The feynmp-auto package*

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1 The package

This package is just a wrapper around feynmp; it receives exactly the same options as that package and works in exactly the same way, so refer to its documentation for the specific commands and environments. There is just one option specific to feynmp-auto: with

```
\usepackage[force]{feynmp-auto}
```

the checks whether the METAPOST files are not changed from the previous LaTeX run get disabled. This option might come handy when one is switching from feynmp to feynmp-auto or, possibly, for the very final runs where one wants to be *really* sure that everything is updated.

What the present package adds is the automatic call of METAPOST at `\end{fmffile}`, taking advantage of the fact that, starting from TeX Live 2012, METAPOST has been added to the external programs that are available in the *restricted shell escape*, that is, programs that are considered safe and so callable from inside every run of LaTeX (with all available engines).

However the call of METAPOST can be made only when the output file containing the METAPOST code is closed, so two runs of LaTeX are necessary anyway in order to include the graphics. The benefit of using this package is that it's not necessary to go to the shell or to open the output file for compiling it.

With pdfLaTeX or LuaLaTeX the METAPOST run will not be performed if the file hasn't changed from the previous run thanks to the `\pdfmdfivesum` feature available with pdfTeX and emulated for LuaTeX via Heiko Oberdiek's pdftexcmds package. This feature is not available with XeTeX, so when using XeLaTeX the call of METAPOST will be performed at each run.

Finally, we add also the `\DeclareGraphicsRule` commands that are needed for loading the MPS files.

*This document corresponds to feynmp-auto v1.1, dated 2013/05/03.

Notes

Some TEX distributions, notably MiKTEX, may not have enabled METAPOST in the restricted shell, so this package will do no good in this case, but it doesn't harm either. This fact is easily discoverable, because LATEX won't be able to find the compiled MPS files.

Also any TEX Live distribution earlier than the 2012 release won't have METAPOST enabled in the restricted shell escape, so the package won't work.

In both the above cases, adding the `-shell-escape` option to the call of the LATEX run is sufficient (but beware for security risks and run with the option only files from safe sources). The `-shell-escape` used to be called `-enable-write18` in older versions of MiKTEX, but newer versions (the 2.9 in particular) understand both.

The package will emit a warning if shell escape is not enabled, which may happen if the call of the engine has the option `-no-shell-escape` (possibly via the front-end settings).

2 Implementation

The usual presentation, that we repeat here for completeness.

```
\ProvidesFile{feynmp-auto.dtx}
\NeedsTeXFormat{LaTeX2e}[2008/04/05]
\ProvidesPackage{feynmp-auto}
  [2013/03/12 v1.0 Automatic processing of feynmp graphics]
```

Now the real macros. First of all we check that the typesetting engine is sufficiently recent to include ε-TEX extensions.

```
\@ifundefined{eTeXversion}
  {\PackageError{feynmp-auto}{LaTeX engine too old, aborting}
   {Please upgrade your TeX system}\@@end}{}
```

2.1 Options

All options are passed to feynmp

```
\newif\iffnmpa@force
\DeclareOption{force}{\fnmpa@forcetrue}
\DeclareOption*{\PassOptionsToPackage{\CurrentOption}{feynmp}}
\ProcessOptions\relax
```

2.2 Required packages and preliminary code

```
\RequirePackage{feynmp}
\RequirePackage{ifpdf,ifxetex}
\RequirePackage{pdftexcmds}
\ifnum\pdf@shellescape=\z@
  \PackageWarningNoLine{feynmp-auto}
```

```
    {The automatic feature can't be used\MessageBreak
     because 'shell escape' is disabled}
\fi
\ifpdf
  \DeclareGraphicsRule{*}{mps}{*}{}
\fi
\ifxetex
  \DeclareGraphicsRule{*}{eps}{*}{}
\fi
```

2.3 Avoiding useless runs

With the `pdfmdfivesum` feature, we can spare useless runs of METAPOST. Its presence is controlled by checking if `\pdf@filemdfivesum` has been defined by pdftexcmds.

```
\ifdefined\pdf@filemdfivesum
```

In this case we define a default value for `fnmpa@mdfivesum` and three macros for doing comparison. If the METAPOST file doesn't exist in the first place, we'll simply run METAPOST when `\end{fmffile}` is scanned. Otherwise we store in `fnmpa@mdfivesum` the MD-5 hash of the file for later comparison.

```
  \def\fnmpa@mdfivesum{0}
  \def\fnmpa@gethash{%
    \IfFileExists{\thefmffile.mp}
      {\edef\fnmpa@mdfivesum{\pdf@filemdfivesum{\thefmffile.mp}}}
      {}%
  }
  \def\fnmpa@processmp{%
    \IfFileExists{\thefmffile.mp}
      {\fnmpa@compare}
      {}%
  }
  \def\fnmpa@compare{%
    \ifnum\pdf@strcmp{\fnmpa@mdfivesum}{\pdf@filemdfivesum{\thefmffile.mp}}=\z@
      % do nothing, the files is unmodified
    \else
      \immediate\write18{mpost \thefmffile}%
    \fi
  }
```

If the MD-5 feature is not available (that is, with XeLaTeX), we don't set up any check.

```
\else
  \let\fnmpa@gethash\relax
  \def\fnmpa@processmp{%
    \IfFileExists{\thefmffile.mp}{\immediate\write18{mpost \thefmffile}}{}%
  }
\fi
```

If the `force` option has been given, then we override in the same way the macros. A bit of code duplication, but this avoids complicated conditional nestings.

```
\iffnmpa@force
  \let\fnmpa@gethash\relax
  \def\fnmpa@processmp{%
    \IfFileExists{\thefmffile.mp}{\immediate\write18{mpost \thefmffile}}{}%
  }
\fi
```

Patching the macros of **feynmp**

We finally need to inject the code in the macros responsible for the `fmffile` environment. In `\fmffile` we add the checks for the MD-5 sums:

```
\def\fmffile#1{%
  \def\thefmffile{#1}%
  \equaltojobname{\thefmffile}{%
    \PackageError{feynmp}
      {The argument of \fmffile MUST NOT be identical\MessageBreak
       to the name of your main input file!  I will use fmfdefault.mf\MessageBreak
       this time around, but you'd better fix your code now!}%
      {Invalid argument to \string\fmffile!}%
    \def\thefmffile{fmfdefault}}{}%
  \if@fmfio
    \fnmpa@gethash % Added
    \@ifundefined{ifmeasuring@}%
      {}%
      {\def\if@fmfio{\ifmeasuring@\else}}%
    \immediate\openout\@outfmf=\thefmffile.mp\relax
    \fmfcmd{\p@rcent\space \thefmffile.mp -- do not edit, %
            generated automatically by \jobname.tex^^J%
            input feynmp^^J%
            require_RCS_revision "\fmf@revision";}%
  \fi
  \setcounter{fmfgraph}{0}}
```

In `\endfmffile` we add the processing of the METAPOST file:

```
\def\endfmffile{%
  \fmfcmd{\p@rcent\space the end.^^J%
          end.^^J%
          endinput;}%
  \if@fmfio
    \immediate\closeout\@outfmf
  \fi
  \fnmpa@processmp % Added
  \let\thefmffile\relax
}
```

Change History

v1.0

General: Initial version 1

v1.1

General: Added 'force' option 1

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Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; numbers in roman refer to the code lines where the entry is used.