pdfx}[2016/04/13]
\hypersetup{colorlinks,allcolors=blue}
\usepackage[american,greek]{babel}
\languageattribute{greek}{polutoniko}
\usepackage{athnum,grmath}
\newcommand{\sg}{\selectlanguage{greek}}
\newcommand{\sa}{\selectlanguage{american}}
\begin{document}
\selectlanguage{american}
\title{Writing Greek with the \ttfamily greek\rmfamily\ option of the
\ttfamily babel\rmfamily\ package}
\author{Apostolos Syropoulos\
...\\...}
\date{October 15, 1997}
\maketitle
\abstract{\noindent
This document describes the use of the Latin transliteration for Greek that
is defined by the LGR font encoding. Today, all modern LaTeX distributions
support literal input of Greek, which is the preferred method for new
documents. [G. Milde 2013/12/02]}
```

Figure 10: Start of enriched L^AT_EX source for a document describing how to typeset in Greek, with added metadata demonstrating the LGR transliteration encoding.

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Prior to proper support for UTF-8 input, a method for preparing document source for the modern Greek language (and also for polytonic Greek), involved the use of LGR encoded fonts. Such a font has Greek (instead of Latin) letters in the slots for `a-zA-Z`, see [18, §9.4.2]. Thus ordinary ASCII letters are used to produce the Greek characters; the mapping of ASCII to Greek is referred to as a ‘transliteration’ scheme. It serves as *both* an input encoding, and as a font encoding. Accents and diacritic marks are provided through ligatures built-in to the fonts. Various documents can be found on the web⁷ and within T_EX Live distributions⁸.

Indeed the current maintainer Günther Milde states “The LGR transliteration does not work for PDF metadata”. This is because there is no translation of LGR input into \TeX LICRs, as happens with say `\usepackage[utf8]{inputenc}` for UTF-8 input, or when upper 8-bit characters are present using `\usepackage[iso-8859-7]{inputenc}`. With these, LICRs such as `\textAlpha`, `\textOmicron`, ..., `\textomega` are produced, which result in the correct characters for metadata and bookmarks, perhaps employing Unicode ‘combining’ characters for accented letters. Using pdfx the UTF-8 characters can be put directly into the `.xmpdata` file; LICRs are interpreted provided the `grkxmp` loading option has been specified.

Using the methods of pdfx the metadata difficulty is remedied, as can be seen in Figure 9 using coding as shown in Figure 10. This requires the `LGRxmp` option and `\textLGR` ‘parser’ macro. The original document source, called `usage.tex`, can be found in the directory specified in the footnote below. As this document is essentially an English description of how to use LGR for Greek, we have used the ‘Keywords’ field to provide examples of such usage. Since a macro `\textgreek` can be used for greek portions within such documents, this macro name is aliased to `\textLGR` within the context where metadata is processed. Furthermore, parsing using `\textLGR` generates correct pre-composed characters for letters with accents or diacritics. Bookmarks can also be generated from LGR input, using a technique described in Section 4.1.4.

The features available with different loading options are summarised here.

- no option: all metadata in `.xmpdata` file is in UTF-8 (incl. ASCII)
- `grkxmp`: LICRs can be present; e.g. `\textAlpha`, `\textOmega`, etc.
- `LGRxmp`: supports LGR-encoded input and ISO-8859-7 upper range characters, using the `\textLGR` ‘parser’ macro.

With `LGRxmp` specified, the features of `grkxmp` are also available; so any lower-listed option allows data to be mixed with that for higher-listed ones.

The final piece to get validation for PDF/A from LGR input, is to specify a Unicode point for the ‘v’ used only in the strong ‘sv’ ligature to obtain a non-final ‘sigma’ typeset in isolation.

```
\pdfglyphtounicode{internalchar2}{200D}
```

This gives an interpretation as ‘zero-width joiner’. There are two instances of this within `usage.tex`. Copy/Paste works as desired. Using pdf \TeX the above command is done automatically. Drivers, such as Xe \TeX lacking an implementation of `\pdfglyphtounicode`, can fail to produce a valid PDF due to this rather minor deficiency.

Greek numerals, using `\greeknumeral` or `\Greeknnumeral` cannot work directly within a `.xmpdata` file. However if such is desired, the following technique allows correct LICRs to be found for use in the metadata. At any convenient place within the \TeX source; e.g., near where the required number is used, insert coding such as:

```
{\pdfxGreeknnumeralsHack \textgreek{\edef\num{\greeknumeral{1997}}\show\num}}%
```

Upon processing, the following will be written to the console or `.log`-window.

⁷e.g., <http://milde.users.sourceforge.net/LGR/>

⁸TeXLive: `.../2016/texmf-dist/doc/generic/babel-greek/`

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```
> \num=macro:
->\LGR\textaristerikeraia \LGR\textalpha \LGR\textsampi \let \protect \LGR\text
dexiakeraia \LGR\textqoppa \let \protect \LGR\textdexiakeraia \LGR\textzeta \le
t \protect \LGR\textdexiakeraia \protect \LGR\textdexiakeraia .
<argument> ...um {\greeknumeral {1997}}\show \num

1.90 ...k{\edef\num{\greeknumeral{1997}}\show\num}
}
```

from which the desired string of LICRs, is extracted; viz.

```
\textaristerikeraia\textalpha\textsampi\textqoppa\textzeta\textdexiakeraia
```

The corresponding trick does not work with `\Greeknatural`, but the uppercasing can be done by manually from the string obtained using `\greeknumeral`,

```
\textaristerikeraia\textAlpha\textSampi\textQoppa\textZeta\textdexiakeraia
```

leaving the initial and final `\text...keraia` macros as all lowercase. For smooth processing, remove or comment-out the added line after collecting the LICRs.

4.1.4. Metadata with Armenian

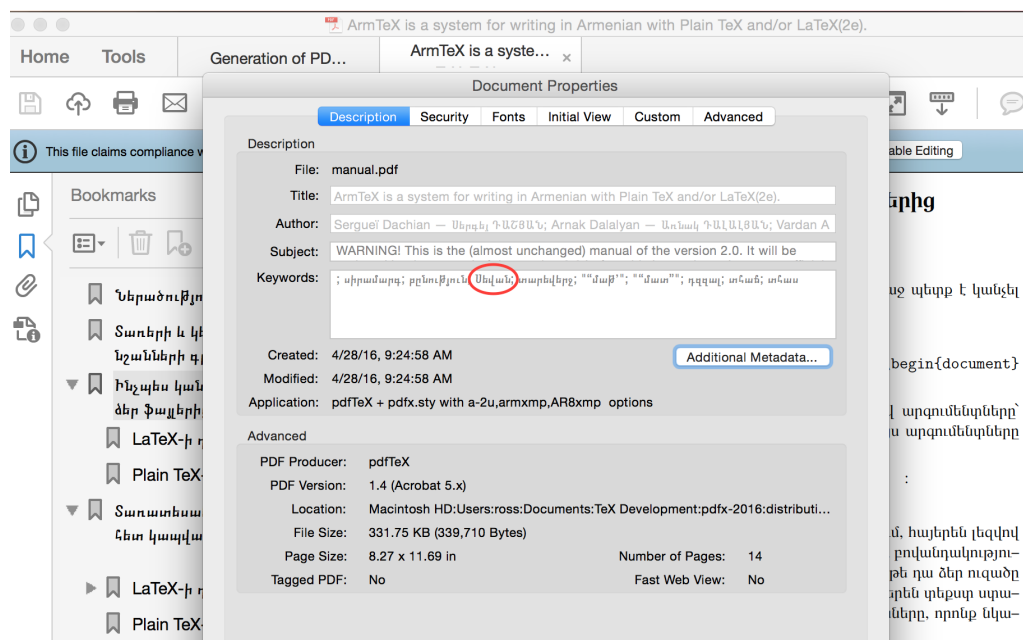


Figure 11: Metadata generated from the coding shown in Figure 12 using the Armenian language specified using ArmTeX transliteration. Bookmarks have been generated in Armenian. Figure 13 explains how the word indicated in red is obtained via parsing.

The ArmTeX package⁹ provides the method to typeset Armenian, with input being specified in various ways including a transliteration scheme from ASCII input. This transliteration is

⁹documentation: TeXLive: [.../2016/texmf-dist/doc/generic/armenian/](http://www.tug.org/texlive/doc/generic/armenian/)

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```
%%
%%
%% This is the 'manual.tex' file (ArmTeX manual in Armenian).
...
%%
%%
\providecommand{\pdfxopts}{a-2u,armxmp,AR8xmp}
\immediate\write18{rm \jobname.xmpdata}
\begin{filecontents*}{\jobname.xmpdata}
\Title{ArmTeX is a system for writing in Armenian with Plain TeX and/or LaTeX(2e).\textLF
\textARM{\ArmTeX` {\aroff\TeX}-um ev {\aroff\LaTeX}-um Hayeren Lezvov Grelu Hamakarg}}
\Author{Sergue\`i Dachian \textARM{--- Sergey DASHYAN}\sep Arnak Dalalyan
\textARM{--- Ar'nak DALALYAN}\sep Vardan Akopian \textARM{--- Vardan HAKOBYAN}}
\Copyright{\textcopyright 1997\textendash 2013 ArmTeX may be distributed and/or modified
under the conditions of the LaTeX Project Public License, either version 1.3 of this
license or (at your option) any later version.}
\CopyrightURL{http://www.latex-project.org/lppl.txt}
\Subject{WARNING! This is the (almost unchanged) manual of the version 2.0. It will be
replaced by the manual of the version 3.0 before this beta release becomes official.
A (temporary) brief description of the new features of \latArmTeX~3.0 can be found at
the end of the ``readme.txt'' file. \textLF
\textLF\textARM{OWSHADROWT'YOWN: Sa tarberak 2.0-i (grethe anphophox) dzer'narkn e': Ayn
kphoxarinvi tarberak 3.0-i dzer'narkov naxqan ays beta tho\~ghark\~man pashtonakanacowmu':
\ArmTeX~3.0-i nor hnaravoruthyunneri (g'a\~ma\~na\~ka\~vor) hamar'ot nkaragrowmu' (angleren
lezvov) karogh eq gu't'armuh nel~``}readme.txt\textARM{'' fayli verjum:}
\textLF\textLF\textARM{Hamakargu' o'gtagorc'elu hamar bavakan e' karoghanal ayn kanchel dzer
fayleric, tirapetel tar'qatesakneru' phoxogh hramannerin ev i\~ma\~nal the inchpes petq e'
nermuc'el teqstu' steghnasharic: Ays gor\~c'o\~ghu\~thyun\~ne\~ru' nkaragrvac' en hajordogh
ereq bag'innerum:}}
\Keywords{\textARM{si\~ra\~marg}}\sep \textARM{bu'\armuh nuthyun}\sep \textARM{Se\armuh van}
\sep \textARM{tare\*verj}\sep \textARM{'\mat''}\sep \textARM{'\mat''}\sep \textARM{d\*zzal}
\sep \textARM{t\*haj'}\sep \textARM{t\*has}}
\CoverDisplayDate{1 June 1999 (\textARM{1-u' hunisi 1999 th.})}
\Creator{pdfTeX + pdfx.sty with \pdfxopts\space options}
\pdfxEnableCommands{\let\sl\empty%
\xdef\sectAtitle{\textARM{Nerac'uthyun}}%
\xdef\sectBtitle{\textARM{Tar'eri ev ketadrakan nshanneri greladzevu'}}%
...
\xdef\sectFtitle{\textARM{Arm\TeX-i phophoxman patmuthyunu'}}}%
}
\end{filecontents*}

\documentclass[12pt,a4paper]{article}
\usepackage[\pdfxopts]{pdfx}
\hypersetup{colorlinks,allcolors=blue}
...
\title{\ArmTeX$, \$` $, \$ {\aroff \TeX}-um ev {\aroff \LaTeX}-um Hayeren Lezvov
Grelu Hamakarg\ {\normalsize\aroff (\latArmTeX: a System for Writing in Armenian
with \TeX\ and \LaTeX)}}
\author{ ... }%
\date{1-u' hunisi 1999 th.}
...
\begin{document}
\maketitle
...
%\section{\sectAtitle}%{Nerac'uthyun}}
\pdfxBookmark{\section}{\sectAtitle}{Nerac'uthyun}
```

Figure 12: Enriched L^AT_EX source for the Armenian version of the ArmTeX manual, with added metadata demonstrating the ArmTeX transliteration scheme for CVR, and the coding used to produce bookmarks from the transliteration.

directed at the use of fonts using the OT6 encoding, developed for this purpose. Each way is supported by pdfx.sty with appropriate loading options, similar to the support for Greek (see Section 4.1.3).

- no option: all metadata in .xmpdata file is in UTF-8 (incl. ASCII)
- armxmp: using LICR-like macro names; e.g. \armAyb, \armsha, \armfe etc.
- AR8xmp: using the ArmT_EX (OT6) transliteration scheme or with upper-range characters in ArmSCII8 encoding, using the ‘parser’ macro \textARM.

There are 39 letters in the Armenian alphabet, so the transliteration includes many 2-letter combinations to specify the desired character. Whereas Greek uses punctuation symbols to specify diacritics, Armenian requires either ligatures implemented in the OT6-encoded font, or careful parsing of the input into LICR-like macros. T_EX source¹⁰ for the ArmT_EX documentation is available in both English and Armenian. Figure 11 shows the result of enriching the Armenian version with relevant metadata, using coding as shown in Figure 12.

As in earlier examples, that metadata has come from the extensive comments at the head of the T_EX source file (represented by ... in Figure 12), and other title-page material, such as title and author names in both English and Armenian. Within the keywords are armenian words that are mentioned in the documentation as being slightly tricky to represent in transliteration, to verify that the required tricks have been correctly implemented.

Also apparent in Figure 11 is the use of Armenian letters in the Bookmarks pane, having been generated from the transliteration source. This requires a 3-step process, as follows.

1. conversion of transliterated source into UTF-8. This is done as the .xmpdata file is processed, using \pdfxEnableCommands to make global definitions; e.g.

```
\xdef\ssectAtitle{\textARM{Nerac'uthyun}}
```

capturing the section title in the form supplied in the T_EX source. This can be seen in Figure 12, near the end of the {filecontents*} environment, and at the bottom where the \section command would occur.

2. conversion of the UTF-8 representation into UTF16-be, suitable for bookmark strings within the PDF file. With PDFT_EX this is done using \StringEncodingConvert from Heiko Oberdiek's stringenc.sty package. LuaT_EX and XeT_EX can use the UTF-8 representation directly.
3. integration of the UTF16-be string (PDFT_EX) or UTF-8 string (LuaT_EX and XeT_EX) into the coding that would normally generate the bookmark from a provided section title, in transliterated form.

These last two steps are combined into a single command, to replace the usual command for a section title; \section, \subsection, etc.

```
\pdfxBookmark{\section}{\ssectAtitle}{Nerac'uthyun}
```

Now \pdfxBookmark first checks that the macro passed as the 2nd argument actually exists. If it does not, an error message is given and upon continuation would just do \section{Nerac'uthyun} as normal. When it does exist, then step 2 is done (by PDFT_EX) storing the result as \pdfx@temp. With LuaT_EX and XeT_EX, \pdfx@temp stores a copy of the UTF-8 data. Then the commands needing to be executed are essentially

¹⁰TeXLive: .../2016/texmf-dist/doc/generic/armenian/examples/latex/

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```
\pdfstringdefDisableCommands{\let\sectAtitle\pdfx@temp}
\def\sectAtitle{Nerac'uthyun}
\section{\sectAtitle}
```

so that the correct section heading is displayed on the page, but when `\sectAtitle` is processed to create a bookmark it is replaced by the pre-prepared contents of `\pdfx@temp`. There are some technicalities¹¹ to make this work cleanly, as just doing these commands would interfere with other uses of `\pdfstringdef`. In case a long sectioning command has an optional argument, or a *-variant is needed, then include it this way.

```
\pdfxBookmark[Ar'avot e'r]{\section*{\sectAtitle}{Ar'avot e'r, Araratyan dashti ...}}
```

4.1.5. Other Languages

There is support for Metadata using characters from other languages, with corresponding loading options, as follows.

- `arbxmp` : Arabic; via LICRs `\textarabicallef`, `\textarabicqaf`, `\textarabicaleflowerhamza`, etc.
- `devxmp` : Devanagari; via LICRs `\textdevanagaria`, `\textdevanagarivocalicr`, `\textdevanagaricandrabindu`, etc.
- `hebxmp` : Hebrew; via LICRs `\hebalef`, `\hebsamekh`, `\hebfinalpe` and accent marks `\segol`, `\qubuts`, etc.
- `vnmxmp` : Vietnamese; via LICRs `\ABREVE`, `\OCIRCUMFLEX`, `\uhorn` etc. and the combinations of multiple accents applied as usual via `\'`, `\``, `\^`, etc.

The LICRs include support mapping accented letters to precomposed glyphs, falling back on ‘combining characters’ only in unusual situations. Special input conventions or methods, such as transliteration schemes, are *not yet* supported. Indeed, these options are largely untested, so any difficulties encountered should be reported to the package authors. Requests to support extra input methods or other language blocks should also be directed to the authors, along with pointers to where the desired input methods are fully described. Sample ‘real-world’ documents would be greatly appreciated.

4.2. L8U Encoding

To understand how pdfx handles the translation into UTF-8 of input that is not already in that format, we’ll briefly discuss T_EX’s font-encoding mechanism, which is the basis for LICR macros [18, § 7.11]. As an example, consider the macro `\textgamma` representing the lowercase Greek letter γ . Various T_EX packages declare this as LICR in different ways, for different purposes.

```
greek-fontenc/lgrenc.def:\DeclareTextSymbol{\textgamma}{LGR}{103}
greek-fontenc/greek-euenc.def:\DeclareTextCommand{\textgamma}{\LastDeclaredEncoding}{Î§}
hyperref/puenc.def:\DeclareTextCommand{\textgamma}{PU}{\83\263}%* U+03B3
tipa/t3enc.def:\DeclareTextSymbol\textgamma{T3}{71} % Gamma
ucs/data/uni-2.def:\uc@dc1c{611}{tipa}{\textgamma}%
ucs/data/uni-3.def:\uc@dc1c{947}{default}{\textgamma}%
```

Here the `\uc@dc1c` commands associate UTF-8 input of Ux0263 (IPA small letter gamma) and Ux03B3 (Greek small letter gamma) internally with `\textgamma`, whereas the others deal with

¹¹In fact a small change is made to how `\@writetorep` is used.

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output formats¹². The LGR refers to greek fonts, encoded as explained in Section 4.1.3, whereas PU is used to create bookmark strings, and other PDF string inclusions, using `\pdfstringdef` from the `hyperref` package. IPA phonetics use the T3 encoding, allowing `\textgamma` to refer to a character from a completely different Unicode block. With `greek-euenc.def` designed for XeT_EX and LuaT_EX, the encoding can be variable, with the output bytes being those for the UTF-8 encoding of γ , namely `^^ce^b3`, shown here as the T1-encoded pair `Î$`.

Thus there are 4 output forms for this character, and we’ve not even considered how γ is used in mathematics! To handle these concurrently, one has internally defined control-sequence names

```
\LGR\textgamma=\char"67      where 6 × 16 + 7 = 103
\PU\textgamma=\long macro:->\83\263
\T3\textgamma=\char"47      where 4 × 16 + 7 = 71
\L8U\textgamma=\long macro:->Î$
```

where the 2nd ‘\’ is part of the name¹³. The latter macro is explained below. To use the specific version of the macro, L_TE_X maintains a ‘font-encoding’ parameter, set using `\fontencoding{...}` local to the surrounding environment grouping.

To the above declarations of `\textgamma`, to deal with conversion to UTF-8, the pdfx package adds the following declarations when the LGRxmp option is used.

```
pdfx/l8ugrk.def:\DeclareTextCommand{\textgamma}{L8U}{Î$}
pdfx/l8ugrk.def:\DeclareTextCompositeCommand{\textLGRenc}{L8U}{\textgamma}{Î$}
pdfx/l8ugrk.def:\DeclareTextCompositeCommand{\textLGRenc}{L8U}{g}{Î$}
pdfx/l8ugrk.def:\DeclareTextCompositeCommand{\textLGRenc}{L8U}{^^e3}{Î$}
```

The encoding name L8U indicates Local conversion into UTF-8 Unicode, as required for meta-data, using pdfx.sty. Currently this encoding is used in one place only; during the interpretation of information supplied through the `\jobname.xmpdata` file. This happens as part of the pdfx package, *before* it uses `xmpincl.sty`. Such specificity justifies being called a ‘Local’ encoding. However, other tasks may emerge requiring on-the-fly conversion to UTF-8. In this case all the functionality of this encoding could be shifted into a separate package, and the name of the encoding changed to reflect this more general usage. Bookmarks from transliterated input, as described in Section 4.1.4, is possibly a sufficient reason to have a separate package. Another possibility is to generate on-the-fly creation of UTF-8 strings, to be sent to XeT_EX or LuaT_EX running as a slave process to generate images of string using OTF fonts, which pdfT_EX currently cannot handle. The result would then be imported back into the running job as an image. The authors invite suggestions of how this L8U encoding functionality can be put to good use.

Accented letters normally use (e.g., from `t1enc.def`)

```
\DeclareTextComposite{\`}{T1}{A}{192}
```

to get the pre-composed ‘À’, rather than a composite built from ‘`’ and ‘A’. The last parameter is an index into a font; however the `\DeclareTextCompositeCommand` variant allows arbitrary coding as that final parameter, so can be the bytes for the UTF-8 representation of a character. In the above code lines, macros are defined as follows

¹²Whereas `ucs.sty` handles UTF-8 input, mapping it to LICRs, with pdfx.sty we need the reverse mapping into UTF-8, not just from LICRs but also from legacy 8-bit encodings and transliteration schemes.

¹³ obtained using `\csname LGR\string\textgamma\endcsname`.

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```
\\L8U\textLGRenc-\textgamma=macro:->Î$
\\L8U\textLGRenc-g=macro:->Î$
\\L8U\textLGRenc-ã=macro:->Î$
```

where now the 2nd and 3rd (and perhaps 4th) ‘\’ are part of the name¹⁴. This shows how the ascii letter ‘g’ is associated with the UTF-8 bytes for γ , and how the upper 8-bit character from ^e3 can be similarly associated, as in ISO-8859-7 encoding.

All these associations come together in the ‘parser’ macro `\textLGR` which works as follows. Firstly, `\textLGR` is declared for L8U encoding only, where it expands as follows.

```
\\L8U\textLGR #1->\textgreekLGRstring {#1}
\\L8U\textgreekLGRstring #1->\textgreekLGR@ii #1\@empty \@empty
\textgreekLGR@ii #1#2\@empty -> ... coding to test what is in #2
... \textLGRenc{#1}\@empty if #2 is \@empty
... \textLGRenc{#1}\textgreekLGR@i #2\@empty if #2 has more tokens
\textgreekLGR@i #1->\textgreekLGR@ii #1
```

Thus `\textLGRenc` is called on each token in the argument of `\textLGR`. Now `\textLGRenc`, which is applicable only when L8U encoding is in effect, has a default expansion of just passing the character through unchanged; viz.

```
\DeclareTextCommand{\textLGRenc}{L8U}[1]{#1}
```

but by using `\DeclareTextCompositeCommand{\textLGRenc}{L8U}{...}{...}`, alternate expansions apply with specific arguments, as shown above. In particular, that final argument can include coding that ‘looks ahead’ to find the next character. This is used, for example, with diacritics in Greek, multi-letter sequences for Armenian letters, and other special cases related to ligatures and punctuation symbols. To illustrate this Figure 13 follows the conversion of a specific word, given in the transliteration for Armenian (see Section 4.1.4). This conversion occurs using only T_EX’s macro-expansion ability. Some of the details relevant to this example are explained there.

Note how in Figure 13 the ArmT_EX user macro `\armuh` gets aliased to an LICR called `\textarmuh`. Since `\armuh` is already defined, not as an LICR, it cannot be declared to be one without creating problems. Instead, within the environment grouping where L8U encoding is specified, one uses `\let\armuh\textarmuh` within a ‘rebinding’ macro command `\LIIXUmaparmenianletters`¹⁵. to get LICR functionality from user-commands.

```
\def\LIIXUmaparmenianletters{%
  \let\ArmTeX\textArmTeX
  \let\Armayb\textArmayb
  ...
  \let\armuh\textarmuh
  ...
  \def\armbf{}%
  ... }
```

As well as rebinding each command for a letter, the font style-switching commands are aliased to do nothing, as these are not relevant to creating UTF-8 output. Being localised by the L8U grouping, this causes no problem elsewhere within the document. This is similar to `\psdaliasnames` and `\psdmapshortnames` from `hyperref.sty` which rebind user macros to LICRs, so that PU encoded versions of LICRs can be used.

¹⁴ obtained using `\csname\string\LGR\string\textLGRenc-\string\textgamma\endcsname`.

¹⁵The start of the macro name is derived from pseudo-Roman numerals: IX = 9, IIX = 8

```
\textARM{Se\armuh van}
\textarmenARMstring {Se\armuh van}
\textarmenARM@ii Se\armuh van\@empty \@empty
\textARMenc {S}\textarmenARM@i e\armuh van\@empty \@empty
\arm@en{S}{\tilde{O}}{\arm@enc{h}{\tilde{O}}{\arm@enc{H}{\tilde{O}}{\tilde{O}}}}\textarmenARM@i e\armuh van\@empty ...
\arm@enc{h}{\tilde{O}}{\arm@enc{H}{\tilde{O}}{\tilde{O}}}\textarmenARM@i e\armuh van\@empty \@empty
\arm@enc{H}{\tilde{O}}{\tilde{O}}\textarmenARM@i e\armuh van\@empty \@empty
\tilde{O}\textarmenARM@i e\armuh van\@empty \@empty
\tilde{O}\textARMenc {e}\textarmenARM@i \armuh van\@empty \@empty
\tilde{O}\textARMenc {e}\textarmenARM@i \armuh van\@empty \@empty
\tilde{O}\arm@en{e}{\tilde{O}}{\arm@enc{'}}{\tilde{O}}{\arm@enc{v}}{\tilde{O}}{\tilde{O}}}\textarmenARM@i \armuh van\@empty ...
\tilde{O}\arm@enc{'}}{\tilde{O}}{\arm@enc{v}}{\tilde{O}}{\tilde{O}}}\textarmenARM@i \armuh van\@empty \@empty
\tilde{O}\arm@enc{v}}{\tilde{O}}{\tilde{O}}\textarmenARM@i \armuh van\@empty \@empty
\tilde{O}\tilde{O}\textarmenARM@i \armuh van\@empty \@empty
\tilde{O}\tilde{O}\textARMenc {\armuh }\textarmenARM@i van\@empty \@empty
\tilde{O}\tilde{O}\textarmuh\textarmenARM@i van\@empty \@empty
\tilde{O}\tilde{O}\L8U\textarmuh-\textarmenARM@i van\@empty \@empty
\tilde{O}\tilde{O}\textarmgobbblespace van\@empty \@empty
\tilde{O}\tilde{O}\L8U\textarmgobbblespace- van\@empty \@empty
\tilde{O}\tilde{O}\textarmenARM@i van\@empty \@empty
\tilde{O}\tilde{O}\textARMenc {v}\textarmenARM@i an\@empty \@empty
\tilde{O}\tilde{O}\arm@en{v}}{\tilde{O}}{\arm@enc{n}}{\tilde{I}}{\tilde{O}}}\textarmenARM@i an\@empty \@empty
\tilde{O}\tilde{O}\arm@enc{n}}{\tilde{I}}{\tilde{O}}}\textarmenARM@i an\@empty \@empty
\tilde{O}\tilde{O}\tilde{O}\textarmenARM@i an\@empty \@empty
\tilde{O}\tilde{O}\tilde{O}\textARMenc {a}\textarmenARM@i n\@empty \@empty
\tilde{O}\tilde{O}\tilde{O}\tilde{a}\textarmenARM@i n\@empty \@empty
\tilde{O}\tilde{O}\tilde{O}\tilde{a}\textARMenc {n}\@empty
\tilde{O}\tilde{O}\tilde{O}\tilde{a}\tilde{O}\@empty
\tilde{O}\tilde{O}\tilde{O}\tilde{a}\tilde{O}
```

The macro `\armen@en` (named for **e**mpy or **n**ext), looks ahead to see if the 5th-next argument token is `\@empty`, signifying that there is nothing left of the original input. (A closed bracing `{...}` counts as a single argument.) If `\@empty` the tokens in the 2nd bracing are substituted, otherwise those in the 3rd bracing. Similarly `\armen@nc` (named for **n**ext **c**haracter) looks to see whether that 5th argument token matches with the character in the 1st bracing. If so, the 2nd bracing's tokens are substituted, else those of the 3rd bracing. This is how to cope with 'Sh' or 'Sh', implemented as ligatures in an OT6 encoded font, denoting a different letter from a single 'S'. The macro `\armuh` is used here to *prevent* a ligature from `ev` that would otherwise occur. But then one must have written `e\armuh v` to get the separate letters. The space becoming an active token, which explains the need for `\textarmgobbblespace` to restart parsing appropriately. Of course `\textarmenARM@i` behaves like `\textgreekLGR@i` as explained earlier, with a test for `\@empty` as the 2nd token. At the end, any remaining `\@empty` expand into nothing.

Figure 13: Partial tracing of the conversion of an Armenian word, indicated by the red oval in Figure 11, from OT6 transliterated form into UTF-8 bytes. In each line, \TeX expansion occurs at the position of the left-most `\`. The resulting bytes are shown here in T1 encoding, as in previous examples.

Several other 'rebinding' commands are defined, mostly with package-loading options.

- `\LIIXUmapTeXnames` always defined
- `\LIIXUscriptcommands` handles `\textsuperscript`, `\textsubscript`
- `\LIIXUmaparabicletters` with `arbxmp`

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- `\LIIXUmapgreekletters` with `grkxmp` and `LGRxmp`
- `\LIIXUmaplatinchars` and `\LIIXUcancelfontswitches` with `LATxmp`
- `\LIIXUmapmathletterlikes` always defined
- `\LIIXUmapmathspaces` always defined
- `\LIIXUmapmath...` with `mathxmp` — see Section 4.3 below.

It may well be that more macro names can be added to some of these commands, to allow more user macros to be used within the metadata. Suggestions for such additions should be sent to the pdfx package authors.

4.3. Nested Parsing — Mathematics in Metadata

Macro commands for many mathematical symbols can be used directly in metadata without extra support; e.g., basic arithmetic operations, letter-like symbols, spacing commands. Super- and subscripted letters and numerals can use `\textsuperscript` and `\textsubscript` when there is an appropriate Unicode character (digits, comma, $+/-/=$, parentheses, many letters but not all).

When the `mathxmp` loading option is specified, many more symbols become available, using ‘rebinding’ macros. These are necessary, as the macros for mathematical symbols are generally *not* defined as LICRs, but use `\mathchar`. Thus new LICRs are needed, and existing names bound to these.

`\LIIXUmapmathaccents` using ‘combining’ characters from Unicode ranges at Ux0300, Ux1DC0, Ux20D0
`\LIIXUmapisomathgreek` using Ux0391–Ux03F8 for greek symbols
`\LIIXUmapmatharrowsA` supporting symbols in the Ux2190–Ux21FF block
`\LIIXUmapmathoperatorsA` supporting symbols in the Ux2200–Ux227F block
`\LIIXUmapmathoperatorsB` supporting symbols in the Ux2280–Ux22FF block
`\LIIXUmapmiscmathsymbolsA` supporting some symbols in the Ux27C0–Ux27EF range
`\LIIXUmapsupparrowsA` supporting some symbols in the Ux27F0–Ux27FF block
`\LIIXUmapsupparrowsB` supporting some symbols in the Ux2900–Ux297F block
`\LIIXUmapmiscmathsymbolsB` supporting symbols in the Ux2980–Ux29FF block
`\LIIXUmapsuppmathoperators` supporting symbols in the Ux2A00–Ux2AFF block
`\LIIXUmapunimathgreek` using Ux1D6E2–Ux1D71B for greek symbols
`\LIIXUmapmathalphabets` allows access to symbols in the Ux1D400–Ux1D755 block

The ‘parser’ macro idea can extend to handle a large class of mathematical expressions.

```
\let\(\textinlinemath
\DeclareTextCommand{\textinlinemath}{L8U}{\liixu@getinlinemath}
\def\liixu@getinlinemath#1\){\space\textmathnormalstring{#1}\space}
\DeclareTextCommand{\textmathnormalstring}{L8U}[1]{\textmathnormal@ii#1\empty\empty}
\textmathnormal@ii #1#2\empty -> ... coding to test what is in #2
... \textmathnormal{#1}\empty if #2 is \empty
... \textmathnormal{#1}\textmathnormal@ii #2\empty if #2 has more tokens
\let\[\textdisplaymath defined similarly to call \textmathnormalstring
```

This allows `\textmathnormal` to test each token, in particular mapping letters A–Za–z into the Unicode range Ux1D44E–Ux1D467 (except for *h*). Mathematical styles, such as `\mathrm`, `\mathbf`, `\mathbb` etc. can now be handled using declarations such as:

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```
\Dec...positeCommand{\textmathnormal}{L8U}{\mathrm}{\liixu@mathreorder\textmathrmstring}  
\Dec...positeCommand{\textmathnormal}{L8U}{\mathbf}{\liixu@mathreorder\textmathbfstring}
```

where `\liixu@mathreorder` uses some TeX pattern-matching to allow the `\textmathrmstring` parser macro to work on the argument to `\mathrm` before allowing `\textmathnormal` parsing to continue afterwards. We refer to this as ‘nested parsing’.

Similarly ‘nested parsing’ can be used with superscripts and subscripts using `^{\dots}` and `_{\dots}` and to specify linebreaks, and even super-/subscripts within styles; viz.

```
\Declar...CompositeCommand{\textmathnormal}{L8U}{^}{\liixu@mathreorder\textsuperstring}  
\DeclareTextCompositeCommand{\textmathnormal}{L8U}{_}{\liixu@mathreorder\textsubstring}  
\DeclareTextCompositeCommand{\textmathnormal}{L8U}{\}{\textLF}  
\DeclareTextCompositeCommand{\textmathnormal}{L8U}{\cr}{\textLF}  
\DeclareTextCompositeCommand{\textmathrm}{L8U}{^}{\liixu@mathreorder\textsuperstring}  
\DeclareTextCompositeCommand{\textmathrm}{L8U}{_}{\liixu@mathreorder\textsubstring}
```

Such ‘nested parsing’ seems to be quite robust¹⁶, but a great deal more testing is required to uncover cases which may require special handling. An ultimate aim is to be able to just copy the \TeX source for the ‘Abstract’ of a technical paper into the `\Subject{\dots}` field of the `.xmpdata` file, with a large expectation that it will ‘just work’, or need only trivial edits to make it so.

4.4. Metadata in a Production Workflow

At Macquarie University, the Mathematics Department produces personalised topmatter or coversheets for student assignments and tutorial papers using \TeX , incorporating information that has been stored in a database. This is done by writing extra definitions at the top of a copy of the \TeX source as prepared by the lecturers. For example information analogous to the following

```
\def\thestudentname{\utext{Moore} Ross}  
\def\thestudentid{55507247}  
\def\theunitcode{MATH337}  
\def\theoffering{S116}  
\def\thetaskname{Assignment 5}  
\def\theassignmentnumber{5}  
\def\theduedate{09/05 2016}  
...
```

is prepended to the file shown in Figure 15, for each student downloading their personalised assignment paper. The \TeX source makes use of this information, including recording some of it within the Metadata. When preparing such documents \TeX ’s `\providecommand` is used to supply default values, not drawn from the database; but when actually used, these are ignored as the required information has been supplied using TeX’s `\def` command. The resulting metadata is as in Figure 14, showing also how the information is displayed at the top of the PDF file that is produced. Notice how a command `\utext` is included to obtain the underlining of the surname within the produced PDF. This is modified, using `\pdfxEnableCommands` in the `\jobname.xmpdata` file, to just place a comma after the surname in the metadata, as it precedes the given name.

¹⁶ ... so far, barring multi-line aligned environments.

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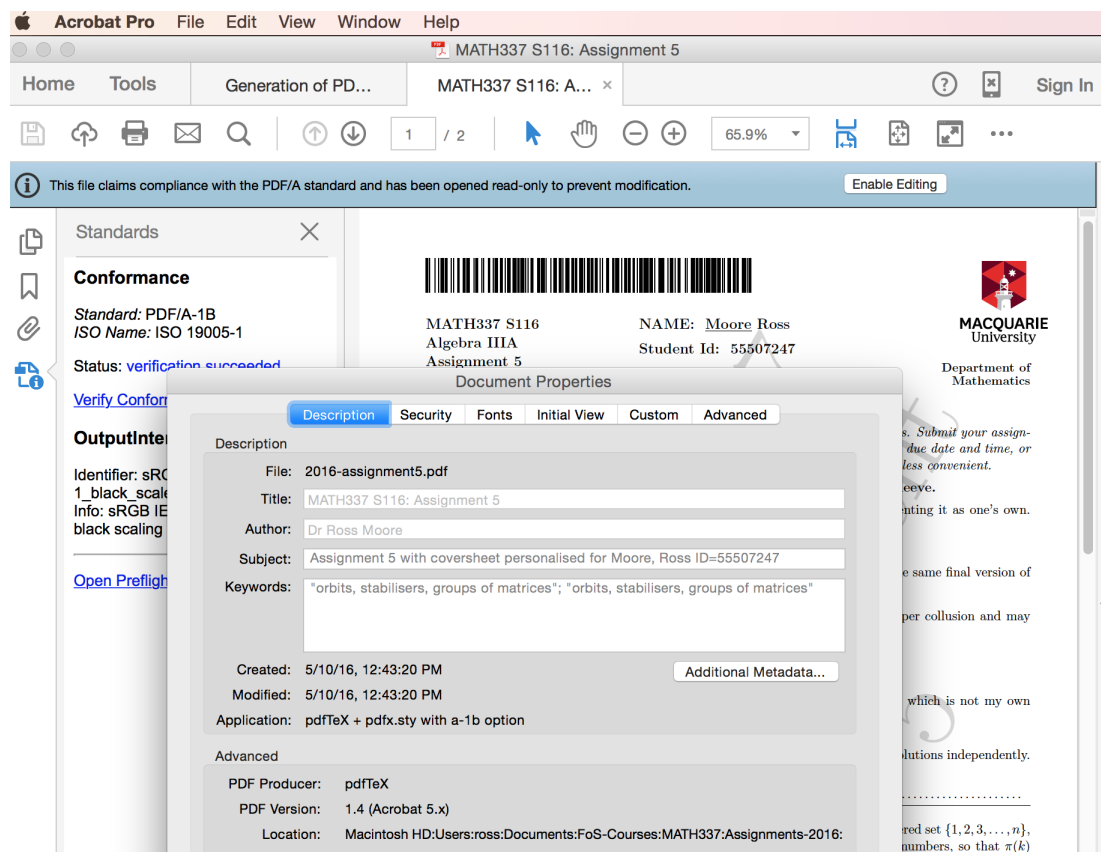


Figure 14: Metadata from student assignment papers, using information drawn from a database. The start of the \LaTeX coding for this example is shown in Figure 15.

Another way that jobs can be customised using essentially the same \LaTeX source, is via the command used to initiate the job. For example the file `sample.tex`, accompanying the `pdfx` distribution, can be used to test the loading options to create PDFs conforming to the various flavours of PDF/A, PDF/E and PDF/X. Consider a shell script containing the following (Unix/Linux) commands.

```
pdflatex "\def\pdfxopt{a-2b}\input sample.tex"
pdflatex "\def\pdfxopt{a-2b}\input sample.tex"
mv sample.pdf sample-a2b.pdf

pdflatex "\def\pdfxopt{a-2u}\input sample.tex"
pdflatex "\def\pdfxopt{a-2u}\input sample.tex"
mv sample.pdf sample-a2u.pdf
...
```

With a 3-line block for each flavour, this produces a corresponding PDF from the same \LaTeX source, named according to each particular variant. A default `\providecommand{\pdfxopt}{a-1b}` at the start of `sample.tex` catches the case of normal typesetting, doing nothing when `\pdfxopt` already has an expansion value.

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```
\providecommand{\theassignmentnumber}{5}
\providecommand{\assignLecturer}{Dr Ross Moore}
\providecommand{\theunitcode}{MATH337}
\providecommand{\theunitname}{Algebra IIIA}
\providecommand{\theyear}{2016}
...
\def\assigntopics{orbits, stabilisers, groups of matrices}
\providecommand{\pdfxopts}{a-1b}
%% XMP metadata for PDF/A conformance
\begin{filecontents*}{\jobname.xmpdata}
\Title{\theunitcode\ \theoffering: Assignment \theassignmentnumber}
\Author{\assignLecturer}
\Copyright{Macquarie University, Mathematics Department}
\Subject{Assignment \theassignmentnumber, with coversheet personalised for \thestudentname,
  id = \thestudentid}
\Keywords{\assigntopics}
\Creator{pdfTeX + pdfx.sty with \pdfxopts\space option}
\pdfxEnableCommands{\def\utext#1{#1},}
\end{filecontents*}

\documentclass[a4paper,11pt]{article}
\RequirePackage{assignments}
\usepackage[\pdfxopts]{pdfx}
```

Figure 15: Start of the \LaTeX source for an assignment paper, using macro expansion values supplied via definitions prepended to this file.

4.5. Further Developments

Prospects for further development of the pdfx package are as follows, listed not necessarily in order of perceived importance.

- Support for the dvips driver with Ghostscript as PDF producer; possible since gs v9.21.
- Support for Lang specification in XMP Metadata.
- Separate the L8U encoding support into a separate package.
- Conformance to multiple PDF standards; e.g. both PDF/A and PDF/E, both PDF/A and PDF/X with RGB or CMYK color profile, other combinations.
- Explore delaying the processing of metadata until `\begin{document}`, thereby allowing some fields to be set automatically from other information supplied within the document preamble.
- Support for input using other legacy 8-bit encodings and transliterations.
- Support for more mathematical environments within the metadata.
- Support for more PRISM metadata fields, incl. PRISM 3.0 [19].
- Explore ways to overcome difficulties that may arise with other packages.
- Full support for PDF/VT.
- Support for some aspects of PDF/UA and ‘Tagged PDF’.
- Develop ways to usefully use L8U apart from metadata and bookmarks.

5. Bibliography

References

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http://www.adobe.com/devnet/pdf/pdf_reference.html.
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<http://dublincore.org/documents/dces/>
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Revised as ISO 14289-1:2014 (December 2014): http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=64599.
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PDF/E: <https://en.wikipedia.org/wiki/PDF/E>
PDF/VT: <https://en.wikipedia.org/wiki/PDF/VT>
PDF/UA: <https://en.wikipedia.org/wiki/PDF/UA>
PDF/X: <https://en.wikipedia.org/wiki/PDF/X>

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6. Implementation

```
1 \ifpackageloaded{pdfxmult}{%
2   \PackageError{pdfx}%
3   {^^JThis package may not be used in conjunction with the \space
4     pdfxmult \space package}%
5   {Type \space x <return> \space to exit; or just \space <return> \space
6     to continue without this package.}%
7   \expandafter\let\csname opt@pdfx.sty\endcsname\@empty\endinput
8 }{}%
9 \NeedsTeXFormat{LaTeX2e}
10 \ProvidesPackage{pdfx}
11   [2016/05/03 v1.5.8 PDF/X and PDF/A support (CVR/HTH/RRM/PS)]
12
13 \newif\ifpdfx@noBOM \pdfx@noBOMfalse % use a BOM in the XMP packet
14 \newif\ifpdfx@x \pdfx@xfalse % PDF/X mode
15 \newif\ifpdfx@e \pdfx@efalse % PDF/E mode; not implemented yet
16 \newif\ifpdfx@vt \pdfx@vtfalse % PDF/VT mode, extension of PDF/X
17 \newif\ifno@icccprofile % used with PDF/X-4p and PDF/X-5pg
18 \newif\ifpdfx@noerr % error messages become just warnings
19
20 \DeclareOption{noerr}{\pdfx@noerrtrue}
21
22 %% Not all combinations of the following parameters are meaningful.
23 \def\xmp@Part{1} % PDF/A part: 1, 2, or 3
24 \def\xmp@Conformance{B} % Conformance level: A, B, or U
25 \def\xmp@ReleaseDate{2005} % 2001 for PDF/X-1, 2005 for PDF/A-1,
26 % 2010 for PDF/A-2, 2012 for PDF/A-3.
27
28 %% default is to create PDF/A-1b
29 %% options can change this for PDF/X or higher levels of PDF/A
30 \DeclareOption{a-1a}{\global\pdfx@xfalse\def\xmp@Part{1}%
31 \def\xmp@Conformance{A}\def\xmp@ReleaseDate{2005}}
32 \DeclareOption{a-1b}{\global\pdfx@xfalse\def\xmp@Part{1}%
33 \def\xmp@Conformance{B}\def\xmp@ReleaseDate{2005}}
34 \DeclareOption{a-2a}{\global\pdfx@xfalse\def\xmp@Part{2}%
35 \def\xmp@Conformance{A}\def\xmp@ReleaseDate{2010}}
36 \DeclareOption{a-2b}{\global\pdfx@xfalse\def\xmp@Part{2}%
37 \def\xmp@Conformance{B}\def\xmp@ReleaseDate{2010}}
38 \DeclareOption{a-2u}{\global\pdfx@xfalse\def\xmp@Part{2}%
39 \def\xmp@Conformance{U}\def\xmp@ReleaseDate{2010}}
40 \DeclareOption{a-3a}{\global\pdfx@xfalse\def\xmp@Part{3}%
41 \def\xmp@Conformance{A}\def\xmp@ReleaseDate{2012}}
42 \DeclareOption{a-3b}{\global\pdfx@xfalse\def\xmp@Part{3}%
43 \def\xmp@Conformance{B}\def\xmp@ReleaseDate{2012}}
44 \DeclareOption{a-3u}{\global\pdfx@xfalse\def\xmp@Part{3}%
45 \def\xmp@Conformance{U}\def\xmp@ReleaseDate{2012}}
46 \DeclareOption{x-1}{\global\pdfx@xtrue\def\xmp@Part{1}%
47 \def\xmp@Conformance{a}\def\xmp@ReleaseDate{2001}}%
48 \global\pdfminorversion=3 }
49 \DeclareOption{x-1a}{\global\pdfx@xtrue\def\xmp@Part{1}%
50 \def\xmp@Conformance{a}\def\xmp@ReleaseDate{2003}}%
```


Generation of PDF/X- and PDF/A-compliant PDFs with pdfT_EX — pdfx.sty

C. V. Radhakrishnan, Hàn Thế Thành, Ross Moore and Peter Selinger

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```
51 \global\pdfminorversion=3 }
52 \DeclareOption{x-1a1}{\global\pdfx@xtrue\def\xmp@Part{1}%
53 \def\xmp@Conformance{a}\def\xmp@ReleaseDate{2001}%
54 \global\pdfminorversion=3 }
55 \DeclareOption{x-1a3}{\global\pdfx@xtrue\def\xmp@Part{1}%
56 \def\xmp@Conformance{a}\def\xmp@ReleaseDate{2003}%
57 \global\pdfminorversion=3 }
58 \DeclareOption{x-2}{\global\pdfx@xtrue\def\xmp@Part{2}%
59 \def\xmp@Conformance{ }\def\xmp@ReleaseDate{2002}%
60 \global\pdfminorversion=4 }
61 \DeclareOption{x-3}{\global\pdfx@xtrue\def\xmp@Part{3}%
62 \def\xmp@Conformance{ }\def\xmp@ReleaseDate{2002}%
63 \global\pdfminorversion=3 }
64 \DeclareOption{x-302}{\global\pdfx@xtrue\def\xmp@Part{3}%
65 \def\xmp@Conformance{ }\def\xmp@ReleaseDate{2002}%
66 \global\pdfminorversion=3 }
67 \DeclareOption{x-303}{\global\pdfx@xtrue\def\xmp@Part{3}%
68 \def\xmp@Conformance{ }\def\xmp@ReleaseDate{2003}%
69 \global\pdfminorversion=4 }
70 %% Later versions, yet to be fully implemented
71 \DeclareOption{x-4}{\global\pdfx@xtrue\def\xmp@Part{4}%
72 \def\xmp@Conformance{ }\def\xmp@ReleaseDate{2008}%
73 \global\pdfminorversion=6 }
74 \DeclareOption{x-4p}{\global\pdfx@xtrue\global\no@iccprofiletrue
75 \def\xmp@Part{4}\def\xmp@Conformance{p}\def\xmp@ReleaseDate{2008}%
76 \global\pdfminorversion=6 }
77 \DeclareOption{x-408}{\global\pdfx@xtrue\def\xmp@Part{4}%
78 \def\xmp@Conformance{ }\def\xmp@ReleaseDate{2008}%
79 \global\pdfminorversion=6 }
80 \DeclareOption{x-410}{\global\pdfx@xtrue\def\xmp@Part{4}%
81 \def\xmp@Conformance{ }\def\xmp@ReleaseDate{2010}%
82 \global\pdfminorversion=6 }
83 \DeclareOption{x-4p08}{\global\pdfx@xtrue\global\no@iccprofiletrue
84 \def\xmp@Part{4}\def\xmp@Conformance{p}\def\xmp@ReleaseDate{2008}%
85 \global\pdfminorversion=6 }
86 \DeclareOption{x-4p10}{\global\pdfx@xtrue\global\no@iccprofiletrue
87 \def\xmp@Part{4}\def\xmp@Conformance{p}\def\xmp@ReleaseDate{2010}%
88 \global\pdfminorversion=6 }
89 \DeclareOption{x-5}{\global\pdfx@xtrue\def\xmp@Part{5}%
90 \def\xmp@Conformance{ }\def\xmp@ReleaseDate{2008}%
91 \global\pdfminorversion=6 }
92 \DeclareOption{x-5g}{\global\pdfx@xtrue\def\xmp@Part{5}%
93 \def\xmp@Conformance{g}\def\xmp@ReleaseDate{2008}%
94 \global\pdfminorversion=6 }
95 \DeclareOption{x-5n}{\global\pdfx@xtrue\def\xmp@Part{5}%
96 \def\xmp@Conformance{n}\def\xmp@ReleaseDate{2008}%
97 \global\pdfminorversion=6 }
98 \DeclareOption{x-5pg}{\global\pdfx@xtrue\global\no@iccprofiletrue
99 \def\xmp@Part{5}\def\xmp@Conformance{pg}\def\xmp@ReleaseDate{2008}%
100 \global\pdfminorversion=6 }
101 \DeclareOption{x-508}{\global\pdfx@xtrue\def\xmp@Part{5}%
102 \def\xmp@Conformance{ }\def\xmp@ReleaseDate{2008}%
```

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C. V. Radhakrishnan, Hàn Thế Thành, Ross Moore and Peter Selinger

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```
103 \global\pdfminorversion=6 }
104 \DeclareOption{x-5g08}{\global\pdfx@true\def\xmp@Part{5}%
105 \def\xmp@Conformance{g}\def\xmp@ReleaseDate{2008}%
106 \global\pdfminorversion=6 }
107 \DeclareOption{x-5n08}{\global\pdfx@true\def\xmp@Part{5}%
108 \def\xmp@Conformance{n}\def\xmp@ReleaseDate{2008}%
109 \global\pdfminorversion=6 }
110 \DeclareOption{x-5pg08}{\global\pdfx@true\global\no@iccprofiletrue
111 \def\xmp@Part{5}\def\xmp@Conformance{pg}\def\xmp@ReleaseDate{2008}%
112 \global\pdfminorversion=6 }
113 \DeclareOption{x-510}{\global\pdfx@true\def\xmp@Part{5}%
114 \def\xmp@Conformance{} \def\xmp@ReleaseDate{2010}%
115 \global\pdfminorversion=6 }
116 \DeclareOption{x-5g10}{\global\pdfx@true\def\xmp@Part{5}%
117 \def\xmp@Conformance{g}\def\xmp@ReleaseDate{2010}%
118 \global\pdfminorversion=6 }
119 \DeclareOption{x-5n10}{\global\pdfx@true\def\xmp@Part{5}%
120 \def\xmp@Conformance{n}\def\xmp@ReleaseDate{2010}%
121 \global\pdfminorversion=6 }
122 \DeclareOption{x-5pg10}{\global\pdfx@true\global\no@iccprofiletrue
123 \def\xmp@Part{5}\def\xmp@Conformance{pg}\def\xmp@ReleaseDate{2010}%
124 \global\pdfminorversion=6 }
125 \DeclareOption{e-1}{\global\pdfx@false\global\pdfx@true
126 \def\xmp@Part{1}\def\xmp@Conformance{} \def\xmp@ReleaseDate{2008}%
127 \global\pdfminorversion=6 }
128 \DeclareOption{vt-1}{\global\pdfx@true\global\pdfx@vttrue
129 \def\xmp@Part{4}\def\xmp@vtPart{1}\def\xmp@Conformance{}%
130 \def\xmp@vtConformance{} \def\xmp@ReleaseDate{2010}%
131 \global\pdfminorversion=6 }
132 \DeclareOption{vt-2}{\global\pdfx@true\global\pdfx@vttrue
133 \global\no@iccprofiletrue
134 \def\xmp@Part{5}\def\xmp@vtPart{2}\def\xmp@Conformance{pg}%
135 \def\xmp@vtConformance{} \def\xmp@ReleaseDate{2010}%
136 \global\pdfminorversion=6 }
137 \DeclareOption{vt-2s}{\global\pdfx@true\global\pdfx@vttrue
138 \global\no@iccprofiletrue
139 \def\xmp@Part{5}\def\xmp@vtPart{2}\def\xmp@Conformance{pg}%
140 \def\xmp@vtConformance{s}\def\xmp@ReleaseDate{2010}%
141 \global\pdfminorversion=6 }
142
143 %% options to alter PDF minor version, in case needed in special circumstances
144 \DeclareOption{pdf13}{\global\pdfminorversion=3 }
145 \DeclareOption{pdf14}{\global\pdfminorversion=4 }
146 \DeclareOption{pdf15}{\global\pdfminorversion=5 }
147 \DeclareOption{pdf16}{\global\pdfminorversion=6 }
148 \DeclareOption{pdf17}{\global\pdfminorversion=7 }
149
150 %% inhibits writing the XMP byte-order marker
151 \DeclareOption{noBOM}{\pdfx@noBOMtrue}
152 \DeclareOption{useBOM}{\pdfx@noBOMfalse}
153
154 \expandafter\ifx\csname pdfminorversion\endcsname\relax
```

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C. V. Radhakrishnan, Hàn Thế Thành, Ross Moore and Peter Selinger

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```
155 \gdef\thepdfminorversion{4}% assumed with XeTeX
156 \def\pdf@minorversion@xetex=#1{\gdef\thepdfminorversion{#1}}%
157 \let\pdfminorversion\pdf@minorversion@xetex
158 \else
159 \pdfminorversion=4 % assumed for PDF/A ; options may change this for PDF/X
160 \fi
161 \expandafter\ifx\csname pdfresetpageorigin\endcsname\relax\else
162 \pdfresetpageorigin=0
163 \fi
164
165 %% options for language character macros in XMP metadata
166 \newif\ifcyrxmp
167 \newif\ifcyrKOIxmpt
168 \newif\ifgrkxmp
169 \newif\ifgrkLGRxmpt
170 \newif\ifhebxml
171 \newif\ifarbxmp
172 \newif\ifarmxmp
173 \newif\ifarmSCIxmp
174 \newif\ifvnmxml
175 \newif\iflatEXTxmpt
176 \newif\iflatLATxmpt
177 \newif\ifipaxmp
178 \newif\ifmathxmpt
179
180 \DeclareOption{latxmpt}{\global\latEXTxmpttrue}
181 \DeclareOption{LATxmpt}{\global\latLATxmpttrue\global\latEXTxmpttrue}
182 \DeclareOption{cyrxmp}{\global\cyrxmpttrue}
183 \DeclareOption{KOIxmpt}{\global\cyrKOIxmpttrue\global\cyrxmpttrue}
184 \DeclareOption{grkxmp}{\global\grkxmpttrue}
185 \DeclareOption{LGRxmpt}{\global\grkLGRxmpttrue\global\grkxmpttrue}
186 \DeclareOption{hebxml}{\global\hebxmltrue}
187 \DeclareOption{arbxmp}{\global\arbxmpttrue}
188 \DeclareOption{armxmp}{\global\armxmpttrue}
189 \DeclareOption{AR8xmpt}{\global\armSCIxmptrue\global\armxmpttrue}
190 \DeclareOption{vnmxml}{\global\vnmxmpttrue}
191 \DeclareOption{ipaxmp}{\global\ipaxmpttrue\global\latEXTxmpttrue}
192 \DeclareOption{mathxmpt}{\global\mathxmpttrue\global\grkxmpttrue}
193
194 %% all the above
195 \DeclareOption{allxmpt}{%
196 \global\cyrxmpttrue
197 \global\cyrKOIxmpttrue
198 \global\grkxmpttrue
199 \global\grkLGRxmpttrue
200 \global\hebxmltrue
201 \global\arbxmpttrue
202 \global\armxmpttrue
203 \global\armSCIxmptrue
204 \global\vnmxmpttrue
205 \global\latEXTxmpttrue
206 \global\latLATxmpttrue
```

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```
207 \global\ipaxmptrue
208 \global\mathxmptrue
209 }
210
211 \ExecuteOptions{noBOM,a-1b}
212 \ProcessOptions
213
214 \expandafter\ifx\csname thepdfminorversion\endcsname\relax
215 \xdef\thepdfminorversion{\the\pdfminorversion}
216 \fi
217
218 \newif\ifpdfx@nopdfinfo
219 \ifmathxmp\pdfx@nopdfinfotrue
220 \else
221 \iflatLATxmp\pdfx@nopdfinfotrue
222 \else
223 \ifgrkLGRxmp\pdfx@nopdfinfotrue
224 \else
225 \ifcyrKOIxmp\pdfx@nopdfinfotrue
226 \else
227 \ifarmSCIxmp\pdfx@nopdfinfotrue
228 \fi\fi\fi\fi\fi
229
230 \newif\ifpdfx@useactivespaces
231 \iflatLATxmp\pdfx@useactivespacestrue\fi
232 \ifgrkLGRxmp\pdfx@useactivespacestrue\fi
233 \ifcyrKOIxmp\pdfx@useactivespacestrue\fi
234 \ifarmSCIxmp\pdfx@useactivespacestrue\fi
235
236 \newif\ifpdfx@transliterated
237 \ifgrkLGRxmp\pdfx@transliteratedtrue\fi
238 \ifarmSCIxmp\pdfx@transliteratedtrue\fi
239
240 %% Support for pdfTeX primitives when using XeTeX:
241 \RequirePackage{ifxetex}
242 \ifxetex
243 \def\pdfx@pages@xetex#1{\special{pdf:put @pages <<#1>>}}
244 \def\pdfx@docinfo@xetex#1{\special{pdf:put @docinfo <<#1>>}}
245 \def\pdfx@catalog@xetex#1{\special{pdf:put @catalog <<#1>>}}
246 \def\pdfx@mapline@xetex#1{}
247 \def\pdf@compress@xetex=#1{}
248 %%
249 \let\pdfpageattr\pdfx@pages@xetex
250 \let\pdfinfo\pdfx@docinfo@xetex
251 \let\pdfcatalog\pdfx@catalog@xetex
252 \let\pdfmapline\pdfx@mapline@xetex
253 \let\pdfcompresslevel\pdf@compress@xetex
254 \let\pdfobjcompresslevel\pdf@compress@xetex
255 \fi
256
257 \RequirePackage{ifluatex}
258 \ifluatex
```

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C. V. Radhakrishnan, Hàn Thế Thành, Ross Moore and Peter Selinger

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```
259 \IfFileExists{luatex85.sty}{% 2016+
260 \RequirePackage{luatex85}%
261 \edef\pdfcreationdate{\pdfcreationdate}%
262 }{% earlier versions
263 }%
264 \RequirePackage{pdfdoccmds}%
265 \let\pdfx@mdfivesum\pdf@mdfivesum
266 \else
267 \ifxetex
268 \usepackage{everyshi}%
269 \expandafter\ifx\csname mdfivesum\endcsname\relax
270 % too early a version of XeTeX
271 \let\pdfx@mdfivesum\relax
272 \else
273 % since mid-2015
274 \let\pdfx@mdfivesum\mdfivesum
275 \fi
276 \else
277 \let\pdfx@mdfivesum\pdfmdfivesum
278 \fi
279 \fi
280 \def\pdfx@encodingfile{l8uenc.def}
281
282 \expandafter\ifx\csname pdftexbanner\endcsname\relax
283 \expandafter\ifx\csname luatexbanner\endcsname\relax
284 \else % luatex85
285 \let\pdftexbanner\luatexbanner
286 \fi
287 \else % pdfTeX, but which version ???
288 {\endlinechar=-1
289 \everyeof{\noexpand}%
290 \xdef\pdfx@bannerstring{\expandafter\scantokens\expandafter{\pdftexbanner}}
291 }%
292 \def\pdfx@testbannerstr{%
293 This is pdfTeX, Version 3.14159265-2.6-1.40.15 (TeX Live 2014/dev)
294 kpathsea version 6.2.0dev}%
295 \ifx\pdfx@bannerstring\pdfx@testbannerstr
296 \typeout{This version of pdfTeX cannot write out upper-range character bytes,
297 128-255.}%
298 \typeout{Any UTF-8 Unicode characters in the Metadata will not be written
299 correctly.}%
300 \typeout{Please update to a more stable version of pdfTeX.^^J}%
301 \fi
302 \fi
303
304 %% How to support XeTeX here ?
305 \ifpdfx@x
306 \pdfobjcompresslevel=0 \relax
307 \expandafter\ifx\csname pdfinterwordspaceoff\endcsname\relax\else
308 \pdfinterwordspaceoff
309 \let\pdfinterwordspaceon\pdfinterwordspaceoff
310 \let\pdfinterwordspace\relax
```

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C. V. Radhakrishnan, Hàn Thế Thành, Ross Moore and Peter Selinger

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```
311 \fi
312 \expandafter\ifx\csname pdfgeninterwordspace\endcsname\relax\else
313 \pdfgeninterwordspace=0 \relax
314 \fi
315 \begingroup
316 \dimen0=0.996264009963\paperwidth\relax
317 \edef\pdfx@mwidth{\strip@pt\dimen0}%
318 \advance\dimen0 -25\p@
319 \edef\pdfx@twidth{\strip@pt\dimen0}%
320 \dimen0=0.996264009963\paperheight\relax
321 \edef\pdfx@mheight{\strip@pt\dimen0}%
322 \advance\dimen0 -20\p@
323 \edef\pdfx@theight{\strip@pt\dimen0}%
324 \ifxetex
325 \xdef\pdfx@everypage@xetex{%
326 /MediaBox[0 0 \pdfx@mwidth\space \pdfx@mheight]^J
327 /TrimBox[25 20 \pdfx@twidth\space \pdfx@theight]%
328 }%
329 \fi
330 \edef\next{\endgroup\pdfpageattr{%
331 /MediaBox[0 0 \pdfx@mwidth\space \pdfx@mheight]^J
332 %% /ArtBox[0 0 \pdfx@mwidth\space \pdfx@mheight]^J
333 /BleedBox[0 0 \pdfx@mwidth\space \pdfx@mheight]^J
334 /TrimBox[25 20 \pdfx@twidth\space \pdfx@theight]}
335 }\next
336 \ifxetex
337 \AtBeginDvi{%
338 \immediate\special{pdf:put @thispage <<\pdfx@everypage@xetex>>}}%
339 \EveryShipout{%
340 \immediate\special{pdf:put @thispage <<\pdfx@everypage@xetex>>}}%
341 \fi
342 \fi
343 \ifxetex
344 %% How to support XeTeX here ?
345 \else
346 \ifnum\thepdfminorversion >3 \relax
347 \expandafter\ifx\csname pdfsuppresswarningdupmap\endcsname\relax
348 \expandafter\ifx\csname pdfmapline\endcsname\relax\else
349 \pdfmapline{+dummy-space <dummy-space.pfb>
350 \fi
351 \else
352 \advance\pdfsuppresswarningdupmap 1
353 \pdfmapline{+dummy-space <dummy-space.pfb>
354 \advance\pdfsuppresswarningdupmap -1
355 \fi
356 \expandafter\ifx\csname pdfgeninterwordspace\endcsname\relax\else
357 \pdfgeninterwordspace=1 \relax
358 \fi
359 \fi
360 \fi
361
362 \ifluatex\else
```


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C. V. Radhakrishnan, Hàn Thế Thành, Ross Moore and Peter Selinger

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```
363 \@ifpackageloaded{inputenc}{%
364 }{%
365   \RequirePackage{inputenc}
366   % allow this to be loaded again cleanly
367   \expandafter\let\csname ver@inputenc.sty\endcsname\relax
368 }
369 \fi
370
371 %% pseudo-declare the L8U encoding
372 \expandafter\let\csname L8U-cmd\expandafter\endcsname\csname OT1-cmd\endcsname
373 \@namedef{T@L8U}{}%
374 \@namedef{D@L8U}{}%
375 \@namedef{M@L8U}{}%
376 \InputIfFileExists{\pdfx@encodingfile}{}{}
377
378 %%-----
379 %% Macros for reading XMP data with special catcodes. Usage:
380 %%
381 %% \xmp@parse{continuation}{data}
382 %%
383 %% The effect is to read the data with special catcodes: '<', '>', and
384 %% '&' are "active", and '^', '_', '#', '$', '~' are "other". The data
385 %% is then bound to the locally scoped name \@this, and the
386 %% continuation is called.
387 \def\xmp@parse#1{%
388   \begingroup
389   \catcode'\<=13\catcode'\>=13\catcode'\&=13\catcode'\^=12
390   \catcode'\_ =12\catcode'\#=12\catcode'\$=12\catcode'\~=12
391   \ifpdfx@useactivespaces\obeyspaces\fi % capture spaces as active characters
392   \xmp@doparse{#1}%
393 }
394 \def\xmp@doparse#1#2{%
395   \def\@this{#2}#1
396   \endgroup
397 }
398
399 %%-----
400 %% Local commands. They are only brought into scope during the reading
401 %% of xmpdata.
402 \def\pdfx@localcommands{
403   \def\Title{\xmp@parse{\global\let\xmp@Title\@this}}
404   \def\Author{\xmp@parse{\global\let\xmp@Author\@this}}
405   \def\Keywords{\xmp@parse{\global\let\xmp@Keywords\@this}}
406   \def\Subject{\xmp@parse{\global\let\xmp@Subject\@this}}
407   \def\CreatorTool{\xmp@parse{\global\let\xmp@CreatorTool\@this}}
408   \def\Producer{\xmp@parse{\global\let\xmp@Producer\@this}}
409   \def\Volume{\xmp@parse{\global\let\xmp@Volume\@this}}
410   \def\Issue{\xmp@parse{\global\let\xmp@Issue\@this}}
411   \def\CoverDisplayDate{\xmp@parse{\global\let\xmp@CoverDisplayDate\@this}}
412   \def\CoverDate{\xmp@parse{\global\let\xmp@CoverDate\@this}}
413   \def\Copyright{\xmp@parse{\global\let\xmp@Copyright\@this}}
414   \ifx\xmp@Copyrighted\empty\gdef\xmp@Copyrighted{True}\fi}
```

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```
415 \def\CopyrightURL{\xmp@parse{\global\let\xmp@CopyrightURL\@this%
416   \ifx\xmp@Copyrighted\@empty\gdef\xmp@Copyrighted{True}\fi}}
417 \def\Copyrighted{\xmp@parse{\global\let\xmp@Copyrighted\@this}}
418 \def\Doi{\xmp@parse{\global\let\xmp@Doi\@this}}
419 \def\Lastpage{\xmp@parse{\global\let\xmp@Lastpage\@this}}
420 \def\Firstpage{\xmp@parse{\global\let\xmp@Firstpage\@this}}
421 \def\PublicationType{\xmp@parse{\global\let\xmp@PublicationType\@this}}
422 \def\Journaltitle{\xmp@parse{\global\let\xmp@Journaltitle\@this%
423   \ifx\xmp@PublicationType\@empty\gdef\xmp@PublicationType{journal}\fi}}
424 \def\Journalnumber{\xmp@parse{\global\let\xmp@Journalnumber\@this}}
425 \def\Publisher{\xmp@parse{\global\let\xmp@Publisher\@this}}
426 %%
427 %% currently unused; for backward compatibility only
428 \def\AuthoritativeDomain{\xmp@parse
429   {\global\let\xmp@AuthoritativeDomain\@this}}
430 \let\Creator\CreatorTool % for backward compatibility
431 \let\Org\Publisher % for backward compatibility
432 \let\WebStatement\CopyrightURL % for backward compatibility
433 }
434
435 %%-----
436 %% The following characters and markup can be used within the XMP data
437 %% defined by \Author, \Title, and so on.
438 %%
439 %% * All printable non-whitespace ASCII characters except
440 %%   '%', '{', '}', '\ ' can be used as themselves.
441 %%
442 %% * All printable non-whitespace UTF-8 encoded Unicode characters
443 %%   from the basic multilingual plane can be used as themselves.
444 %%
445 %% * As usual, consecutive whitespace characters are contracted to a
446 %%   single space. Whitespace after a macro such as \copyright is
447 %%   ignored. Blank lines are not permitted.
448 %%
449 %% * The following markup can be used:
450 %%   '\ ' - a literal space (for example after a macro)
451 %%   \% - a literal '%'
452 %%   \{ - a literal '{'
453 %%   \} - a literal '}'
454 %%   \backslash - a literal '\'
455 %%   \copyright - the (c) copyright symbol
456 %%
457 %%   \sep - only permitted within \Author, \Keywords, \Publisher.
458 %%
459 %% * For backward compatibility, \& and \TextCopyright are also
460 %%   provided. Their use is deprecated.
461
462 %%-----
463 %% The macro \pdfx@actives binds the active characters
464 %% '&', '<', and '>' to \pdfx@amp, \pdfx@lt, and \pdfx@gt,
465 %% respectively, without actually making them active.
466 \begingroup
```

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```
467 \catcode'\<=13
468 \catcode'\>=13
469 \catcode'\&=13
470 \gdef\pdfx@actives{
471   \def&{\pdfx@amp}
472   \def<{\pdfx@lt}
473   \def>{\pdfx@gt}
474 }
475 \endgroup
476
477 %%-----
478 %% Markup bindings to be used during XMP generation.
479
480 {\obeyspaces\ifpdfx@useactivespaces%
481 \xdef\pdfx@sep {</rdf:li>^^J      <rdf:li>}%
482 \else\gdef\pdfx@sep{</rdf:li>^^J      <rdf:li>}%
483 \fi}
484
485 \def\pdfx@xmpmarkup{%
486   \pdfx@actives
487   \edef\@amp{\expandafter\@gobble\string\&}%
488   \edef\@hash{\expandafter\@gobble\string\#}%
489   \edef\@ { \expandafter\@gobble\string\ }%
490   \edef\%{\expandafter\@gobble\string\}%
491   \edef\{{\expandafter\@gobble\string\{}%
492   \edef\}{\expandafter\@gobble\string\}}%
493   \edef\backslash{\expandafter\@gobble\string\\}%
494   \def\@unicode##1{\@amp\@hash x##1;}%
495   \def\pdfx@amp{\@unicode{0026}}%
496   \def\pdfx@lt{\@unicode{003c}}%
497   \def\pdfx@gt{\@unicode{003e}}%
498   \def\copyright{\@unicode{00A9}}%
499   \let\&\pdfx@amp      % for backward compatibility
500   \let\TextCopyright\copyright % for backward compatibility
501   \let\sep\pdfx@sep
502   \pdfx@xmpunimarkup    % only need this when writing XMP
503   \the\pdfxsafeforxmp@toks
504 }
505
506 %% cope with active spaces with LGR encoding
507 %% and the spaces written out with \IeC in KOI8-r
508 %% It's possible to have both together.
509 \def\liixu@IeC#1#{\liixu@IeCi}
510 \def\liixu@IeCi#1{\liixu@IeCii#1}
511 \def\liixu@IeCii#1#2{#1}
512 \def\liixu@enableIeC{\ifpdfx@useactivespaces
513   \let\IeC\liixu@IeC\else\def\IeC##1{##1}\fi}
514 \def\liixu@numberline#1#{\liixu@numberlinei}
515 \def\liixu@numberlinei#1{\liixu@numberlineii#1}
516 \def\liixu@numberlineii#1{\textLF #1. }
517 \def\liixu@enablenumberline{\ifpdfx@useactivespaces
518   \let\numberline\liixu@numberline
```

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```
519 \else\def\numberline##1{\textLF ##1. }\fi}
520
521 \def\pdfx@xmpunimarkup{%
522   \liixu@enableIeC
523   \liixu@enablenumberline
524   \def\empty{}% used in LICR patterns
525   \LIIXUscriptcommands
526   \LIIXUmapTeXnames
527   %% from Hyperref's psdextra.def
528   \csname psdmapshortnames\endcsname
529   \csname psdaliasnames\endcsname
530   %% from lu8enc.def
531   \csname LIIXUmapmathletterlikes\endcsname
532   \csname LIIXUmapmathspaces\endcsname
533   \iflatLATxmp
534     \LIIXUmaplatinchars
535     \LIIXUcancelfontswitches
536   \fi
537   \ifmathxmp
538     \let\(\textinlinemath
539     \let\[\textdisplaymath
540     \LIIXUmapmathaccents
541     \LIIXUmapisomathgreek
542     \LIIXUmapmatharrowsA
543     \LIIXUmapmathoperatorsA
544     \LIIXUmapmathoperatorsB
545     \LIIXUmapmiscmathsymbolsA
546     \LIIXUmapsupparrowsA
547     \LIIXUmapsupparrowsB
548     \LIIXUmapmiscmathsymbolsB
549     \LIIXUmapsuppmathoperators
550     \LIIXUmapunimathgreek
551     \LIIXUmapmathalphabets
552   \fi
553   \ifarbxmp \LIIXUmaparabicletters\fi
554   \ifarmxmp \LIIXUmaparmenianletters\fi
555   \ifgrkxmp \LIIXUmapgreekletters\fi
556 }
557
558 %% In case macros are used in XMP Metadata, need a way to map these
559 %% to simple text, rather than specific font characters, or whatever:
560 \newtoks\pdfxsafeforxmp@toks
561 \def\pdfxEnableCommands{%   user command
562   \begingroup
563   \ifpdfx@useactivespaces\obeyspaces\fi
564   \pdfx@EnableCommands
565 }
566 \def\pdfx@EnableCommands#1{%   internal command
567   \expandafter\global\expandafter\pdfxsafeforxmp@toks
568   \expandafter{\the\pdfxsafeforxmp@toks#1}%
569   \endgroup
570 }
```

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```
571
572 %%-----
573 %% Markup bindings to be used during PDF string generation.
574
575 \def\pdfx@pdfmarkup{%
576   \pdfx@actives
577   \edef%\{\expandafter\@gobble\string\}%
578   \edef\{\{\expandafter\@gobble\string\}\}%
579   \edef\}\{\expandafter\@gobble\string\}\}%
580   \edef\pdfx@backslash{\expandafter\@gobble\string\}%
581   \def\backslash{\pdfx@backslash000\pdfx@backslash134}%
582   \edef\pdfx@amp{\expandafter\@gobble\string\&%
583   \edef\pdfx@lt{\expandafter\@gobble\string\<%
584   \edef\pdfx@gt{\expandafter\@gobble\string\>%
585   \let\TextCopyright\copyright % for backward compatibility
586   \def\sep{; }%
587   %\let\sep\pdfx@sep
588 %% Note: '\ ', \&, \copyright are already predefined by hyperref.
589   \the\pdfx@safeforxmp@toks
590 }
591
592 %%-----
593 %% Defaults
594 \ifxetex
595   \def\xmp@Producer{XeTeX}
596 \else\ifluatex
597   \def\xmp@Producer{LuaTeX}
598 \else
599   \def\xmp@Producer{pdfTeX}
600 \fi\fi
601
602 \global\let\xmp@CreatorTool\@empty
603 \global\let\xmp@Title\@empty
604 \global\let\xmp@Author\@empty
605 \global\let\xmp@Keywords\@empty
606 \global\let\xmp@Subject\@empty
607 \global\let\xmp@Volume\@empty
608 \global\let\xmp@Issue\@empty
609 \global\let\xmp@CoverDisplayDate\@empty
610 \global\let\xmp@CoverDate\@empty
611 \global\let\xmp@Copyright\@empty
612 \global\let\xmp@Copyrighted\@empty
613 \global\let\xmp@CopyrightURL\@empty
614 \gdef\xmp@WebStatement{\xmp@CopyrightURL}
615 \global\let\xmp@Doi\@empty
616 \global\let\xmp@Lastpage\@empty
617 \global\let\xmp@Firstpage\@empty
618 \global\let\xmp@PublicationType\@empty
619 \global\let\xmp@Journaltitle\@empty
620 \global\let\xmp@Journalnumber\@empty
621 \global\let\xmp@Publisher\@empty
622 \gdef\xmp@Org{\xmp@Publisher}
```

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C. V. Radhakrishnan, Hàn Thế Thành, Ross Moore and Peter Selinger

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```
623 \global\let\xmp@AuthoritativeDomain\@empty
624
625 %%-----
626 %% Alternative way to get the CreationDate using Lua for XeTeX
627 \ifdefined\pdfcreationdate\else
628 \begin{filecontents*}{creationdate.lua}
629 os.remove("creationdate.timestamp")
630 io.output("creationdate.timestamp"):write(os.date("\edef\tempa{\string D:%Y%m%d%H%M%S}\n\
631 \end{filecontents*}
632 \ifnum\shellescape=1
633 \begingroup
634 \immediate\write18{texlua creationdate.lua}
635 \input{creationdate.timestamp}
636 \def\tempc#1#2#3#4#5{#1#2#3'#4#5'}
637 \edef\tempb{\expandafter\tempc\tempb}
638 \edef\x{\endgroup\def\noexpand\pdfcreationdate{\tempa\tempb}}\x
639 \else
640 \ifpdfx@noerr
641 \PackageWarning{pdfx}{%
642 CreationDate is not properly supported;^^J
643 PDF validation may fail. To avoid this problem use:^^J
644 xelatex -shell-escape -output-driver="xdvipdfmx -z 0" <filename>^^J}
645 \else
646 \PackageError{pdfx}{%
647 CreationDate is not properly supported;^^J
648 PDF validation may fail.}{To avoid this problem use:^^J
649 xelatex -shell-escape -output-driver="xdvipdfmx -z 0" <filename> }
650 \fi
651 \fi
652 \fi
653
654 %%-----
655 \def\pdfx@findUUID#1{\edef\pdfx@tmpstring{\pdfx@mdfivesum{#1}}
656 \expandafter\pdfx@eightofnine\pdfx@tmpstring\end}
657 \def\pdfx@eightofnine#1#2#3#4#5#6#7#8#9\end{%
658 \xdef\pdfx@eightchars{#1#2#3#4#5#6#7#8}
659 \pdfx@fourofffive#9\end}
660 \def\pdfx@fourofffive#1#2#3#4#5\end{\xdef\pdfx@fffourchars{#1#2#3#4}
661 \pdfx@sfourofffive#5\end}
662 \def\pdfx@sfourofffive#1#2#3#4#5\end{\xdef\pdfx@sfffourchars{#1#2#3#4}
663 \pdfx@tfourofffive#5\end}
664 \def\pdfx@tfourofffive#1#2#3#4#5\end{\xdef\pdfx@tfourchars{#1#2#3#4}
665 \xdef\pdfx@laststring{#5}}
666
667 \def\pdfx@uuid{\pdfx@eightchars-%
668 \pdfx@fffourchars-%
669 \pdfx@sfffourchars-%
670 \pdfx@tfourchars-%
671 \pdfx@laststring}
672
673 \expandafter\ifx\csname pdfx@mdfivesum\endcsname\relax
674 \PackageError{pdfx}{%
```


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```
675   No implementation for \string\pdfx@mdfivesum.^^J
676   \ifxetex XeTeX needs to be 2015 or later\fi
677   }{%
678   Continue without, but the PDF will not validate.
679   }%
680   \def\xmp@docid{%
681   \def\pdfx@findUUID#1{%
682   \def\pdfx@uuid{%
683   \else
684   \pdfx@findUUID{\jobname.pdf}
685   \edef\xmp@docid{\pdfx@uuid}
686   \fi
687
688   \expandafter\ifx\csname pdfcreationdate\endcsname\relax\relax
689   \PackageWarning{pdfx}{%
690   No implementation for \string\pdfxcreation .
691   }%
692   \def\xmp@instid{%
693   %%
694   \else %% use the MD5 sum methods
695   %%
696   \pdfx@findUUID{\pdfcreationdate}%
697   \edef\xmp@instid{\pdfx@uuid}
698   \fi
699
700   %%-----
701   %% load xcolor before hyperref to get the link colors correct
702   %%
703   \ifpdfx@x
704   \RequirePackage[cmyk,hyperref]{xcolor}
705   \else
706   %% \RequirePackage[rgb,hyperref]{xcolor}
707   \fi
708
709   %% the "pdftex" option seems to work fine with LuaTeX
710
711   %% Hyperref options for PDF/X
712   \def\pdfx@pdfX@opts@pdftex{%
713   draft,pdftex,pdfpagemode=UseNone,bookmarks=false,%
714   pdfversion=1.\thepdfminorversion,pdfstartview=}
715   \def\pdfx@pdfX@opts@xetex{%
716   draft,xetex,pdfpagemode=UseNone,bookmarks=false,%
717   pdfversion=1.\thepdfminorversion,pdfstartview=}
718   \def\pdfx@pdfX@opts@luatex{%
719   draft,pdftex,pdfpagemode=UseNone,bookmarks=false,%
720   pdfversion=1.\thepdfminorversion,pdfstartview=}
721
722   %% Hyperref options for PDF/A and PDF/E
723   \def\pdfx@pdfAE@opts@pdftex{pdftex,pdfa,pdfversion=1.\thepdfminorversion}%
724   \def\pdfx@pdfAE@opts@xetex{xetex,pdfa,pdfversion=1.\thepdfminorversion}%
725   \def\pdfx@pdfAE@opts@luatex{pdftex,pdfa,pdfversion=1.\thepdfminorversion}%
726
```

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```
727 \ifpdfx@x
728 \@ifpackageloaded{hyperref}{%
729   \ifxetex
730     \hypersetup{\pdfx@pdfX@opts@xetex}
731   \else\ifluatex
732     \hypersetup{\pdfx@pdfX@opts@luatex}
733   \else
734     \hypersetup{\pdfx@pdfX@opts@pdftex}
735   \fi\fi
736 }{%
737   \ifxetex
738     \RequirePackage[\pdfx@pdfX@opts@xetex]{hyperref}
739   \else\ifluatex
740     \RequirePackage[\pdfx@pdfX@opts@luatex]{hyperref}
741   \else
742     \RequirePackage[\pdfx@pdfX@opts@pdftex]{hyperref}
743   \fi\fi
744 }%
745 \else
746 \ifpdfx@e
747 \@ifpackageloaded{hyperref}{%
748   \ifxetex
749     \hypersetup{\pdfx@pdfAE@opts@xetex}
750   \else\ifluatex
751     \hypersetup{\pdfx@pdfAE@opts@luatex}
752   \else
753     \hypersetup{\pdfx@pdfAE@opts@pdftex}
754   \fi\fi
755 }{%
756   \ifxetex
757     \RequirePackage[\pdfx@pdfAE@opts@xetex]{hyperref}
758   \else\ifluatex
759     \RequirePackage[\pdfx@pdfAE@opts@luatex]{hyperref}
760   \else
761     \RequirePackage[\pdfx@pdfAE@opts@pdftex]{hyperref}
762   \fi\fi
763 }%
764 \else % generating PDF/A or ...
765 \@ifpackageloaded{hyperref}{%
766   \ifxetex
767     \hypersetup{\pdfx@pdfAE@opts@xetex}%
768   \else\ifluatex
769     \hypersetup{\pdfx@pdfAE@opts@luatex}%
770   \else
771     \hypersetup{\pdfx@pdfAE@opts@pdftex}%
772   \fi\fi
773 }{%
774   \ifxetex
775     \RequirePackage[\pdfx@pdfAE@opts@xetex]{hyperref}
776   \else\ifluatex
777     \RequirePackage[\pdfx@pdfAE@opts@luatex]{hyperref}
778   \else
```

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```
779 \RequirePackage[\pdfx@pdfAE@opts@pdftex]{hyperref}
780 \fi\fi
781 }%
782 \fi\fi
783 \hypersetup{pdfencoding=auto}% unicode
784 \expandafter\ifx\csname KV@Hyp@psdextra\endcsname\relax\else
785 \hypersetup{psdextra}
786 \fi
787
788 \ifx\xmp@CreatorTool\empty
789 \edef\xmp@CreatorTool{\@pdfcreator}
790 \fi
791
792 \newif\ifpdfx@cmymk
793 \ifpdfx@x % PDF/X normally needs a CMYK color profile for printing
794 \global\pdfx@cmymktrue
795 \fi
796 %%-----
797 %% ----- Color Profiles -----
798 %% Define how to specify the profile, so the default
799 %% can be over-ridden in the .xmpdata file.
800 %%
801 %% --- user-command --- RGB profile needed with PDF/A-??
802 %% \setRGBcolorprofile{<filename>}{<identifier>}
803 %% {<info string>}{<registry URL>}
804 \def\setRGBcolorprofile{%
805 \begingroup
806 \catcode'\_ 11\relax\catcode'\& 11\relax\catcode'\~ 11\relax
807 \catcode'\% 11\relax
808 \edef\({\string\({}\edef\){\string\)}}%
809 \pdfx@setrgbprofile}
810 %%
811 %% --- user-command --- CMYK profile needed with PDF/X-??
812 %% \setCMYKcolorprofile{<filename>}{<output intent>}
813 %% {<identifier>}{<registry URL>}
814 \def\setCMYKcolorprofile{%
815 \begingroup
816 \catcode'\_ 11\relax\catcode'\& 11\relax\catcode'\~ 11\relax
817 \catcode'\% 11\relax
818 \edef\({\string\({}\edef\){\string\)}}%
819 \pdfx@setcmkprofile}
820 %%
821 %% --- user-command --- DeviceGray profile needed with PDF/E-1
822 %% \setGRAYcolorprofile{<filename>}{<output intent>}
823 %% {<identifier>}{<registry URL>}
824 \def\setGRAYcolorprofile{%
825 \begingroup
826 \catcode'\_ 11\relax\catcode'\& 11\relax\catcode'\~ 11\relax
827 \catcode'\% 11\relax
828 \edef\({\string\({}\edef\){\string\)}}%
829 \pdfx@setgrayprofile}
830 %%
```

Generation of PDF/X- and PDF/A-compliant PDFs with pdfT_EX — pdfx.sty

C. V. Radhakrishnan, Hàn Thế Thành, Ross Moore and Peter Selinger

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```
831 %% --- user-command --- External profile with PDF/X-4p and PDF/X-5pg
832 %% \setEXTERNALprofile{<profilename>}{<output intent>}
833 %% {<identifier>}{<registry URL>}{<color-space>}%
834 %% {<ICC Version>}{<provider URL>}{<extra info>}{<Check Sum>}
835 \def\setEXTERNALprofile{%
836 \begingroup
837 \catcode'\_ 11\relax\catcode'\& 11\relax\catcode'\~ 11\relax
838 \catcode'\% 11\relax
839 \edef\({\string\}\edef\){\string\})%
840 \pdfx@externalprofile}
841 %%
842 %%
843 \def\pdfx@setRGBcolorprofiledir#1{%
844 \gdef\pdfx@RGBcolorprofiledir{#1}%
845 }
846 \def\pdfx@setCMYKcolorprofiledir#1{%
847 \gdef\pdfx@CMYKcolorprofiledir{#1}%
848 }
849 \pdfx@setRGBcolorprofiledir{}
850 \pdfx@setCMYKcolorprofiledir{}
851
852 %% This does indeed work! Use it in .xmpdata files
853 \providecommand{\MacOSColordir}%
854 {/System/Library/ColorSync/Profiles/}
855 \providecommand{\AdobeMacOSdir}%
856 {/Library/Application Support/Adobe/Color/Profiles/Recommended/}
857 \edef\pdfx@tmp{C:\string\Windows\string\System32\string\Spool%
858 \string\Drivers\string\Color\string/}
859 \expandafter\providecommand\expandafter
860 {\expandafter\WindowsColordir\expandafter}\expandafter{\pdfx@tmp}
861 %%\pdfx@setcolorprofiledir{\AdobeMacOSdir}
862
863 %% override that value using the following commands:
864 \let\pdfxSetCMYKcolorProfileDir\pdfx@setCMYKcolorprofiledir
865 \let\pdfxSetRGBcolorProfileDir\pdfx@setRGBcolorprofiledir
866 %% for back-compatibility
867 \let\pdfxSetColorProfileDir\pdfxSetCMYKcolorProfileDir
868 %%
869 \def\pdfx@setrgbprofile#1#2#3#4{%
870 \xdef\pdfx@rgb@profile{\pdfx@RGBcolorprofiledir#1}% valid file name
871 \gdef\pdfx@rgb@identifier{#2}%
872 \gdef\pdfx@rgb@info{#3}%
873 \pdfstringdef\pdfx@rgb@registry{#4}% valid URL
874 \endgroup
875 \global\pdfx@cmykfalse
876 }% closes-off \setRGBcolorprofile
877 %%
878 \def\pdfx@setcmykprofile#1#2#3#4{%
879 \xdef\pdfx@cmyk@profile{\pdfx@CMYKcolorprofiledir#1}% valid file name
880 %% \expandafter\gdef\expandafter\pdfx@cmyk@profile\expandafter
881 %% {\pdfx@colorprofiledir#1}% valid file name
882 \gdef\pdfx@cmyk@intent{#2}%
```

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```
883 %% \pdfstringdef\pdfx@cmky@intent{#2}% color intent
884 \gdef\pdfx@cmky@identifier{#3}%
885 %% \pdfstringdef\pdfx@cmky@identifier{#3}% text string identifier
886 \gdef\pdfx@cmky@registry{#4}%
887 %% \pdfstringdef\pdfx@cmky@registry{#4}% valid URL
888 \endgroup
889 \global\pdfx@cmkytrue
890 }% closes-off \setCMYKcolorprofile
891 %%
892 \def\pdfx@setgrayprofile#1#2#3#4{%
893 \gdef\pdfx@gray@profile{#1}% valid file name
894 \gdef\pdfx@gray@intent{#2}%
895 \gdef\pdfx@gray@identifier{#3}%
896 \pdfstringdef\pdfx@gray@registry{#4}% valid URL
897 \endgroup}% closes-off \setGRAYcolorprofile
898 %%
899 \def\pdfx@externalprofile#1#2#3#4#5#6#7#8#9{%
900 \gdef\pdfx@extprofile{#1}% PDF string for /ProfileName
901 \gdef\pdfx@cmky@intent{#2}% PDF string for /OutputCondition
902 \gdef\pdfx@cmky@identifier{#3}% PDF string for /OutputConditionIdentifier
903 \gdef\pdfx@cmky@registry{#4}% {http://www.color.org}%
904 \gdef\pdfx@profileCS{#5}% 4 bytes for /ProfileCS
905 \gdef\pdfx@iccversion{#6}% Hex string for /ICCVersion < ... >
906 \gdef\pdfx@colorURL{#7}% URL
907 \gdef\pdfx@cmky@info{#8}% for /Info
908 \gdef\pdfx@profile@checksum{#9}% Hex string for /Checksum < ... >
909 \endgroup}% closes-off \setEXTERNALprofile
910 %%
911 %% default color profiles
912 {\catcode'\_ 12 \catcode'\& 12 \catcode'\~ 12
913 \gdef\pdfx@xprofile@cmkydefault{coated_FOGRA39L_arg1.icc}
914 \gdef\pdfx@aprofile@rgbdefault{sRGB_IEC61966-2-1_black_scaled.icc}
915 \gdef\pdfx@eprofile@graydefault{Gray_linear.icc}
916 \gdef\pdfx@pprofile@externaldefault{FOGRA39}
917 }% end of \catcode
918 \xdef\pdfx@rgb@profile{\pdfx@aprofile@rgbdefault}
919 \xdef\pdfx@cmky@profile{\pdfx@xprofile@cmkydefault}
920 \xdef\pdfx@gray@profile{\pdfx@eprofile@graydefault}
921 \xdef\pdfx@external@profile{\pdfx@pprofile@externaldefault}
922
923 %%-----
924 %% License for the file sRGB_IEC61966-2-1_black_scaled.icc :
925 %%
926 %% Copyright International Color Consortium, 2009 -- http://www.color.org/
927 %%
928 %% It is hereby acknowledged that the file "sRGB_IEC61966-2-1_black_scaled.icc"
929 %% is provided "AS IS" WITH NO EXPRESS OR IMPLIED WARRANTY.
930 %%
931 %% Licensing
932 %%
933 %% This profile is made available by the International Color Consortium,
934 %% and may be copied, distributed, embedded, made, used, and sold without
```

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```
935 %% restriction. Altered versions of this profile shall have the original
936 %% identification and copyright information removed and shall not be
937 %% misrepresented as the original profile.
938 %%
939 %% Terms of use
940 %%
941 %% To anyone who acknowledges that the file "sRGB_IEC61966-2-1_black_scaled.icc"
942 %% is provided "AS IS" WITH NO EXPRESS OR IMPLIED WARRANTY, permission to use,
943 %% copy and distribute these file for any purpose is hereby granted without fee,
944 %% provided that the file is not changed including the ICC copyright notice tag,
945 %% and that the name of ICC shall not be used in advertising or publicity
946 %% pertaining to distribution of the software without specific, written prior
947 %% permission. ICC makes no representations about the suitability of this
948 %% software for any purpose.
949 %%
950 %%-----
951 {\catcode'\ 14 \catcode'\% 12 \catcode'\_ 12
952 \edef\@bchar{\expandafter\@gobble\string\}|
953 \edef\({\string\}\edef\){\string\}}|
954 \begingroup | \endgroup occurs within the macro expansion
955 \expandafter\pdfx@setrgbprofile\expandafter
956 {sRGB_IEC61966-2-1_black_scaled.icc}|
957 {sRGB_IEC61966-2-1_black_scaled}|
958 {sRGB IEC61966 v2.1 with black scaling}|
959 {http://www.color.org}|
960 \begingroup | \endgroup occurs within the macro expansion
961 \pdfx@setcmykprofile{coated_FOGRA39L_argl.icc}| coated_FOGRA39L_argl.icc
962 {Coated FOGRA39}|
963 {FOGRA39 \string\ (ISO Coated v2 300%\space \string\ (ECI\string\)\string\)}|
964 {http://www.argyllcms.com/}|{http://www.color.org}|
965 \begingroup | \endgroup occurs within the macro expansion
966 \pdfx@setgrayprofile{Gray_linear.icc}|
967 {}|
968 {Custom}|
969 {http://www.freedesktop.org/wiki/OpenIcc}|
970 \ifno@iccprofile
971 \begingroup | \endgroup occurs within the macro expansion
972 \pdfx@externalprofile{Coated FOGRA39 \ (ISO 12647-2:2004\)}|
973 {Offset commercial and specialty printing according to ISO 12647-2:2004 |
974 / Amd 1, paper type 1 or 2 \ (gloss or matte coated offset, 115 g/m2\), |
975 screen frequency 60/cm.}|
976 {FOGRA39}{http://www.color.org}{CMYK}{02100000}{http://www.adobe.com}|
977 {Coated FOGRA39 \ (ISO 12647-2:2004\)}{74FF62F330BF0DBE4495B5720542D511}|
978 \fi
979 }% end of \catcode
980 %%
981 %%-----
982 %% License for the file coated_FOGRA39L_argl.icc :
983 %%
984 %% The zlib/libpng License
985 %%
986 %% Copyright (c) 2008 Kai-Uwe Behrmann
```


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C. V. Radhakrishnan, Hàn Thế Thành, Ross Moore and Peter Selinger

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```
987 %%
988 %% This software is provided 'as-is', without any express or implied
989 %% warranty. In no event will the authors be held liable for any damages
990 %% arising from the use of this software.
991 %%
992 %% Permission is granted to anyone to use this software for any purpose,
993 %% including commercial applications, and to alter it and redistribute
994 %% it freely, subject to the following restrictions:
995 %%
996 %% 1. The origin of this software must not be misrepresented; you
997 %% must not claim that you wrote the original software. If you use
998 %% this software in a product, an acknowledgment in the product
999 %% documentation would be appreciated but is not required.
1000 %%
1001 %% 2. Altered source versions must be plainly marked as such, and
1002 %% must not be misrepresented as being the original software.
1003 %%
1004 %% 3. This notice may not be removed or altered from any source
1005 %% distribution.
1006 %%-----
1007
1008 \newif\ifexternalICCprofiles
1009
1010 \begingroup
1011 %% override unneeded color-profile specifier
1012 \ifpdfx@x
1013 \ifno@iccprofile % PDF/X-4p and PDF/X-5pg PDF/VT-2
1014 \begingroup
1015 \def\pdfx@extprofiles@store{AdobeExternalProfiles.tex}%
1016 \InputIfFileExists{\pdfx@extprofiles@store}%
1017 {\global\externalICCprofilestrue \catcode '\# 12\relax}%
1018 {\typeout{** pdfx: No file \pdfx@extprofiles@store\space
1019 found for PDF/X-4p or PDF/X-5pg}}%
1020 \endgroup
1021 \else
1022 \begingroup
1023 \def\pdfx@profiles@store{AdobeColorProfiles.tex}%
1024 \InputIfFileExists{\pdfx@profiles@store}%
1025 {\global\externalICCprofilesfalse \catcode '\# 12\relax}%
1026 {\typeout{** pdfx: No file \pdfx@profiles@store\space
1027 found for PDF/X variants}}%
1028 \endgroup
1029 %% \def\setRGBcolorprofile#1#2#3#4{%
1030 %% \PackageError{pdfx}{PDF/X requires a CMYK color profile}%
1031 %% {Just continue using the default CMYK profile.^^J}}%
1032 \fi
1033 \else
1034 %% load it, in case the macros are used in .xmpdata
1035 \InputIfFileExists{AdobeColorProfiles.tex}{}{}%
1036 \ifpdfx@e
1037 \else
1038 \def\setCMYKcolorprofile#1#2#3#4{%
```

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```
1039 \def\setGRAYcolorprofile#1#2#3#4{%
1040 \fi\fi
1041 %%
1042 \ifluatex\else\ifxetex\else
1043 \inputencoding{8bit}%
1044 \fi\fi
1045 \makeatletter
1046 \pdfx@localcommands
1047 %%
1048 \InputIfFileExists{\jobname.xmpdata}%
1049 {\typeout{** pdfx: Metadata file \jobname.xmpdata read successfully.}}%
1050 {\typeout{** pdfx: No file \jobname.xmpdata .
1051 Metadata will be incomplete!}}
1052 \endgroup
1053
1054 %% -----
1055 \begingroup
1056 \ifpdfx@x % PDF/X needs a CMYK or RGB color profile for printing
1057 \edef\@pctchar{\expandafter\@gobble\string\}%
1058 \edef\@bchar{\expandafter\@gobble\string\}
1059 \edef\@0{\string\0}
1060 \edef\@{\string\{ }
1061 \edef\@}\{\string\}
1062 \catcode'\_ 12
1063 \ifno@iccprofile % PDF/X-4p and PDF/X-5pg
1064 \ifxetex
1065 \special{pdf:obj @colorURL <</FS/URL/F(\pdfx@colorURL)>>}%
1066 \special{pdf:obj @colorprofile <<%
1067 /Checksum <\pdfx@profile@checksum>^^J%
1068 /ICCVersion <\pdfx@iccversion>%
1069 /ProfileCS (\pdfx@profileCS)^^J%
1070 /ProfileName (\pdfx@extprofile)^^J%
1071 /URLs [ @colorURL ]
1072 >>}
1073 \def\OBJ@ICC{@colorprofile}%
1074 \else
1075 \immediate\pdfobj {<</FS/URL/F(\pdfx@colorURL)>>}%
1076 \edef\OBJ@URLs{\the\pdflastobj\space 0 R}%
1077 \immediate\pdfobj {<<%
1078 /Checksum <\pdfx@profile@checksum>^^J%
1079 /ICCVersion <\pdfx@iccversion>%
1080 /ProfileCS (\pdfx@profileCS)^^J%
1081 /ProfileName (\pdfx@extprofile)^^J%
1082 /URLs [\OBJ@URLs ]
1083 >>} %
1084 \edef\OBJ@ICC{\the\pdflastobj\space 0 R}%
1085 \fi
1086 \pdfcatalog{%
1087 /OutputIntents [ <<
1088 /Type/OutputIntent
1089 /S/GTS_PDFX
1090 /OutputCondition (\pdfx@cmky@intent)%
```

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```
1091 /OutputConditionIdentifier (\pdfx@cmk@identifier)%
1092 /Info(\pdfx@cmk@intent)%
1093 /RegistryName(\pdfx@cmk@registry)
1094 %% extra dictionary required for PDF/X-4p and PDF/X-5pg
1095 /DestOutputProfileRef \OBJ@ICC
1096 >> ]}%
1097 %%
1098 \else % PDF/X-1 , PDF/X-1a , PDF/X-3 , PDF/X-4 , PDF/X-5g
1099 %%
1100 \ifpdfx@cmk
1101 \IfFileExists{"\pdfx@cmk@profile"}{%
1102 % embedded CMYK color profile
1103 \ifxetex
1104 \immediate\special{pdf:fstream @colorprofile (\pdfx@cmk@profile) <</N 4>>}
1105 \def\OBJ@CMYK{@colorprofile}%
1106 \else
1107 \immediate\pdfobj stream attr{/N 4} file{\pdfx@cmk@profile}%
1108 \edef\OBJ@CMYK{\the\pdflastobj\space 0 R}%
1109 \fi
1110 \pdfcatalog{%
1111 /OutputIntents [ <<
1112 /Type/OutputIntent
1113 /S/GTS_PDFX
1114 /OutputCondition (\pdfx@cmk@intent)%
1115 /OutputConditionIdentifier (\pdfx@cmk@identifier)%
1116 /Info(\pdfx@cmk@intent)%
1117 /RegistryName(\pdfx@cmk@registry)
1118 /DestOutputProfile \OBJ@CMYK
1119 >> ]}%
1120 }{%
1121 \errmessage{No color profile \pdfx@cmk@profile\ found
1122 to use for CMYK printing colors.}%
1123 }%
1124 \else % allow RGB profile with PDF/X ???
1125 \ifpdfx@noerr
1126 \PackageWarning{pdfx}{PDF/X normally requires a CMYK color profile.^J
1127 Assuming RGB profile is of type 'prtr' not 'mntr'.^J^J}%
1128 \else
1129 \PackageError{pdfx}{PDF/X normally requires a CMYK color profile.}%
1130 {To use RGB ensure profile is of type 'prtr' not 'mntr'.^J^J}%
1131 \fi
1132 \IfFileExists{"\pdfx@rgb@profile"}{%
1133 \ifxetex
1134 \immediate\special{pdf:fstream @colorprofile (\pdfx@rgb@profile) <<
1135 /N 3 /Alternate/DeviceRGB >>}
1136 \def\OBJ@RGB{@colorprofile}%
1137 \else
1138 \immediate\pdfobj stream attr{/N 3^J/Alternate/DeviceRGB}
1139 file{\pdfx@rgb@profile}%
1140 \edef\OBJ@RGB{\the\pdflastobj\space 0 R}%
1141 \fi
1142 \edef\pdfx@outintent@dict{%
```

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```
1143      /Type /OutputIntent
1144      /S/GTS_PDFX
1145      /OutputConditionIdentifier (\pdfx@rgb@identifier)%
1146      /DestOutputProfile \OBJ@RGB
1147      /Info(\pdfx@rgb@info)
1148      /RegistryName(\pdfx@rgb@registry)
1149    }%
1150    \ifxetex
1151      \special{pdf:obj @outintent@dict << \pdfx@outintent@dict >>}
1152      \edef\pdfx@outintent@dict{ @outintent@dict }%
1153    \else
1154    %%      pdfTeX or LuaTeX
1155    \fi
1156    \ifxetex
1157      \immediate\special{pdf:obj @outintentsarray [ ]}%
1158      \immediate\special{pdf:put @outintentsarray \pdfx@outintent@dict}%
1159      \def\pdfx@outintents{@outintentsarray}%
1160    \else
1161      \immediate\pdfobj{<<\pdfx@outintent@dict>>}
1162      \edef\pdfx@outintents{[\the\pdflastobj\space 0 R]}%
1163    \fi
1164    \pdfcatalog{%
1165      /ViewerPreferences <</DisplayDocTitle true >>
1166      /OutputIntents \pdfx@outintents
1167    }%
1168  }{%
1169    \errmessage{No color profile found to use for RGB screen colors.}%
1170  }%
1171  \fi % end of \ifpdfx@cmky
1172  \fi % end of \ifno@iccprofile
1173 \else
1174 %% PDF/A and PDF/E can specify a CMYK profile
1175 \expandafter\ifx\expandafter\relax\pdfx@rgb@profile\relax
1176   \global\pdfx@cmkytrue
1177   \IfFileExists{"\pdfx@cmky@profile"}{%
1178     % embedded CMYK color profile
1179   %% How to support XeTeX here ?
1180   \ifxetex
1181     \special{pdf:fstream @colorprofile (\pdfx@cmky@profile) <</N 4>>}
1182     \def\OBJ@CMYK{@colorprofile}%
1183   \else
1184     \immediate\pdfobj stream attr{/N 4} file{\pdfx@cmky@profile}%
1185     \edef\OBJ@CMYK{[\the\pdflastobj\space 0 R]}%
1186   \fi
1187   \edef\pdfx@outintent@dict{%
1188     /Type /OutputIntent
1189     \ifpdfx@e
1190     /S/ISO_PDFA1
1191   \else
1192     /S/GTS_PDFA1
1193   \fi
1194     /OutputCondition (\pdfx@cmky@intent)% use this or /Info ?
```

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```
1195 /OutputConditionIdentifier (\pdfx@cmyk@identifier)%
1196 /DestOutputProfile \OBJ@CMYK
1197 /Info(\pdfx@cmyk@intent)%
1198 /RegistryName(\pdfx@cmyk@registry)
1199 }
1200 \ifxetex
1201 \special{pdf:obj @outintent@dict << \pdfx@outintent@dict >>}
1202 \edef\pdfx@outintent@dict{ @outintent@dict }%
1203 \else
1204 %% pdfTeX
1205 \fi
1206 \ifxetex
1207 \immediate\special{pdf:obj @outintentsarray [ ]}%
1208 \immediate\special{pdf:put @outintentsarray \pdfx@outintent@dict}%
1209 \def\pdfx@outintents{@outintentsarray}%
1210 \else
1211 \immediate\pdfobj{<<\pdfx@outintent@dict>>}
1212 \edef\pdfx@outintents{[\the\pdflastobj\space 0 R]}%
1213 \fi
1214 \pdfcatalog{%
1215 /ViewerPreferences <</DisplayDocTitle true >>
1216 /OutputIntents \pdfx@outintents
1217 }
1218 }{%
1219 \errmessage{No color profile \pdfx@cmyk@profile\ found
1220 to use for CMYK screen colors.}%
1221 }%
1222 \else
1223 %% PDF/A and PDF/E usually need an RGB color profile for on-screen rendering
1224 \global\pdfx@cmykfalse
1225 \IfFileExists{"\pdfx@rgb@profile"}{%
1226 %% How to support XeTeX here ?
1227 \ifxetex
1228 \immediate\special{pdf:fstream @colorprofile (\pdfx@rgb@profile) <<
1229 /N 3 /Alternate/DeviceRGB >>}
1230 \def\OBJ@RGB{@colorprofile}%
1231 \else
1232 \immediate\pdfobj stream attr{/N 3^^J/Alternate/DeviceRGB}
1233 file{\pdfx@rgb@profile}%
1234 \edef\OBJ@RGB{[\the\pdflastobj\space 0 R]}%
1235 \fi
1236 \edef\pdfx@outintent@dict{%
1237 /Type /OutputIntent
1238 \ifpdfx@e
1239 /S/ISO_PDFE1
1240 \else
1241 /S/GTS_PDFA1
1242 \fi
1243 /OutputConditionIdentifier (\pdfx@rgb@identifier)%
1244 /DestOutputProfile \OBJ@RGB
1245 /Info(\pdfx@rgb@info)
1246 /RegistryName(\pdfx@rgb@registry)
```

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```
1247 }%
1248 \ifxetex
1249   \special{pdf:obj @outintent@dict << \pdfx@outintent@dict >>}
1250   \edef\pdfx@outintent@dict{ @outintent@dict }%
1251 \else
1252 %% pdfTeX
1253 \fi
1254 \ifxetex
1255   \immediate\special{pdf:obj @outintentsarray [ ]}%
1256   \immediate\special{pdf:put @outintentsarray \pdfx@outintent@dict}%
1257   \def\pdfx@outintents{@outintentsarray}%
1258 \else
1259   \immediate\pdfobj{<<\pdfx@outintent@dict>>}
1260   \edef\pdfx@outintents{[\the\pdflastobj\space 0 R]}%
1261 \fi
1262 \pdfcatalog{%
1263   /ViewerPreferences <</DisplayDocTitle true >>
1264   /OutputIntents \pdfx@outintents
1265 }%
1266 }{%
1267   \errmessage{No color profile found to use for RGB screen colors.}%
1268 }%
1269 \fi % end of \ifx
1270 \fi % end of \ifpdfx@
1271 \endgroup
1272
1273 %% -----
1274 %% Make a version of \xmp@Keywords and \xmp@Author where \sep has been
1275 %% replaced by a comma. The first is for the pdf:Keywords property,
1276 %% which accepts a comma-separated string of keywords, and seems to be
1277 %% mandatory for PDF/A-1 compliance. The second is for the dc:creator
1278 %% property. Although it is defined to be a sequence of authors, Adobe
1279 %% Acrobat will in fact ignore and delete all except the first author.
1280 %% Therefore, it's safer to always separate authors by commas.
1281
1282 \begingroup
1283 \let\pdfx@xmpunimarkup\relax
1284 \pdfx@xmpmarkup
1285 \ifluatex\else\ifxetex\else
1286   \inputencoding{8bit}%
1287 \fi\fi
1288 \makeatletter
1289 \IfFileExists{\pdfx@encodingfile}{%
1290 %% \def\cf@encoding{U}\fontencoding{U}%
1291 \def\cf@encoding{L8U}\fontencoding{L8U}%
1292 }{%
1293 %% \xdef\xmp@@@Author{\xmp@Author}% no need to expand
1294 \global\let\xmp@@@Author\xmp@Author
1295 \def\sep{;}% expand to replace \sep !!! no longer needed
1296 %% \xdef\xmp@@@Copyright{\xmp@Copyright}%
1297 \global\let\xmp@@@Copyright\xmp@Copyright
1298 %% \xdef\xmp@@@Keywords{\xmp@Keywords}%
```


Generation of PDF/X- and PDF/A-compliant PDFs with pdfTeX — pdfx.sty

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```
1299 %% \global\let\xmp@@Keywords\xmp@Keywords
1300 %% \global\let\xmp@Keywords\@empty %
1301 \global\let\xmp@@Keywords\@empty % don't use pdf:Keywords
1302 \endgroup
1303
1304 %% -----
1305 \def\xmp@convertDate{\pdfx@getYear}
1306 {\catcode'\D=12 \catcode'\:=12
1307 \gdef\pdfx@getYear D:#1#2#3#4{\edef\pdfx@xYear{#1#2#3#4}\pdfx@getMonth}
1308 }
1309 \def\pdfx@getMonth#1#2{\edef\pdfx@xMonth{#1#2}\pdfx@getDay}
1310 \def\pdfx@getDay#1#2{\edef\pdfx@xDay{#1#2}\pdfx@getHour}
1311 \def\pdfx@getHour#1#2{\edef\pdfx@xHour{#1#2}\pdfx@getMin}
1312 \def\pdfx@getMin#1#2{\edef\pdfx@xMin{#1#2}\pdfx@getSec}
1313 \def\pdfx@getSec#1#2{\edef\pdfx@xSec{#1#2}\pdfx@getTZh}
1314 \def\pdfx@getTZh{\futurelet\pdfx@next\pdfx@getTZh@branches}
1315
1316 {\catcode'\@=11 \catcode'\Z=12 \catcode'\+=12 \catcode'\-=12
1317 \gdef\pdfx@getTZh@branches{%
1318 \ifx\pdfx@next Z\let\pdfx@getTZbranch\pdfx@getTZnozone
1319 \else\ifx\pdfx@next +\let\pdfx@getTZbranch\pdfx@getTZplus
1320 \else\ifx\pdfx@next -\let\pdfx@getTZbranch\pdfx@getTZminus
1321 \else\let\pdfx@getTZbranch\pdfx@getTZerror
1322 \fi\fi\fi \pdfx@getTZbranch }
1323
1324 \catcode'\@=12
1325 \gdef\pdfx@getTZnozone Z#1\pdfx@getTZend{%
1326 \edef\pdfx@xTZh{+00}\edef\pdfx@xTzm{00}}
1327 \gdef\pdfx@getTZplus +#1'#2'#3\pdfx@getTZend{%
1328 \edef\pdfx@xTZh{+#1}\edef\pdfx@xTzm{#2}%
1329 \ifx\relax#2\relax\def\pdfx@xTzm{00}\fi}
1330 \gdef\pdfx@getTZminus -#1'#2'#3\pdfx@getTZend{%
1331 \edef\pdfx@xTZh{-#1}\edef\pdfx@xTzm{#2}%
1332 \ifx\relax#2\relax\def\pdfx@xTzm{00}\fi}
1333 %%
1334 %% How to support XeTeX here ?
1335 \expandafter\ifx\csname pdfcreationdate\endcsname\relax
1336 %% \xdef\pdfx@convDate{2016-04-01}% April fool!
1337 %% \xdef\xmp@convDate{2016-04-01}% April fool!
1338 \else
1339 \expandafter\expandafter\expandafter\xmp@convertDate\pdfcreationdate'\'\pdfx@getTZend
1340 \xdef\pdfx@convDate{\pdfx@xYear\pdfx@xMonth\pdfx@xDay\pdfx@xHour
1341 \pdfx@xMin\pdfx@xSec\pdfx@xTZh'\pdfx@xTzm'}%
1342 \xdef\xmp@convDate{\pdfx@xYear-\pdfx@xMonth-\pdfx@xDay
1343 T\pdfx@xHour:\pdfx@xMin:\pdfx@xSec\pdfx@xTZh:\pdfx@xTzm}%
1344 \fi
1345 }% end of \catcode
1346
1347 %% -----
1348 %% \pdfx@topdfstring\toka\tokb: Convert the string in \tokb to a format
1349 %% appropriate for PDF /Info strings, i.e., PDFDoc encoding or UTF-16
1350 %% encoding, and store the result in \toka As a special case, if \tokb
```

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```
1351 %% is \@empty, set \toka to \@empty.
1352
1353 \def\pdfx@topdfstring#1#2{%
1354   \ifx#2\@empty
1355     \global\let#1\empty
1356   \else
1357     \begingroup
1358     \ifluatex\else
1359       \inputencoding{utf8}%
1360       \fi
1361       \hypersetup{pdfencoding=auto}%
1362       \pdfstringdef#1{#2}%
1363     \endgroup
1364   \fi
1365 }
1366
1367 %% -----
1368 %% if high-bit characters are already encoded as active
1369 %% then \pdfstringdef probably changes their meaning
1370 %% so save these for later reversion.
1371 %%
1372 \newif\ifpdf@activechars
1373 {\ifnum\catcode'^^c0 = 13\relax \aftergroup\pdf@activecharstrue\fi}%
1374 %%
1375 %% normally not used with XeTeX
1376 %%
1377
1378 \ifpdf@activechars
1379   \global\let\pdfx@save@co ^^c0\relax
1380   \global\let\pdfx@save@ci ^^c1\relax
1381   \global\let\pdfx@save@cii ^^c2\relax
1382   \global\let\pdfx@save@ciii ^^c3\relax
1383   \global\let\pdfx@save@civ ^^c4\relax
1384   \global\let\pdfx@save@cv ^^c5\relax
1385   \global\let\pdfx@save@cvi ^^c6\relax
1386   \global\let\pdfx@save@cvii ^^c7\relax
1387   \global\let\pdfx@save@cvihi ^^c8\relax
1388   \global\let\pdfx@save@cix ^^c9\relax
1389   \global\let\pdfx@save@ca ^^ca\relax
1390   \global\let\pdfx@save@cb ^^cb\relax
1391   \global\let\pdfx@save@cc ^^cc\relax
1392   \global\let\pdfx@save@cd ^^cd\relax
1393   \global\let\pdfx@save@ce ^^ce\relax
1394   \global\let\pdfx@save@cf ^^cf\relax
1395   \global\let\pdfx@save@do ^^d0\relax
1396   \global\let\pdfx@save@di ^^d1\relax
1397   \global\let\pdfx@save@dii ^^d2\relax
1398   \global\let\pdfx@save@diii ^^d3\relax
1399   \global\let\pdfx@save@div ^^d4\relax
1400   \global\let\pdfx@save@dv ^^d5\relax
1401   \global\let\pdfx@save@dvi ^^d6\relax
1402   \global\let\pdfx@save@dvihi ^^d7\relax
```

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```
1403 \global\let\pdfx@save@dvi^d8\relax
1404 \global\let\pdfx@save@dix^d9\relax
1405 \global\let\pdfx@save@da^da\relax
1406 \global\let\pdfx@save@db^db\relax
1407 \global\let\pdfx@save@dc^dc\relax
1408 \global\let\pdfx@save@dd^dd\relax
1409 \global\let\pdfx@save@de^de\relax
1410 \global\let\pdfx@save@df^df\relax
1411 \global\let\pdfx@save@eo^e0\relax
1412 \global\let\pdfx@save@ei^e1\relax
1413 \global\let\pdfx@save@eii^e2\relax
1414 \global\let\pdfx@save@eiii^e3\relax
1415 \global\let\pdfx@save@eiv^e4\relax
1416 \global\let\pdfx@save@ev^e5\relax
1417 \global\let\pdfx@save@evi^e6\relax
1418 \global\let\pdfx@save@evii^e7\relax
1419 \global\let\pdfx@save@eviii^e8\relax
1420 \global\let\pdfx@save@eix^e9\relax
1421 \global\let\pdfx@save@ea^ea\relax
1422 \global\let\pdfx@save@eb^eb\relax
1423 \global\let\pdfx@save@ec^ec\relax
1424 \global\let\pdfx@save@ed^ed\relax
1425 \global\let\pdfx@save@ee^ee\relax
1426 \global\let\pdfx@save@ef^ef\relax
1427 \global\let\pdfx@save@fo^f0\relax
1428 \global\let\pdfx@save@fi^f1\relax
1429 \global\let\pdfx@save@fii^f2\relax
1430 \global\let\pdfx@save@fiii^f3\relax
1431 \fi
1432
1433 %% -----
1434 %% detect when \sep is used for multiple authors
1435 %% then suppress the /Author field in PDF /Info
1436 \newif\ifpdfx@sepinAuthor
1437 \let\pdfx@endparse\relax
1438 \def\pdfx@parseforsep#1\sep#2\pdfx@endparse{%
1439   \ifx\relax#2\relax\else\pdfx@sepinAuthortrue\fi
1440 }
1441
1442 %% Convert the relevant XMP properties to PDF strings, expanding markup
1443 %% (such as \sep, \&, \copyright, etc) in an appropriate way.
1444 %% These PDF strings are actually not necessary, but if supplied they
1445 %% must match exactly what is in the XMP version. This may be impossible
1446 %% if math symbols are used; e.g. Plane-1 alphanumerics.
1447 %% Generally, it is better to *not* provide PDF-info strings;
1448 %% instead just providing metadata through XMP.
1449 %% This is not always enough â€” a driver may add it by default!
1450 %%
1451 \begingroup
1452 \pdfx@pdfmarkup
1453 \global\let\pdfx@Title\@empty
1454 \global\let\pdfx@Subject\@empty
```

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C. V. Radhakrishnan, Hàn Thế Thành, Ross Moore and Peter Selinger

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```
1455 \global\let\pdfx@Keywords\@empty
1456 \ifpdfx@nopdfinfo\else
1457   \pdfx@topdfstring\pdfx@Title\xmp@Title
1458   \ifpdfx@e\else\ifpdfx@x\else
1459     \pdfx@topdfstring\pdfx@Subject\xmp@Subject
1460   \fi\fi
1461 %%   \pdfx@topdfstring\pdfx@Keywords\xmp@Keywords
1462 \fi
1463 \pdfx@topdfstring\pdfx@CreatorTool\xmp@CreatorTool
1464 \pdfx@topdfstring\pdfx@Producer\xmp@Producer
1465 \expandafter\pdfx@parseforsep\xmp@Author\sep\pdfx@endparse
1466 \ifpdfx@sepinAuthor
1467   \aftergroup\let\aftergroup\pdfx@Author\aftergroup\@empty
1468 \else
1469   \aftergroup\let\aftergroup\pdfx@Author\aftergroup\@empty
1470 %%   \pdfx@topdfstring\pdfx@Author\xmp@Author
1471 \fi
1472 \endgroup
1473
1474 %% How to support XeTeX here ?
1475 \ifxetex\else
1476   \input glyphtounicode.tex
1477   \input glyphtounicode-cmr.tex
1478   \pdfgentounicode=1
1479   \ifgrkLGRxmp
1480     \pdfglyphtounicode{internalchar2}{200D}%
1481   \fi
1482 \fi
1483
1484 \def\pdfx@linkfile@pdfX#1#2#3{%
1485   \Hy@colorlink\@filecolor#1\Hy@xspace@end}
1486 \def\pdfx@linkstart@pdfX#1#2#3{%
1487   \Hy@colorlink\@linkcolor#3\endgroup\Hy@xspace@end}
1488 \def\pdfx@linkurl@pdfX#1#2{%
1489   \Hy@colorlink\@urlcolor#1\endgroup\Hy@xspace@end}
1490 \def\pdfx@StartlinkName@pdfX#1#2{%
1491 \def\pdfx@close@pdflink{\Hy@VerboseLinkStop\Hy@endcolorlink}%
1492
1493 \ifpdfx@x
1494   \let\hyper@linkfile\pdfx@linkfile@pdfX
1495   \let\hyper@linkurl\pdfx@linkurl@pdfX
1496   \let\hyper@linkstart\pdfx@linkstart@pdfX
1497   \let\hyper@linkend\relax
1498   \let\Hy@StartlinkName\pdfx@StartlinkName@pdfX
1499   \let\close@pdflink\pdfx@close@pdflink
1500   \Hy@bookmarksfalse
1501 %% {\def\sep{;}% should not be needed, but just in case
1502   \AtBeginDocument{%
1503     % cancel annotations and links
1504     %
1505     \def\PDF@FinishDoc{% ??? What uses this ???
1506       \Hy@UseMaketitleInfos
```

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```
1507 {\def\sep{;}% should not be needed, but just in case
1508 \pdfinfo{%
1509 \ifx\pdfx@Title\@empty\else /Title(\pdfx@Title)\fi
1510 \ifx\pdfx@Author\@empty\else /Author(\pdfx@Author)\fi
1511 \ifx\pdfx@Subject\@empty\else /Subject(\pdfx@Subject)\fi
1512 \ifx\pdfx@Keywords\@empty\else /Keywords(\pdfx@Keywords)\fi
1513 /Creator(\pdfx@CreatorTool)%
1514 \ifx\@pdfcreationdate\@empty
1515 /CreationDate(D:\pdfx@convDate)%
1516 \else
1517 \ifxetex\else
1518 /CreationDate(\@pdfcreationdate)%
1519 \fi\fi
1520 \ifx\@pdfmoddate\@empty
1521 /ModDate(D:\pdfx@convDate)%
1522 \else
1523 /ModDate(\@pdfmoddate)%
1524 \fi
1525 /Producer(\pdfx@Producer)%
1526 /Trapped/False
1527 \ifnum\xmp@Part=1
1528 /GTS_PDFXVersion(PDF/X-1\ifnum\xmp@ReleaseDate>2001
1529 \xmp@Conformance\fi:\xmp@ReleaseDate)%
1530 \else
1531 /GTS_PDFXVersion(PDF/X-\xmp@Part\xmp@Conformance
1532 \ifnum\xmp@Part< 4 :\xmp@ReleaseDate\fi)%
1533 \fi
1534 \ifnum\xmp@Part < 3
1535 /GTS_PDFXConformance(PDF/X-\xmp@Part\xmp@Conformance
1536 :\xmp@ReleaseDate)%
1537 \fi
1538 \ifpdfx@vt
1539 %% support for PDF/VT extensions of PDF/X-4 and PDF/X-5
1540 /GTS_PDFVVersion(PDF/VT-\xmp@vtPart\xmp@vtConformance)%
1541 \fi
1542 }% end of PDF/X info
1543 }% end of scope for \sep
1544 }% end of \PDF@FinishDoc
1545 }% end of \AtBeginDocument
1546 %% \pdfinfo{% order of these dictionary keys should not matter
1547 %% \ifx\pdfx@Author\@empty\else /Author(\pdfx@Author)\fi
1548 %% /CreationDate(D:\pdfx@convDate)%
1549 %% /Creator(\pdfx@CreatorTool)%
1550 %% \ifnum\xmp@Part=1
1551 %% /GTS_PDFXVersion(PDF/X-1\ifnum\xmp@ReleaseDate>2001
1552 %% \xmp@Conformance\fi:\xmp@ReleaseDate)%
1553 %% \else
1554 %% /GTS_PDFXVersion(PDF/X-\xmp@Part\xmp@Conformance
1555 %% \ifnum\xmp@Part< 4 :\xmp@ReleaseDate\fi)%
1556 %% \fi
1557 %% \ifnum\xmp@Part < 3
1558 %% /GTS_PDFXConformance(PDF/X-\xmp@Part\xmp@Conformance
```

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```
1559 %%           : \xmp@ReleaseDate)%
1560 %%       \fi
1561 %%
1562 %%       \ifpdfx@vt
1563 %%% support for PDF/VT extensions of PDF/X-4 and PDF/X-5
1564 %%       /GTS_PDFVTVersion(PDF/VT-\xmp@vtPart\xmp@vtConformance)%
1565 %%       \fi
1566 %%       \ifx\pdfx@Keywords\@empty\else /Keywords(\pdfx@Keywords)\fi
1567 %%       /ModDate(D:\pdfx@convDate)%
1568 %%       /Producer(\pdfx@Producer)%
1569 %%       \ifx\pdfx@Subject\@empty\else /Subject(\pdfx@Subject)\fi
1570 %%       \ifx\pdfx@Title\@empty\else /Title(\pdfx@Title)\fi
1571 %%       /Trapped/False%
1572 %% }% end of PDF/X info
1573 %%}% end of scope for \sep
1574 \else
1575 \ifpdfx@e
1576 \AtBeginDocument{%
1577 \def\PDF@FinishDoc{% ??? What uses this ???
1578 \Hy@UseMaketitleInfos
1579 {\def\sep{;}}% should not be needed, but just in case
1580 \pdfinfo{%
1581 \ifx\pdfx@Title\@empty\else /Title(\pdfx@Title)\fi
1582 \ifx\pdfx@Author\@empty\else /Author(\pdfx@Author)\fi
1583 \ifx\pdfx@Subject\@empty\else /Subject(\pdfx@Subject)\fi
1584 \ifx\pdfx@Keywords\@empty\else /Keywords(\pdfx@Keywords)\fi
1585 /Creator(\pdfx@CreatorTool)%
1586 \ifx\pdfcreationdate\@empty
1587 /CreationDate(D:\pdfx@convDate)%
1588 \else
1589 \ifxetex\else
1590 /CreationDate(\@pdfcreationdate)%
1591 \fi\fi
1592 \ifx\@pdfmoddate\@empty
1593 /ModDate(D:\pdfx@convDate)%
1594 \else
1595 /ModDate(\@pdfmoddate)%
1596 \fi
1597 /Producer(\pdfx@Producer)%
1598 /Trapped/False
1599 /GTS_PDFEVersion(PDF/E-1\xmp@Conformance:\xmp@ReleaseDate)%
1600 }% end of PDF/E info
1601 }% end of scope for \sep
1602 }% end of \PDF@FinishDoc
1603 }% end of \AtBeginDocument
1604 %%% {\def\sep{;}}% should not be needed, but just in case
1605 %%% \pdfinfo{% order of these dictionary keys should not matter
1606 %%% \ifx\pdfx@Title\@empty\else /Title(\pdfx@Title)\fi
1607 %%% \ifx\pdfx@Author\@empty\else /Author(\pdfx@Author)\fi
1608 %%% \ifx\pdfx@Subject\@empty\else /Subject(\pdfx@Subject)\fi
1609 %%% \ifx\pdfx@Keywords\@empty\else /Keywords(\pdfx@Keywords)\fi
1610 %%% \ifx\pdfx@Author\@empty\else /Author(\pdfx@Author)\fi
```


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```
1611 %%      /CreationDate(\pdfx@convDate)%
1612 %%      /Creator(\pdfx@CreatorTool)%
1613 %%      /GTS_PDFFVersion(PDF/E-1\xmp@Conformance:\xmp@ReleaseDate)%
1614 %%      \ifx\pdfx@Keywords\@empty\else /Keywords(\pdfx@Keywords)\fi
1615 %%      /ModDate(D:\pdfx@convDate)%
1616 %%      /Producer(\pdfx@Producer)%
1617 %%      \ifx\pdfx@Subject\@empty\else /Subject(\pdfx@Subject)\fi
1618 %%      \ifx\pdfx@Title\@empty\else /Title(\pdfx@Title)\fi
1619 %%      /Trapped/False%
1620 %% }% end of PDF/E info
1621 %%}% end of scope for \sep
1622 \else
1623   \def\pdfx@confA{a}%
1624   \def\pdfx@confB{b}%
1625   \def\pdfx@confU{u}%
1626   \expandafter\def\expandafter\xmp@conf\expandafter
1627     {\csname pdfx@conf\xmp@Conformance\endcsname}%
1628   \AtBeginDocument{%
1629     \def\PDF@FinishDoc{% ??? What uses this ???
1630       \Hy@UseMaketitleInfos
1631       {\def\sep{; }% should not be needed, but just in case
1632         \pdfinfo{%
1633           \ifx\pdfx@Title\@empty\else /Title(\pdfx@Title)\fi
1634           \ifx\pdfx@Author\@empty\else /Author(\pdfx@Author)\fi
1635           \ifx\pdfx@Subject\@empty\else /Subject(\pdfx@Subject)\fi
1636           \ifx\pdfx@Keywords\@empty\else /Keywords(\pdfx@Keywords)\fi
1637           /Creator(\pdfx@CreatorTool)%
1638           \ifx\@pdfcreationdate\@empty
1639             /CreationDate(D:\pdfx@convDate)%
1640           \else
1641             \ifxetex\else
1642               /CreationDate(\@pdfcreationdate)%
1643             \fi\fi
1644           \ifx\@pdfmoddate\@empty
1645             /ModDate(D:\pdfx@convDate)%
1646           \else
1647             /ModDate(\@pdfmoddate)%
1648           \fi
1649           /Producer(\pdfx@Producer)%
1650           /Trapped/False
1651           /GTS_PDFA1Version (PDF/A-\xmp@Part\xmp@conf:\xmp@ReleaseDate)%
1652         }% end of PDF/A info
1653       }% end of scope for \sep
1654     }% end of \PDF@FinishDoc
1655   }% end of \AtBeginDocument
1656 \fi\fi
1657
1658 %%-----
1659 \ifxetex
1660 % override the \ifpdf check
1661 \pdftrue
1662 \else\ifluatex
```

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```
1663 \pdftrue
1664 \fi\fi
1665 \RequirePackage{xmpincl}
1666 \ifxetex
1667 % revert \ifpdf
1668 \pdffalse
1669 \else\ifluatex
1670 \pdffalse
1671 \fi\fi
1672
1673 %% combine coding from xmpincl and hyperxml to support XeTeX
1674 \def\pdfx@xmpincl@xetex#1{%
1675 \IfFileExists{#1.xmp}{%
1676 \mcs@xmpincl@patchFile{#1}%
1677 \begingroup
1678 \special{pdf:fstream @pdfx@Metadata (#1.xmpi)
1679 <<
1680 /Type /Metadata
1681 /Subtype /XML
1682 >>
1683 }%
1684 \special{pdf:put @catalog
1685 <<
1686 /Metadata @pdfx@Metadata
1687 >>
1688 }%
1689 \endgroup
1690 }{%
1691 \newcommand{\mcs@xmpincl@filename}{#1.xmp}%
1692 \PackageError{xmpincl}%
1693 {The file \mcs@xmpincl@filename\space was not found}%
1694 {The file \mcs@xmpincl@filename\space The metadata file
1695 wasn't found.\MessageBreak Oops.}%
1696 }
1697 }
1698 \ifxetex
1699 \let\includexmp\pdfx@xmpincl@xetex
1700 \fi
1701
1702 %%-----
1703 \begingroup
1704 \ifpdfx@x
1705 \ifpdfx@vt
1706 \def\xmp@template{pdfvt}%
1707 \else
1708 \def\xmp@template{pdfx}% formerly pdfx-1a
1709 \fi
1710 \else
1711 \ifpdfx@e
1712 \def\xmp@template{pdfe}%
1713 \else
1714 \def\xmp@template{pdfa}%
```

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```
1715 \fi\fi
1716 %% patch commands from xmpincl.sty ...
1717 \def\pdfx@xmpinclStart{% supply byte-order marker
1718   <?xpacket begin='^ef^bb^be' id='W5M0MpCehiHzreSzNTczkc9d' ?> %
1719 }%
1720 \def\pdfx@xmpinclStartAlt{% no byte-order marker
1721   <?xpacket begin='' id='W5M0MpCehiHzreSzNTczkc9d' ?> %
1722 }%
1723 \def\pdfx@xmpinclEnd{% allow XMP packet to be writable
1724   <?xpacket end='w'?> %
1725 }%
1726 \let\mcs@xmpinclStart\pdfx@xmpinclStart
1727 \let\mcs@xmpinclStartAlt\pdfx@xmpinclStartAlt
1728 \ifpdfx@noBOM % don't use the byte-order marker
1729   \let\mcs@xmpinclStart\pdfx@xmpinclStartAlt
1730 \fi
1731 \let\mcs@xmpinclEnd\pdfx@xmpinclEnd
1732 %% ... preventing their redefinition
1733 \def\newcommand#1#2{%
1734   %%
1735   %% \def\pdfx@endeval{%
1736   %% \noexpand \TE@setvaltrue \noexpand \else
1737   %% \noexpand \TE@setvalfalse \noexpand \fi
1738   %% \noexpand \TE@negatefalse \noexpand \fi}%
1739   %% \let\TE@endeval\pdfx@endeval
1740   \ifluatex\else\ifxetex\else
1741     \inputencoding{8bit}%
1742   \fi\fi
1743   \makeatletter
1744   \pdfx@xmpmarkup
1745   \expandafter\global\expandafter
1746     \let\csname L8U-cmd\expandafter\endcsname\csname U-cmd\endcsname
1747   \def\cf@encoding{L8U}\fontencoding{L8U}%
1748   \providecommand{\ifnot@empty}[2]{\ifx#1\@empty\relax\else#2\fi}%
1749   \obeyspaces%
1750   %% beware 128 space characters -- for padding end of XMP packet
1751   \gdef\paddingline{
1752     \typeout{Using XMP template file: \xmp@template.xmp}%
1753     \includexmp{\xmp@template}%
1754   \endgroup
1755   %%
1756   %%
1757   %% revert active characters to previous encoding
1758   %%
1759   \ifpdf@activechars
1760     \global\let ^^c0\pdfx@save@co
1761     \global\let ^^c1\pdfx@save@ci
1762     \global\let ^^c2\pdfx@save@cii
1763     \global\let ^^c3\pdfx@save@ciii
1764     \global\let ^^c4\pdfx@save@civ
1765     \global\let ^^c5\pdfx@save@cv
1766     \global\let ^^c6\pdfx@save@cvi
```

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```
1767 \global\let ^c7\pdfx@save@cvii
1768 \global\let ^c8\pdfx@save@cviii
1769 \global\let ^c9\pdfx@save@cix
1770 \global\let ^ca\pdfx@save@ca
1771 \global\let ^cb\pdfx@save@cb
1772 \global\let ^cc\pdfx@save@cc
1773 \global\let ^cd\pdfx@save@cd
1774 \global\let ^ce\pdfx@save@ce
1775 \global\let ^cf\pdfx@save@cf
1776 \global\let ^d0\pdfx@save@do
1777 \global\let ^d1\pdfx@save@di
1778 \global\let ^d2\pdfx@save@dii
1779 \global\let ^d3\pdfx@save@diii
1780 \global\let ^d4\pdfx@save@div
1781 \global\let ^d5\pdfx@save@dv
1782 \global\let ^d6\pdfx@save@dvi
1783 \global\let ^d7\pdfx@save@dvii
1784 \global\let ^d8\pdfx@save@dviii
1785 \global\let ^d9\pdfx@save@dix
1786 \global\let ^da\pdfx@save@da
1787 \global\let ^db\pdfx@save@db
1788 \global\let ^dc\pdfx@save@dc
1789 \global\let ^dd\pdfx@save@dd
1790 \global\let ^de\pdfx@save@de
1791 \global\let ^df\pdfx@save@df
1792 \global\let ^e0\pdfx@save@eo
1793 \global\let ^e1\pdfx@save@ei
1794 \global\let ^e2\pdfx@save@eii
1795 \global\let ^e3\pdfx@save@eiii
1796 \global\let ^e4\pdfx@save@eiv
1797 \global\let ^e5\pdfx@save@ev
1798 \global\let ^e6\pdfx@save@evi
1799 \global\let ^e7\pdfx@save@evii
1800 \global\let ^e8\pdfx@save@eviii
1801 \global\let ^e9\pdfx@save@eix
1802 \global\let ^ea\pdfx@save@ea
1803 \global\let ^eb\pdfx@save@eb
1804 \global\let ^ec\pdfx@save@ec
1805 \global\let ^ed\pdfx@save@ed
1806 \global\let ^ee\pdfx@save@ee
1807 \global\let ^ef\pdfx@save@ef
1808 \global\let ^f0\pdfx@save@fo
1809 \global\let ^f1\pdfx@save@fi
1810 \global\let ^f2\pdfx@save@fii
1811 \global\let ^f3\pdfx@save@fiii
1812 \fi
1813
1814 %%
1815 %% controls the color model and conversions with xcolor package
1816 %%
1817 \ifpdfx@cmypk
1818 %
```

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```
1819 % this will have been done already for PDF/X
1820 %
1821 \PassOptionsToPackage{xcolor}{cmk,hyperref}
1822 \def\pdfx@handlecolor{\def\@mod{cmk}\selectcolormodel{cmk}%
1823   \convertcolorsUtrue\convertcolorsDtrue}
1824 \ifpdfx@x
1825 \else
1826 %% \AtBeginDocument{%
1827 %%   \def\@linkcolor{0 1 1 0}%
1828 %%   \def\@anchorcolor{0 0 0 1}%
1829 %%   \def\@citecolor{1 0 1 0}%
1830 %%   \def\@filecolor{.5 0 0 .5}%
1831 %%   \def\@urlcolor{0 1 0 0}%
1832 %%   \def\@menucolor{0 1 1 0}%
1833 %%   \def\@runcolor{.5 0 0 .5}%
1834 %%   \def\@linkbordercolor{0 1 1 0}%
1835 %%   \def\@citebordercolor{1 0 1 0}%
1836 %%   \def\@filebordercolor{.5 0 0 .5}%
1837 %%   \def\@urlbordercolor{1 0 0 0}%
1838 %%   \def\@menubordercolor{0 1 1 0}%
1839 %%   \def\@runbordercolor{.7 0 0 .3}%
1840 %%   \def\Fld@bcolor{0 0 0 0}%
1841 %%   \def\Fld@bordercolor{0 1 1 0}%
1842 %% }
1843 \fi
1844 \else
1845 \PassOptionsToPackage{xcolor}{rgb,hyperref}
1846 \def\pdfx@handlecolor{\def\@mod{rgb}\selectcolormodel{rgb}%
1847   \convertcolorsUtrue\convertcolorsDtrue}
1848 \fi
1849 \@ifpackageloaded{xcolor}{\pdfx@handlecolor
1850   \ifpdfx@cmk\else\color{black}\fi}{%
1851   \AtBeginDocument{\@ifpackageloaded{xcolor}{\pdfx@handlecolor}}}%
1852 }
1853
1854 %%-----
1855 \ifpdfx@transliterated
1856 %% support for bookmarks with transliterated input
1857 \RequirePackage{stringenc}
1858 \ifxetex\let\pdf@escapehex\empty\fi % don't need it
1859 \expandafter\ifx\csname pdf@escapehex\endcsname\relax
1860 \PackageWarning{pdfx}{%
1861   Missing an implementation of \string\pdf@escapehex ^^J
1862   Translated Bookmarks cannot be generated.^^J}%
1863 \newcommand{\pdfxBookmark}[4][\#2[\#1]{\#4}]{%
1864 \else
1865 \def\pdfx@GeneratePdfString#1#2{%
1866   % converts a UTF-8 string to UTF-16be
1867   \StringEncodingConvert{#1}{#2}{utf8}{utf16be}%
1868   \edef#1{\string\376\string\377\pdfescapestring{#1}}}%
1869 }
1870 \newtoks\pdfx@DisabledCommands
```

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```
1871 \def\pdfxDisableCommands#1{%
1872 \expandafter\pdfx@DisabledCommands
1873 \expandafter{\the\pdfx@DisabledCommands#1}}
1874 \pdfxDisableCommands{%
1875 \def\80{% else \000\(\ --> \000\80\050 \000\000\050
1876 \aftergroup\let\aftergroup\HyPsd@ConvertToUnicode\aftergroup\@gobble}
1877 \let\Hy@@writetorep\@writetorep
1878 \def\pdfx@@writetorep#1#2#3#4#5{%
1879 \begingroup
1880 \pdfx@prebookmark
1881 \edef\pdfstringdefPreHook{%\pdfstringdefPreHook
1882 \the\pdfx@DisabledCommands}%
1883 \Hy@@writetorep{#1}{#2}{#3}{#4}{#5}%
1884 \endgroup
1885 }
1886 \newcommand{\pdfxBookmark}[4][[]]{%
1887 \ifx\relax#3\relax
1888 \PackageError{pdfx}{Unknown macro \string#3.
1889 A proper bookmark cannot be created}%
1890 {Proceed to process the \string#1 as usual.}%
1891 #2{#4}%
1892 \else
1893 \ifluatex % use the utf8 directly
1894 \let\pdfx@temp#3\relax
1895 \def\pdfx@prebookmark{%
1896 \pdfx@DisabledCommands}%
1897 \let#3\pdfx@temp
1898 }%
1899 \else\ifxetex % use the utf8 directly
1900 \let\pdfx@temp#3\relax
1901 \def\pdfx@prebookmark{%
1902 \pdfx@DisabledCommands}%
1903 \let#3\pdfx@temp
1904 }%
1905 \else
1906 % convert the utf8 to utf16be
1907 \pdfxBookmarkString\pdfx@temp{#3}%
1908 \fi\fi
1909 \let\@@writetorep\pdfx@@writetorep
1910 \ifx\empty#1\empty
1911 \def#3{#4}%
1912 #2{#3}%
1913 \else
1914 \def#3{#1}%
1915 #2[#3]{#4}%
1916 \fi
1917 \let\@@writetorep\Hy@@writetorep
1918 \fi
1919 \ignorespaces
1920 }
1921 %% use as: \pdfxBookmark{\section}{\sectAtitle}{...}
1922 %% use as: \pdfxBookmark[<opt-title>]{\section}{\sectAtitle}{...}
```


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```
1923 %% only needed by pdfTeX --- Lua-/XeTeX use the utf8 directly
1924 \def\pdfxBookmarkString#1#2{%
1925   \pdfx@GeneratePdfString#1{#2}%
1926   \def\pdfx@prebookmark{%
1927     \pdfxDisableCommands{\let#2#1}%
1928   }%
1929 }
1930 %% use as: \pdfxBookmarkString\PdfSectA\sectAtitle
1931 %% where \sectAtitle has been defined by e.g.
1932 %% \pdfxEnableCommands{\xdef\sectAtitle{\textLGR{...}}}
1933
1934 \fi % end of \ifx\pdf@escapehex\relax
1935 \fi % end of \ifpdfx@transliterated
1936
1937 %%-----
1938
1939 %% disable hyperref options,
1940 %% to prevent changes that will cause an incompatibility
1941 \Hy@DisableOption{pdfauthor}%
1942 \Hy@DisableOption{pdftitle}%
1943 \Hy@DisableOption{pdfsubject}%
1944 \Hy@DisableOption{pdfcreator}%
1945 \Hy@DisableOption{pdfcreationdate}%
1946 \Hy@DisableOption{pdfmoddate}%
1947 \Hy@DisableOption{pdfproducer}%
1948 \Hy@DisableOption{pdfkeywords}%
1949 %% once set correctly, don't let this change
1950 \Hy@DisableOption{pdfa}\let\Hy@pdfafalse\relax\let\Hy@pdfatruerelax
1951 \endinput
```

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\ifpdfx@e
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v1.01	General: glyptounicode-cmr.tex included with the package.	1
v1.3	General: Fix copyright in xmp files.	1
v1.5.4	General: Fixed timezone bug; Unicode support; more PDF variants; added color profiles.	1
v1.5.5	General: Support for PDF/X-4p and PDF/X-5pg with external color profiles.	1
v1.5.6	General: Suppressed ‘dummy-space’ font warning; removed spurious ‘?’ in XMP packets; improved handling of Color Profiles; ensure Hy@pdfatruue when building PDF/A, for link flags; properly enables xcolor conversion of color models.	1
v1.5.7	General: Removed UTF-8 characters that appear in the documentation only, within comments in the package source, but result in a validation failure. Language support in XMP metadata. Added macros for Windows and Mac system color profile directories.	1
v1.5.8	General: MediaBox, TrimBox, etc. derived from the paperheight, paperwidth. Improved language support, incl. KOI8-R encoded cyrillics, Armenian OT6, and LGR Greek encoding, incl. polytonic Greek. All the encodings Latin-1–9 are supported for upper 8-bit characters. Fixed the quoted file-name problem, evident with LuaT _E X. Method to generate correct bookmarks with non-active (transliterated) input. Added support for XeLaT _E X, improvements with LuaT _E X. Updated documentation.	1
v1.5.82	General: Adjusted to changes in the LaTeX core, affecting macros for composite commands; incl. ^a nd others.	1