

# How to Create PDF from L<sup>A</sup>T<sub>E</sub>X

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## Abstract

This document describes how to create high quality PDF from L<sup>A</sup>T<sub>E</sub>X sources and provides some valuable tips.

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# 1 Introduction

## 1.1 General Intro

You can create a postscript file and convert it to PDF using

- **ps2pdf** converts PS to PDF version 1.3 (Adobe 4.x compatible) ⇒ Section 2.
- **dvipdfm**. This converts DVI to PDF version 1.2 (Adobe 3.x compatible) and can automatically convert EPS figures to PDF figures ⇒ Section 3.
- **pdflatex** directly produces PDF version 1.4 (Adobe 5.x compatible) ⇒ Section 4.

You can also add PDF information, WWW links, internal links, cross-references, bookmarks, and more using the famous `hyperref` package that is described in Section 5.

Since PDF is already compressed, do not try to zip PDF.

## 1.2 Font Issues for Best PDF Output

Since PDF has a limited selection of Type 1 fonts,  $\LaTeX$  fonts that you are using are very important in high quality PDF generation. If you use CM (computer modern) font and `ps2pdf`, you should use `dvips -P pdf -G0` to get PS.

For significantly smaller, better quality PDF you would better use one of following  $\LaTeX$  packages for Type 1 fonts:

```

\usepackage{mathptmx} - Times + Helvetica + Courier + Times Math
\usepackage{mathpazo} - Palatino + Helvetica + Courier + Palatino Math
\usepackage{newcent} - New Century Schoolbook + Avant Garde + Courier
\usepackage{bookman} - Bookman + Avant Garde + Courier

```

`mathptmx` and `mathpazo` replace `times` and `palatino` packages, respectively. Since Helvetica and Avant Garde are slightly bigger than the Times and Palatino, you may also load `\usepackage[scaled=0.92]{helvet}` after `mathptmx` or `mathpazo` packages. These packages, parts of PSNFSS collection, are already included in your  $\LaTeX$  system.

Alternatively you can use `txfonts` for Times text and math or `pxfonts` for Palatino text and math. Math symbols in these packages are more comprehensive than the equivalent PSNFSS collections. If you choose full installation of MiK<sub>T</sub>E<sub>X</sub> 2.2, you are ready to use these beautiful fonts.

## 2 ps2pdf: From PS to PDF

Any output of `dvips` may (in principle) be converted to PDF, using either `ps2pdf` in Ghostscript or Adobe distiller, but the results can be pretty poor if certain simple precautions are omitted especially when you use CM fonts. For the best result from `dvips` use Type1 fonts in L<sup>A</sup>T<sub>E</sub>X and use `dvips -Ppdf -G0 filename`.

If you use distiller, make sure you configure the distiller to the “Subset fonts below 100%” option. This will ensure that only fonts for which 100% of all characters are used in the document are included completely and the distiller will remove font data for all unused characters from your PDF file. This will keep your PDF files small.

Unexpectedly you can also use `hyperref` package (see Section 5). The general form is

```
\documentclass[dvips]{article}
\usepackage[dvips]{graphics,color}
\usepackage[dvips,colorlinks]{hyperref}
```

But in this case you would better to use `dvipdfm` or `pdflatex`.

## 3 dvipdfm: From DVI to PDF

### 3.1 General Usage

To use `dvipdfm` begin your document with

```
\documentclass[dvipdfm]{article}
\usepackage[dvips]{graphicx,color}
\usepackage[dvipdfm,colorlinks]{hyperref}
```

and then type `latex file.tex` (may be several times) and then `dvipdfm file.dvi`. One of the advantages of `dvipdfm` is to internally handle EPS files, so you do not need to convert them to PDF figure files as in pdfL<sup>A</sup>T<sub>E</sub>X.

### 3.2 hyperref Package

By using the `hyperref` package with `dvipdfm` you automatically get PDF files with bookmarks (if you have a table of contents) and cross-references etc. See Section 5.

## 4 pdfL<sup>A</sup>T<sub>E</sub>X: From L<sup>A</sup>T<sub>E</sub>X to PDF

### 4.1 General Usage

To use `pdflatex`, begin your document with



Figure 1: Figure insertion from EPS to PDF conversion using `epstopdf`.

```
\documentclass[pdftex]{article}
\usepackage[dvips]{graphicx,color}
\usepackage[pdftex,colorlinks]{hyperref}
```

and then type `pdflatex file.tex` (may be several times) to produce `file.pdf`.

## 4.2 hyperref Package

By using the `hyperref` package with pdfL<sup>A</sup>T<sub>E</sub>X you automatically get PDF files with bookmarks (if you have a table of contents) and cross-references etc. See Section 5.

## 4.3 Color and Graphics

The standard `color` and `graphicx` packages have pdfT<sub>E</sub>X options too which are activated by adding `pdftex` to the document class options. JPEG, TIFF and PNG graphics inclusion is supported.

To deal with a document that has EPS graphics:

- Use **epstopdf package** to convert EPS docs to PDF docs on demand. It needs to be loaded after `\usepackage[pdftex]{graphicx}`.
- Use the **epstopdf program** manually to convert the EPS figures to PDF figures. Ensure that you don't mention the filename's suffix in the `\includegraphics` commands. Add `pdftex` to the options in the document class line when you run `pdflatex`, remove it when you run `latex`, or
- Use the `unpsfrag` command (available from <http://www.gts.tsc.uvigo.es/~fiz/unpsfrag>) to convert a L<sup>A</sup>T<sub>E</sub>X document that uses the `psfrag` into one that doesn't, thus letting you use `pdflatex`.

Figure 1 is a PDF figure converted from EPS using the `epstopdf` program. There is no need to calculate bounding box information using `ebb.exe`.

## 4.4 PDF Information

Add somewhere near the beginning of a T<sub>E</sub>X or L<sup>A</sup>T<sub>E</sub>X document code like:

```
\special{! [ /Author ()
           /Title ()
           /Keywords ()
           /DOCINFO pdfmark}
```

to store the author, title, and keywords in the PDF file automatically (Note that the pdfmark command is understood only by Adobe distiller). If you are using pdfL<sup>A</sup>T<sub>E</sub>X, you can also include this information into the produced PDF file by adding:

```
\pdfinfo{                               % Info dictionary of PDF output;
                                         % all keys are optional.



    /Author (Han The Thanh)
    /CreationDate (D:20000012000000) % D:YYYYMMDDhhmmss (default: the actual date)
    /ModDate (D:20000012000000)    % ModDate is similar
    /Creator (TeX)                  % default: "TeX"
    /Producer (pdfTeX)              % default: "pdfTeX" + pdftex version
    /Title (example.pdf)             %
    /Subject (Example)              %
    /Keywords (PDF TeX)             %
}
```

A better approach under L<sup>A</sup>T<sub>E</sub>X is to use the hyperref package. See Section 5.

## 4.5 PDF Annotation

[The first three examples in this section is taken from the samplepdf.pdf file in your \texmf\doc\pdfTeX\samplepdf.]

This annotation (only on the screen) is created using the following generic annotation.

```
\pdfannot                               % generic annotation
    width 10cm                            % the dimension of the annotation can be controlled
    height 0cm                             % via <rule spec>; if some of dimensions in
    depth 4cm                              % <rule spec> is not given, the corresponding
                                         % value of the parent box will be used.
{
    %
    /Subtype /Text                         % text  notation
    % /Open true                            % if  then the text annotation will be opened
    /Contents                              % text contents
    (Hello, there! Can you see me? ^_^)
}%
```

To see the content click the right mouse button on this figure. You can also move this text icon using your mouse.

You can also play sound and movie files in your PDF (You need Apple Quick Time Movie Player). See the following example:

```
\leftline{%
\pdfannot width 4in height 0in depth 3in {%
    /Subtype /Movie
```

```

    /Movie << /F (MovieFile.mov) >>}
    An example of movie annotation
}%
\leftline{%
\pdfannot width 0in height 0in depth 0in {%
    /Subtype /Movie
    /Movie << /F (SoundFile.wav) >>}
    Sound can be also embedded using Movie annotation
}%

```

To include AVI files you can use the following command in the preamble:

```

\newcommand{\video}[5]{%
    \vspace{#3}\hspace{#2}{\pdfannot width #4 height #5 depth 0cm {%
    /Subtype /Movie /C [1 0 0] /Border [0 0 3] /Movie
    <> }}}

```

and `\video{g.avi}{4cm}{12cm}{12cm}{12cm}` where the first argument is the name of the file, and the 2nd and 3rd control the location of one corner, and 4th and 5th the width and height of the box. You can control the color of the frame and thickness by modifying `/Border`.

## 5 hyperref Package

By using the `hyperref` package with `dvipdfm` or `pdflatex`, you automatically get PDF files with bookmarks (if you have a table of contents) and cross-references etc.

### 5.1 General Usage

```

\usepackage[dvips or dvipdfm or pdftex]{article}
\usepackage[dvips]{graphicx,color}
\usepackage[dvipdfm or pdftex,colorlinks]{hyperref}
\hypersetup{%
    pdftitle={How to Create PDF from LaTeX},
    pdfauthor={Ki-Joo Kim},
    pdfkeywords={pdf, latex, tex, ps2pdf, dvipdfm, pdflatex},
    bookmarksnumbered,
    pdfstartview={FitH},
    urlcolor=cyan,
}%

```

There is a golden rule that the `hyperref` package should be loaded as the last package, except when using `sidewaysfigures`. Some additional options are:

- `breaklinks=true`: Allows link text to break across lines (default=false).

- `colorlinks=true`: Colors the text of links and anchors. The colors chosen depend on the type of link. At present the only types of link distinguished are citations, page references, URLs, local file references, and other links (default=false).
- `linkcolor=red`: Color for normal internal links.
- `anchorcolor=black`: Color for anchor text.
- `citecolor=green`: Color for bibliographical citations in text.
- `filecolor=magenta`: Color for URLs which open local files.
- `menucolor=red`: Color for Acrobat menu items.
- `pagecolor=red`: Color for links to other pages
- `urlcolor=cyan`: Color for linked URLs.
- `pdfstartview={FitB}`: Set the startup page view.
  - `FitH` : Fit whole width of page
  - `FitV` : Fit whole height of page
  - `FitB` : Fit whole "Bounding Box" page
  - `FitBH`: Fit whole width of "Bounding Box" of page
  - `FitBV`: Fit whole height of "Bounding Box" of page
- `pdfpagescrop={53 486 389 754}`: Tells `hyperref` to leave cropping commands in the DVI and PDF. By cropping you can significantly increase screen display size of PDF.

## 5.2 Bookmark

### 5.2.1 Bookmark Options

The following options (with using `\hypersetup`) affect bookmarks:

- `bookmarks`: Make bookmarks (Default: true). This option cannot be used after package has been loaded.
- `bookmarksnumbered`: Put section numbers in bookmarks (Default: false).
- `bookmarksopen=true`: Open up the bookmark tree (Default: false).
- `bookmarksopenlevel`: Level to which bookmarks are open (Default: `\maxdimen`).
- `bookmarkstype`: To specify which toc file to mimic (Default: toc).
- `pdfpagemode`: How document starts when opened (Default: None):
  - `None`: Neither bookmarks nor thumbnails are visible.
  - `UseOutlines`: Bookmarks are visible.
  - `UseThumbs`: Thumbnails are visible.
  - `FullScreen`: Full-screen mode without bars, outlines, and thumbnails.
- `unicode`: Creating Unicode bookmarks (Default: false). After package has been loaded, it switches between Unicode and PDFDocEncoding.

When creating bookmarks `hyperref` writes them into the file `filename.out`. At the second run the bookmarks are set.

### 5.2.2 How to Add Bookmarks

Starred chapter and section headings are not inserted in the table of contents, and thus nor in the bookmark. For manual addition of bookmark,

```
\pdfbookmark[level]{bookmark text}{anchor name}
```

where level is 0 for chapter, 1 for section, 2 for subsection, and so on. Of course, -1 is for part.

### 5.2.3 Math Titles: • $a^2 + b^2 = c^2$

[This section is taken from [AcroTeX](#).]

Sometimes it is desired to have mathematics in the title of a section. Such a title does not translate to PDFDocEncoding automatically. In this case, use `\texorpdfstring{Body title}{Bookmark title}` to offer alternative for your bookmarks. Here is how the section title is generated:

```
\subsubsection{Math Titles: %
  \texorpdfstring{${\bullet}\ a^2+b^2=c^2$}%
  {\textbullet\ a\textttwosuperior\ + b\textttwosuperior\ = c\textttwosuperior}%
}
```

A complete listing of these text commands can be obtained by  $\LaTeX$ ing the `hyperref.dtx`.

## 5.3 WWW Links

The hyperref package has several ways of defining www links. The command `\url{URL}` can be used to state and link a URL in the text.

```
\url{http://www.ctan.org/}
\url{ftp://ftp.gnu.org/}
\url{mailto:email@email.com}
```

A more sophisticated way of www links provides the command `\href{URL}{text}` where URL is the address and text is the text displayed in the document. For example, [The MikTeX site](#). To include the graphics with a hypertext link, use `\href{URL}{fig filename}`.

The www links in PDF will be in a cyan-colored box (default), but will be changed to magenta texts when the `colorlinks` option is loaded as in this document.

## 5.4 Internal Links

`\hypertarget{target name}{text1}` creates an internal link target while `\hyperlink{target name}{text2}` creates an internal link. You can also link external targets. See the `xr` packages that comes with the hyperref package.<sup>1</sup>

The hyper links in PDF will be in a red-colored box (default), but will be changed to red texts when the `colorlinks` option is loaded as in this document.

## 5.5 Acrobat Reader Menu Control

You can also access the menu of Acrobat Reader by using `\Acrobatmenu{menuoption}{text}`. If you want to see the document information of this PDF, click [here](#).

For more menu options, refer to `Hyper_man.pdf` (by Sebastian Rahtz) in your `\texmf\doc tree`.

<sup>1</sup> $\LaTeX$  also has its own `xr` package. In this case disable this one.



## 5.6 hyperref to Bibliography Entries

The hyperrefs in a PDF file, which point to bib-entries are not correct. Write in latex preamble:

```
\renewenvironment{thebibliography}[1]{%
  \phantomsection
  \addcontentsline{toc}{chapter}{Bibliography}
  \chapter*{\bibname
    \@mkboth{\MakeUppercase\bibname}{\MakeUppercase\bibname}}%
  \list{\@biblabel{\@arabic\c@enumiv}}%
    {\settowidth\labelwidth{\@biblabel{#1}}%
    \leftmargin\labelwidth
    \advance\leftmargin\labelsep
    \@openbib@code
    \usecounter{enumiv}%
    \let\p@enumiv\@empty
    \renewcommand\theenumiv{\@arabic\c@enumiv}}%
  \sloppy
  \clubpenalty4000
  \@clubpenalty \clubpenalty
  \widowpenalty4000%
  \sfcode'\.\@m}
{\def\@noitemerr
  {\@latex@warning{Empty 'thebibliography' environment}}%
  \endlist}
```

## 5.7 hyperref to Index

Write just before you insert lists of indices:

```
\clearpage
\phantomsection
\addcontentsline{toc}{chapter}{Index}
```

It maybe a good idea to write in preamble

```
\providecommand*\phantomsection{}
```

than you do not get an error message when disabling the use of hyperref.

# 6 Additional PDF Topics

## 6.1 PDF Slides

If you want to produce presentations from L<sup>A</sup>T<sub>E</sub>X, the **prospcr** (<http://prospcr.sourceforge.net>) package is useful.

## 6.2 PDF Merge

A good shareware program is PDCAT (<http://www.glance.ch>) for Win32 and Unix systems. PDCAT is a command line tool for concatenating PDF files. It also features a variety of modification or enhancement functions like adding a background or logo to each page of an input file, adding hyper links and bookmarks, and so on.

Another method is to use pdfpages package. For example

```
\usepackage{pdfpages}
...
\includepdf[pages={1-10}, nup=2, scale=1.0]{imsi.pdf}
```

Pages of 1-10 of imsi.pdf is inserted as 2 ups into the current position. But remember that the pdfpages package only works with pdfL<sup>A</sup>T<sub>E</sub>X.

## 6.3 Get “Acrobat Reader” Icon and Link

The following HTML fragment creates a link like this to the appropriate page.

```
<a href="http://www.adobe.com/prodindex/acrobat/readstep.html"
target="_blank"></a>
```

## 6.4 PDF with Java Script – I

```
\documentclass[a4paper]{article}
\pdfobj stream {%
  var d = new Date();
  var d1 = util.scand("mm/dd/yy", "1/22/03");
  if((d1.valueOf() - d.valueOf()) < 0){
    app.alert("Document expired! Please get a new version from Ki-Joo");
  }
  this.gotoNamedDest("page.2");
  this.zoomType = zoomtype.fitP;
} \edef\ExpWarnObj{\the\pdflastobj} \pdfrefobj\ExpWarnObj

\usepackage[pdfstartview={}]{hyperref}
\pdfcatalog{}
  openaction
  user {<< /S /JavaScript /JS \ExpWarnObj\space 0 R >>}

\begin{document}
test\newpage page 2
\end{document}
```

## 6.5 PDF with Java Script – II

Another option is to use `insDLJS` package developed by D.P. Story (developer of `AcroTeX`). This package defines a new environment, `insDLJS`, used for inserting Java Script into a PDF file created from a `LaTeX` source. This package works correctly for users of `pdftex` or `dvipdfm`. For those that use the Acrobat Distiller (specifically, those that use either `dvips` or `dripstone` to produce a postscript file, which is then distilled), you are required to have Acrobat 5.0 (or later).

The following is a quick illustration of the use of the new environment.

```
\documentclass{article}
\usepackage[pdftex]{hyperref}
\usepackage[pdftex]{insdljs}

\newcommand\tugHello{Welcome to TUG 2001!}
\begin{insDLJS}[HelloWorld]{mydljs}{My Private DLJS}
function HelloWorld() { app.alert("\tugHello", 3); }
\end{insDLJS}

\begin{document}
\begin{Form} % needed for \PushButton
\section[Test of the \texttt{insDLJS} Package]
% use built in form button of hyperref
Push \PushButton[name=myButton, onclick={HelloWorld();}]{Button}
\end{Form}
\end{document}
```

## 7 Useful Links

- Effective Scientific Electronic Publishing (<http://www.cl.cam.ac.uk/~mgk25/publ-tips.html>).
- Producing HTML and PDF files with `LaTeX` (<http://www-h.eng.cam.ac.uk/help/tpl/textprocessing/makingWWWdocs.html>).
- Using `LaTeX` to Create Quality PDF Documents over the World Wide Web (<http://www.math.uakron.edu/~dpstory/latex2pdf.html>).
- `AcroTeX` (by D.P.Story) (<http://www.math.uakron.edu/~dpstory/acrotex.html>).

## 8 Note

If you find any errors or have suggestions, please let me know. My personal web page is <http://www.geocities.com/kijoo2000>.