

The mpgraphics Package

<http://bitbucket.org/vafa/mpgraphics>

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Abstract

It is not possible to include MetaPost graphics directly into your \LaTeX documents; you have got to process your MetaPost code first with MetaPost and then include the images in your \LaTeX document. This is difficult and time consuming and the situation even becomes worsen when you have many MetaPost graphics.

The `mpgraphics` package allows you to have all your MetaPost codes directly into your \LaTeX document and if you run \LaTeX , or \PDF\LaTeX , or \Xe\LaTeX with the `-shell-escape` option only once, then you can see your MetaPost graphics in your \LaTeX output.

This package works with \PDF\LaTeX (both PDF and DVI modes) and \Xe\LaTeX formats.

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1 Dedication

We dedicate the `mpgraphics` package to the **Iranian mathematician, Jamshid Kashani**. Al-Kashi was one of the best mathematicians in the Islamic world. He was born in 1380,

in Kashan, in central Iran. This region was controlled by Tamurlane, better known as Timur, who was more interested in invading other areas than taking care of what he had. Due to this, al-Kashi lived in poverty during his childhood and the beginning years of his adulthood.

The situation changed for the better when Timur died in 1405, and his son, Shah Rokh, ascended into power. Shah Rokh and his wife, Goharshad, a Persian princess, were very interested in the sciences, and they encouraged their court to study the various fields in great depth. Their son, Ulugh Beg, was enthusiastic about science as well, and made some noted contributions in mathematics and astronomy himself. Consequently, the period of their power became one of many scholarly accomplishments. This was the perfect environment for al-Kashi to begin his career as one of the world's greatest mathematicians.



Figure 1: Ghyath al-Din Jamshid Kashani

Eight years after he came into power in 1409, Ulugh Beg founded an institute in Samarkand which soon became a prominent university. Students from all over the Middle East, and beyond, flocked to this academy in the capital city of Ulugh Beg's empire. Consequently, Ulugh Beg harvested many great mathematicians and scientists of the Muslim world. In 1414, al-Kashi took this opportunity to contribute vast amounts of knowledge to his people. His best work was done in the court of Ulugh Beg, and it is said that he was the king's favourite student.

Al-Kashi was still working on his book, called "Risala al-watar wa'l-jaib" meaning "The Treatise on the Chord and Sine", when he died in 1429. Some scholars believe that Ulugh Beg may have ordered his murder, while others say he died a natural death. The details are unclear.

2 Requirements

- ☞ A web2c $\text{T}_\text{E}\text{X}$ implementation such as $\text{T}_\text{E}\text{XLive}$ or $\text{MiK}_\text{T}_\text{E}\text{X}$ is needed; the package does not work with commercial $\text{T}_\text{E}\text{X}$ implementations such as $\text{PCT}_\text{E}\text{X}$.
- ☞ $\text{L}_\text{A}\text{T}_\text{E}\text{X}$, or $\text{PDFL}_\text{A}\text{T}_\text{E}\text{X}$, or $\text{X}_\text{L}_\text{A}\text{T}_\text{E}\text{X}$ (depending on which one you use) must be called with the `-shell-escape` option.

- ☞ A recent and working version of `epstopdf` program (available in \TeX Live and MiK \TeX) is needed.
- ☞ A recent version of `color`, `graphicx`, `ifpdf`, `ifplatform`, `iftex`, `moreverb`, and `xkeyval` packages are required.

3 Basic Usage

3.1 Placing MetaPost graphics at the center

```
\begin{mpdisplay}
<MetaPost codes between beginfig(); and endfig;>
\end{mpdisplay}
```

- ☞ `mpdisplay` environment places MetaPost graphics in display mode (at the center).

If your MetaPost code is something like this:

```
1 beginfig(1);
2 u=1cm;
3 draw (2u,2u)--(0,0)--(0,3u)--(3u,0)--(0,0);
4 pickup pencircle scaled 4pt;
5 for i=0 upto 2:
6 for j=0 upto 2: drawdot (i*u,j*u); endfor
7 endfor
8 endfig;
9 end;
```

Example 1: MetaPost code

Then the equivalent \LaTeX document should be like this:

```
1 \documentclass{article}
2 \usepackage{mpgraphics}
3 \begin{document}
4 \begin{mpdisplay}
5 u=1cm;
6 draw (2u,2u)--(0,0)--(0,3u)--(3u,0)--(0,0);
7 pickup pencircle scaled 4pt;
8 for i=0 upto 2:
9 for j=0 upto 2: drawdot (i*u,j*u); endfor
10 endfor
11 \end{mpdisplay}
12 \end{document}
```

3.2 Placing MetaPost graphics in inline mode

```
\begin{mpinline}  
<MetaPost codes between beginfig() and endfig;>  
\end{mpinline}
```

☞ `mpinline` environment places MetaPost graphics in inline mode (just like inline maths).

If your MetaPost code is something like this:

```
1 beginfig(2);  
2 draw (20,20)--(0,0)--(0,30)--(30,0)--(0,0);  
3 endfig;  
4 end;
```

Example 2: MetaPost code

Then the equivalent \LaTeX document should be like this:

```
1 \documentclass{article}  
2 \usepackage{mpgraphics}  
3 \begin{document}  
4 \begin{mpinline}  
5 draw (20,20)--(0,0)--(0,30)--(30,0)--(0,0)  
6 \end{mpinline}  
7 \end{document}
```

4 Your Global MetaPost definitions and inputs

```
\begin{mpdefs}  
<your global MetaPost definitions and inputs>  
\end{mpdefs}
```

☞ You can put your global MetaPost definitions and inputs inside `mpdefs` environment.

If your MetaPost code is something like this:

```
1 input metaobj  
2 defaultfont:="ptmr8r";  
3 warningcheck:=0;  
4 beginfig(1)  
5 newDEllipse.a(btex some text etex);  
6 scaleObj(a,1.7);  
7 rotateObj(a,45);  
8 a.c=origin;  
9 drawObj(a);
```

```
10 endfig;  
11 end;
```


Example 3: MetaPost code

Then the equivalent \LaTeX document should be like this:

```
1 \documentclass{article}  
2 \usepackage{mpgraphics}  
3 \begin{document}  
4 \begin{mpdefs}  
5 input metaobj  
6 defaultfont:="ptmr8r";  
7 warningcheck:=0;  
8 \end{mpdefs}  
9 \begin{mpdisplay}  
10 newDEllipse.a(btex some text etex);  
11 scaleObj(a,1.7);  
12 rotateObj(a,45);  
13 a.c=origin;  
14 drawObj(a);  
15 \end{mpdisplay}  
16 \end{document}
```

5 Your \LaTeX packages and macros used within MetaPost graphics

```
\begin{ltxpreamble}  
<Your  $\text{\LaTeX}$  packages and macros used within MetaPost graphics>  
\end{ltxpreamble}
```

 You can put your \LaTeX packages and macros that needs to be used within MetaPost graphics, in `ltxpreamble` environment.

If you want to use the previous MetaPost code but you want that your labels to be typeset with fonts from `fourier` package, then your \LaTeX document should look like this:

```
1 \documentclass{article}  
2 \usepackage{mpgraphics}  
3 \begin{document}  
4 \begin{mpdefs}  
5 input metaobj  
6 defaultfont:="ptmr8r";  
7 warningcheck:=0;  
8 \end{mpdefs}  
9 \begin{ltxpreamble}  
10 \usepackage{fourier}  
11 \end{ltxpreamble}
```

```

12 \begin{mpdisplay}
13 newDEllipse.a(btex some text etex);
14 scaleObj(a,1.7);
15 rotateObj(a,45);
16 a.c=origin;
17 drawObj(a);
18 \end{mpdisplay}
19 \end{document}

```

6 Options of the package and few related commands

There are four options:

`epstopdf={options}` : Options can be appended to the `epstopdf` program if you wish¹. For example, to run `epstopdf` auxiliary compilation with debugging information written to the console, use the following package option:

```
\usepackage [epstopdf={-debug}] {mpgraphics}
```

By default, no option is appended to the `epstopdf` program.

`compilation=(on/off)` : After your MetaPost figures have been generated and you no longer wish to re-generate your MetaPost figures, the package can be given the `compilation=off` option to save compilation time:

```
\usepackage [compilation=off] {mpgraphics}
```

By default, `compilation=on`. Also the following two commands are provided:

```
\mpgOff   \mpgOn
```

☞ `\mpgOff` turns off compilation.

☞ `\mpgOn` turn on compilation.

A command `\NoProcess` is also available to facilitate suppressing of pdf/eps generation of those figures whose pdf/eps's are already available. This might prove helpful when you have more figures to process and many of them are perfected and don't need recompilation and translation everytime you run \LaTeX . The usage is:

¹See options of `epstopdf` program.

```
\NoProcess [comma separated and/or hyphen separated ranges]
```

For example, If you have ten figures and if you want to suppress the processing of the figure numbers 1, 2, 4 to 8 you can issue the command at the top of the document as:

```
\NoProcess [1,2,4-8]
```

metapost={*options*} : The MetaPost auxiliary compilation has some hard-coded options (`-tex=latex`, `-jobname="\mpgfigname"`, and `-interaction=batchmode`), and further options can be appended if you wish². For example, to run MetaPost auxiliary compilation with more information written to the console, use the following package option:

```
\usepackage [metapost={-interaction=nonstopmode}] {mpgraphics}
```

runs={*positive integer*} : Sometimes with some MetaPost macros such as `makecirc`, you find that you need to run MetaPost more than once. The exact number will vary by exact application, and must be set explicitly. For example if you want to run MetaPost twice, then You can have:

```
\usepackage [runs=2] {mpgraphics}
```

By default MetaPost runs only once so we have **runs=1** by default.

7 Controlling different aspects of MetaPost graphics

There are few hooks to control different aspects of MetaPost graphics:

```
\configure [mpggraphic] [width=2in]
\configure [mpggraphic] [height=3in]
\configure [mpggraphic] [width=2in,height=3in]
\configure [mpggraphic] [scale=.5]
\configure [mpggraphic] [linecolor=red]
\configure [mpggraphic] [linewidth=1pt]
\configure [mpggraphic] [background=green]
\configure [mpggraphic] [rulesep=6pt]
```

The functionality is same as the `width`, `height` and `scale` options as in the `\includegraphics` command. But the graphic will be restricted to aspect ratio. `linecolor`, `linewidth`, `rulesep` and `background` corresponds to the box surrounding the graphic. The default values are `white`, `Opt`, `Opt` and `white` respectively.

²See page 89 of MetaPost manual.

8 Acknowledgements

Many thanks to the authors of `pdftricks` (Radhakrishnan CV, Rajagopal CV, and Antoine Chambert-Loir) and `auto-pst-pdf` (Will Robertson and Johannes Große) packages. This package could not exist without their combined efforts over many years as `mpgraphics` package borrows some ideas from `pdftricks` and `auto-pst-pdf` packages.

Enrico Gregorio deserves special mention for his wonderful suggestions and contributions which improved this package a lot.

Finally, I wish to thank John D. Hobby, Taco Hoekwater, and other MetaPost developers for developing MetaPost.

9 `mpgraphics` implementation

```
1 \NeedsTeXFormat{LaTeX2e}
2 \newcommand{\mpgraphics@date}{2011/07/25}
3 \newcommand{\mpgraphics@version}{v0.1}
4 \newcommand{\mpgraphics@commit}{commit 6}
5 \ProvidesPackage{mpgraphics}[\mpgraphics@date\space \mpgraphics@version\space <\mpgraphics@commi
6 inline and display metapost figures in LaTeX}
7 \newcommand{\mpg@graphicsextension}{\ifPDFTeX\ifpdf pdf\else eps\fi\else\ifXeTeX pdf\fi\fi}
8 \newcommand{\mpg@graphicsformatname}{\ifPDFTeX\ifpdf PDF\else EPS\fi\else\ifXeTeX PDF\fi\fi}
9 \newcommand{\mpg@formatname}{\ifPDFTeX\ifpdf pdflatex\else latex\fi\else\ifXeTeX xelatex\fi\fi}
10 \RequirePackage{graphicx,color,moreverb,xkeyval,ifplatform,iftex,ifpdf}
11 \newif\if@mpg@debug\@mpg@debugfalse
12 \expandafter\newif\csname if@mpg@no@\mpg@graphicsextension\endcsname
13 \newif\if@mpg@noprocess \@mpg@noprocessfalse
14 \newif\if@mpg@On
15 \DeclareOptionX{metapost}{%
16   \def\mpg@metapost@opts{%
17     -tex=latex
18     -jobname="\mpgfigname"
19     -interaction=batchmode
20     #1}}
21 \DeclareOptionX{epstopdf}{\def\mpg@epstopdf@opts{#1}}
22 \define@choicekey{mpgraphics.sty}{compilation}[\@tempa\@tempb]{on,off}{%
23   \ifcase\@tempb\relax
24     \@mpg@Ontrue
25   \or
26     \@mpg@Onfalse
27   \fi}
28 \define@choicekey{mpgraphics.sty}{debug}[\@tempa\@tempb]{on,off}{%
29   \ifcase\@tempb\relax
30     \@mpg@debugtrue
31   \or
32     \@mpg@debugfalse
33   \fi}
34 \newcounter{mpg@runs}
35 \DeclareOptionX{runs}{%
```



```

36 \setcounter{mpg@runs}{#1}% support calc
37 \ifnum\c@mpg@runs > \z@
38 \else
39   \mpg@PackageWarning{The number of runs must be at least one.}%
40   \c@mpg@runs\@ne
41 \fi}
42 \newcommand{\mpgOff}{\@mpg@Onfalse}
43 \newcommand{\mpgOn}{\@mpg@Ontrue}
44 \ExecuteOptionsX{%
45   metapost={},%
46   epstopdf={},%
47   compilation=on,%
48   debug=off,%
49   runs=1%
50 }
51 \ProcessOptionsX
52 \def\mpg@exe{\immediate\write18}
53 \def\OnlyIfFileExists#1#2{\IfFileExists{#1}{#2}{}}
54 \def\NotIfFileExists#1#2{\IfFileExists{#1}{}{#2}}
55 \def\mpg@convert#1#2#3{%
56   \OnlyIfFileExists{#2}{%
57     \mpg@exe{\csname mpg@cmd@#1\endcsname{#2}{#3}}%
58     \NotIfFileExists{#3}{\mpg@Warning{Creation of #3 failed.}}}
59 \def\mpg@cmd@metapost#1#2{mpost \mpg@metapost@opts\space
60   "\unexpanded{\input} #1"}
61 \def\mpg@cmd@extrametapost#1#2{mpost \mpg@metapost@opts\space
62   "\unexpanded{\input} #1"}
63 \def\mpg@cmd@epstopdf#1#2{epstopdf \mpg@epstopdf@opts\space -o "#2" "#1"}
64 \def\mpg@nl{^^J\space\space\space\space}
65 \newcommand\mpg@PackageError[2]{%
66   \PackageError{mpgraphics}{\mpg@nl #1^^J}{#2}}
67 \newcommand\mpg@Warning[2]{\if@mpg@debug\PackageWarning{#1}{#2}\fi}
68 \newcommand\mpg@PackageWarning[1]{%
69   \PackageWarning{mpgraphics}{\mpg@nl #1^^JThis warning occurred}}
70 \newcommand\mpg@WarningNoLine[2]{\if@mpg@debug\PackageWarningNoLine{#1}{#2}\fi}
71 \ifshellescape
72   \PackageWarningNoLine{mpgraphics}
73   {*****\MessageBreak
74     Using \csname write\endcsname18 capability \MessageBreak
75     for producing \mpg@graphicsformatname-figures. \MessageBreak
76     *****}
77 \else
78   \mpg@PackageError{%
79     "shell escape" (or "write18") is not enabled;\mpg@nl
80     mpgraphics will not work!}
81   {You need to run "\mpg@formatname\space -shell-escape"\mpg@nl
82     on your LaTeX document Or turn compilation off}
83 \fi
84 \newenvironment{mpdefs}{\MPDEFsverbatimwrite{mpdefs.mp}}
85   {\endMPDEFsverbatimwrite}

```

```

86 \newenvironment{ltxpreamble}{\verbatimwrite{ltxpreamble.ltx}}
87   {\endverbatimwrite}
88 \newcommand{\mpgfigname}{\jobname-fig\thempgfig}
89 \def\MPGverbatimwrite#1{%
90   \@bsphack
91   \immediate\openout \verbatim@out #1
92   \BeforeMPGStream%
93   \let\do\@makeother\dospecials
94   \catcode\^^M\active \catcode\^^I=12
95   \def\verbatim@processline{%
96     \immediate\write\verbatim@out
97       {\the\verbatim@line}}%
98   \verbatim@start}
99 \def\endMPGverbatimwrite{%
100  \immediate\write\verbatim@out{endfig;}
101  \immediate\write\verbatim@out{end;}
102  \immediate\closeout\verbatim@out
103  \@esphack}
104 \def\MPDEFSverbatimwrite#1{%
105   \@bsphack
106   \immediate\openout \verbatim@out #1
107   \BeforeMPDEFSStream%
108   \let\do\@makeother\dospecials
109   \catcode\^^M\active \catcode\^^I=12
110   \def\verbatim@processline{%
111     \immediate\write\verbatim@out
112       {\the\verbatim@line}}%
113   \verbatim@start}
114 \def\endMPDEFSverbatimwrite{%
115  \immediate\closeout\verbatim@out
116  \@esphack}
117 \def\BeforeMPGStream
118   {\message{Opening MPGStream=\mpgfigname.mp}%
119   \ifPDFTeX\ifpdf%
120     \immediate\write\verbatim@out{prologues:=3;} \else
121     \immediate\write\verbatim@out{prologues:=2;} \fi \else \ifXeTeX
122     \immediate\write\verbatim@out{prologues:=3;} \fi \fi
123     \immediate\write\verbatim@out{outputtemplate:= "\@percentchar j.eps";}
124     \immediate\write\verbatim@out{verbatimtex}
125     \immediate\write\verbatim@out{\string\documentclass{article}}
126     \IfFileExists{ltxpreamble.ltx}{\immediate\write\verbatim@out{\string\input{ltxpreamble.ltx}}.
127     \immediate\write\verbatim@out{\string\begin{document}}
128     \immediate\write\verbatim@out{etex;}
129     \IfFileExists{mpdefs.mp}{\immediate\write\verbatim@out{input mpdefs;}}{}
130     \immediate\write\verbatim@out{beginfig(\thempgfig);}
131   }
132 \def\BeforeMPDEFSStream
133   {\message{Opening MPGStream=mpdefs.mp}%
134   \immediate\write\verbatim@out{verbatimtex}
135   \immediate\write\verbatim@out{\string\documentclass{article}}

```

```

136 \IfFileExists{ltxpreamble.ltx}{\immediate\write\verbatim@out{\string\input{ltxpreamble.ltx}};
137 \immediate\write\verbatim@out{\string\begin{document}}
138 \immediate\write\verbatim@out{etex;}
139 }
140 \newenvironment{mpdisplay}{\stepcounter{mpgfig}%
141 \xdef\MPGCutFile{\mpgfigname.mp}
142 \MPGverbatimwrite{\MPGCutFile}}
143 {\endMPGverbatimwrite%
144 \MPGgraphicsinclude%
145 \global\@mpg@noprocessfalse\noindent}
146 \newenvironment{mpinline}{\stepcounter{mpgfig}%
147 \xdef\MPGCutFile{\mpgfigname.mp}
148 \MPGverbatimwrite{\MPGCutFile}}
149 {\endMPGverbatimwrite%
150 \MPGinlinegraphicsinclude%
151 \global\@mpg@noprocessfalse\noindent}
152 \AtEndDocument{\endMPGhook%
153 \csname if@mpg@no@\mpg@graphicsextension\endcsname
154 \PackageWarningNoLine{mpgraphics}
155 {*****\MessageBreak
156 Some \mpg@graphicsformatname\space files of images were not found.\MessageBreak
157 *****}
158 \fi
159 }
160 \gdef\endMPGhook{}
161 \newcommand{\mpgnoprocess}{\global\@mpg@noprocesstrue
162 \PackageWarning{mpgraphics}
163 {*****\MessageBreak
164 Figure Number: \mpgfigname\space is not processed \MessageBreak
165 *****\MessageBreak}
166 }
167 \newcounter{mpgfig}
168 \newif\if@mpgGINwidth
169 \newif\if@mpgGINheight
170 \newif\if@mpgGINscale
171 \long\gdef\MPGgraphicsProcess{%
172 \@ifundefined{Fig\thempgfig}
173 {\mpg@WarningNoLine{mpgraphics}
174 {*****\MessageBreak
175 ***** Processing Fig: \thempgfig\space*****\MessageBreak
176 *****}
177 }
178 {\mpgnoprocess}
179 \ifshellescape\if@mpg@noprocess\relax\else\if@mpg@On
180 \IfFileExists{\mpgfigname.mp}{%
181 \loop\ifnum\c@mpg@runs > \@ne
182 \mpg@convert{extrametapost}{\mpgfigname.mp}{\mpgfigname.eps}%
183 \advance\c@mpg@runs\m@ne
184 \repeat
185 \mpg@convert{metapost}{\mpgfigname.mp}{\mpgfigname.eps}%

```

```

186 \mpg@WarningNoLine{mpgraphics}
187   {*****\MessageBreak
188     \mpgfigname.mp converted to \mpgfigname.eps\MessageBreak
189     *****}
190   }{}
191   \IfFileExists{\mpgfigname.eps}{%
192     \ifPDFTeX\ifpdf%
193     \mpg@convert{epstopdf}{\mpgfigname.eps}{\mpgfigname.pdf}%
194     \mpg@WarningNoLine{mpgraphics}
195     {*****\MessageBreak
196       \mpgfigname.eps converted to \mpgfigname.pdf\MessageBreak
197       *****}\else\fi\else\ifXeTeX%
198     \mpg@convert{epstopdf}{\mpgfigname.eps}{\mpgfigname.pdf}%
199     \mpg@WarningNoLine{mpgraphics}
200     {*****\MessageBreak
201       \mpgfigname.eps converted to \mpgfigname.pdf\MessageBreak
202       *****}\fi\fi
203   }{%
204     \mpg@PackageError{%
205       metapost encountered error(s) while compiling your\mpg@nl
206       metapost code and so it did not produce the figure!}
207     {Fix your metapost code, delete all metapost and\mpg@nl
208     LaTeX auxillary files and then run "\mpg@formatname\space -shell-escape"\mpg@nl
209     on your document again}
210   }\else\fi
211     \ifwindows%
212     \IfFileExists{\mpgfigname.log}{\immediate\write18{del \mpgfigname.log}}{}%
213     \IfFileExists{\mpgfigname.mp}{\immediate\write18{del \mpgfigname.mp}}{}%
214     \ifPDFTeX\ifpdf%
215     \IfFileExists{\mpgfigname.eps}{\immediate\write18{del \mpgfigname.eps}}{\else\fi\else\ifXeTeX%
216     \IfFileExists{\mpgfigname.eps}{\immediate\write18{del \mpgfigname.eps}}{\fi\fi%
217     \IfFileExists{\mpgfigname.mpx}{\immediate\write18{del \mpgfigname.mpx}}{}%
218     \IfFileExists{texnum.mpx}{\immediate\write18{del texnum.mpx}}{}%
219     \IfFileExists{makempx.log}{\immediate\write18{del makempx.log}}{}%
220     \IfFileExists{mpxerr.log}{\immediate\write18{del mpxerr.log}}{}%
221     \IfFileExists{mpxerr.tex}{\immediate\write18{del mpxerr.tex}}{}%
222     \else
223     \IfFileExists{\mpgfigname.log}{\immediate\write18{rm \mpgfigname.log}}{}%
224     \IfFileExists{\mpgfigname.mp}{\immediate\write18{rm \mpgfigname.mp}}{}%
225     \ifPDFTeX\ifpdf%
226     \IfFileExists{\mpgfigname.eps}{\immediate\write18{rm \mpgfigname.eps}}{\else\fi\else\ifXeTeX%
227     \IfFileExists{\mpgfigname.eps}{\immediate\write18{rm \mpgfigname.eps}}{\fi\fi%
228     \IfFileExists{\mpgfigname.mpx}{\immediate\write18{rm \mpgfigname.mpx}}{}%
229     \IfFileExists{texnum.mpx}{\immediate\write18{rm texnum.mpx}}{}%
230     \IfFileExists{makempx.log}{\immediate\write18{rm makempx.log}}{}%
231     \IfFileExists{mpxerr.log}{\immediate\write18{rm mpxerr.log}}{}%
232     \IfFileExists{mpxerr.tex}{\immediate\write18{rm mpxerr.tex}}{}%
233     \fi\fi
234     \fi
235 }

```

```

236 \long\gdef\MPGgraphicsinclude{\MPGgraphicsProcess%
237 \IfFileExists{\mpgfigname.\mpg@graphicsextension}%
238   {\begin{center}
239     \bgroup\fbboxsep\@MPGboxsep\fbboxrule\@MPGboxrule%
240     \color{\@MPGgraphiccolor}%
241     \fcolorbox{\@MPGgraphiclinecolor}{\@MPGgraphicbackground}%
242     {\if@mpgGINwidth%
243     \includegraphics[width=\@MPGgraphicwidth]{\mpgfigname.\mpg@graphicsextension}\else%
244     \if@mpgGINheight%
245     \includegraphics[height=\@MPGgraphicheight]{\mpgfigname.\mpg@graphicsextension}\else%
246     \if@mpgGINscale%
247     \includegraphics[scale=\@MPGgraphicscale]{\mpgfigname.\mpg@graphicsextension}\else%
248     \includegraphics{\mpgfigname.\mpg@graphicsextension}\fi\fi\fi%
249     }\egroup\end{center}%
250     \global\@mpgGINwidthfalse\let\@MPGgraphicwidth\relax
251     \global\@mpgGINheightfalse\let\@MPGgraphicheight\relax
252     \global\@mpgGINscalefalse\let\@MPGgraphicscale\relax
253     }\csname @mpg@no@\mpg@graphicsextension true\endcsname}
254 \gdef\@MPGgraphiclinecolor{white}
255 \gdef\@MPGgraphicbackground{white}
256 \gdef\@MPGboxsep{0pt}
257 \gdef\@MPGboxrule{0pt}
258 }
259 \long\gdef\MPGinlinegraphicsinclude{%
260 \MPGgraphicsProcess%
261 \IfFileExists{\mpgfigname.\mpg@graphicsextension}%
262   {\bgroup\fbboxruleOpt%
263   \normalcolor\fbbox{\includegraphics{\mpgfigname.\mpg@graphicsextension}}%
264   \egroup}%
265   {\csname @mpg@no@\mpg@graphicsextension true\endcsname}%
266 }
267 \def\configure[#1][#2]{\setkeys{#1}{#2}
268 \mpg@Warning{mpgraphics}{Reconfigured #1 parameter(s)\MessageBreak
269 #2\MessageBreak}}
270 \define@key{mpggraphic}{width} {\gdef\@MPGgraphicwidth{#1}%
271 \global\@mpgGINwidthtrue}
272 \define@key{mpggraphic}{height} {\gdef\@MPGgraphicheight{#1}%
273 \global\@mpgGINheighttrue}
274 \define@key{mpggraphic}{scale} {\gdef\@MPGgraphicscale{#1}%
275 \global\@mpgGINscaletrue}
276 \define@key{mpggraphic}{color} {\gdef\@MPGgraphiccolor{#1}}
277 \define@key{mpggraphic}{linecolor} {\gdef\@MPGgraphiclinecolor{#1}}
278 \define@key{mpggraphic}{background} {\gdef\@MPGgraphicbackground{#1}}
279 \define@key{mpggraphic}{linewidth} {\gdef\@MPGboxrule{#1}}
280 \define@key{mpggraphic}{rulesep} {\gdef\@MPGboxsep{#1}}
281 \gdef\@MPGgraphiccolor{black}
282 \gdef\@MPGgraphiclinecolor{white}
283 \gdef\@MPGgraphicbackground{white}
284 \gdef\@MPGboxrule{0pt}
285 \gdef\@MPGboxsep{0pt}

```

```

286 \@ifundefined{c@arraylength}{\newcounter{arraylength}}{}%
287 \@ifundefined{c@ArrayIndex}{\newcounter{ArrayIndex}}{}%
288 \@ifundefined{c@zeroCtr}{\newcounter{zeroCtr}}{}%
289 \@ifundefined{c@recordCtr}{\newcounter{recordCtr}}{}
290 \setcounter{recordCtr}{1}
291 \@ifundefined{c@Ctr}{\newcounter{Ctr}}{}
292 \def\DeclareArray#1{\Array{#1}[0]}%
293 \def\Array#1[#2]#3{%
294     \expandafter\gdef\csname #1#2\endcsname{#3}%
295     \expandafter\gdef\csname #1\endcsname[##1]{\csname #1##1\endcsname}}%
296 \def\getArraylength#1{\setcounter{arraylength}{0}%
297     \loop\expandafter\ifx\csname #1\thearraylength\endcsname\relax%
298     \else\stepcounter{arraylength}\repeat}%
299 \def\addToArray#1#2{\setcounter{arraylength}{0}%
300     \loop\expandafter\ifx\csname #1\thearraylength\endcsname\relax%
301     \else\stepcounter{arraylength}\repeat%
302     \Array{#1}[\thearraylength]{#2}}%
303 \def\clearArray#1{\getArraylength{#1}%
304     \loop\ifnum\c@arraylength >0%
305     \global\expandafter\let\csname #1\thearraylength\endcsname\relax%
306     \addtocounter{arraylength}{-1}\repeat}%
307 \long\def\ArrayIterator#1#2{%
308     \setcounter{ArrayIndex}{1}\getArraylength{#1}%
309     \setcounter{zeroCtr}{\c@arraylength}%
310     \loop\ifnum\c@ArrayIndex<\c@zeroCtr{#2}%
311     \stepcounter{ArrayIndex}\repeat%
312 }%
313 \def\@nnil{\@nil}
314 \def\@empty{}
315 \def\@cvrstop#1\@#2{}
316 \long\def\cvr@delimfor#1#2#3{\DeclareArray{#1}\clearArray{#1}%
317     \long\def\@icvrloop##1#2##2\@##3{\def##3{##1}\ifx ##3\@nnil%
318     \expandafter\@cvrstop \else\addToArray{#1}{##1}%
319     \relax\expandafter\@icvrloop\fi##2\@##3}%
320     \long\def\@cvrloop##1#2##2#3\@##4{\addToArray{#1}{##1}%
321     \def##4{##1}\ifx ##4\@nnil \else%
322     \def##4{##2}\def\y@y{##2}\ifx\y@y\@nnil\else%
323     \addToArray{#1}{##2}\fi\ifx ##4\@nnil \else%
324     \@icvrloop ##3\@##4\fi\fi}%
325     \expandafter\def\expandafter\@fortmp\expandafter{#3}%
326     \ifx\@fortmp\@empty \else%
327     \expandafter\@cvrloop#3#2\@nil#2\@nil\@##4\fi}%
328 \@ifundefined{c@f@irstCtr}{\newcounter{f@irstCtr}}{}%
329 \@ifundefined{c@s@econdCtr}{\newcounter{s@econdCtr}}{}%
330 \long\gdef\NoProcess[#1]{%
331     \long\def\@i@noprocess##1,##2\@##3{\def##3{##1}\ifx ##3\@nnil%
332     \expandafter\@cvrstop \else
333     \expandafter\hyphencheck##1-@-*[*]
334     \relax\expandafter\@i@noprocess\fi##2\@##3}%
335     \long\def\@@noprocess##1,##2,##3\@##4{

```

```

336 \expandafter\hyphencheck##1-@-*[*]
337 \def##4{##1}\ifx ##4\@nnil \else%
338 \def##4{##2}\def\y@y{##2}\ifx\y@y\@nnil\else%
339 \expandafter\hyphencheck##2-@-*[*]
340 \fi\ifx ##4\@nnil \else%
341 \i@@@noproces ##3\@@##4\fi\fi}%
342 \expandafter\def\expandafter\@fortmp\expandafter{#1}%
343 \ifx\@fortmp\@empty \else%
344 \expandafter\@@@noproces#1,\@nil,\@nil\@@\@ee@\fi}%
345 \def\d@d#1[*]{%
346 \def\hyphencheck#1-#2-#3{\def\r@r{@}\def\s@s{*}\edef\c@c{#3}
347 \ifx\c@c\r@r
348 \setcounter{f@firstCtr}{#1}
349 \setcounter{s@econdCtr}{#2}
350 \stepcounter{s@econdCtr}
351 \loop\ifnum\thes@econdCtr > \thef@firstCtr%
352 \expandafter\edef\csname Fig\thef@firstCtr\endcsname{TRUE}
353 \stepcounter{f@firstCtr}
354 \repeat%
355 \else\ifx\c@c\s@s%
356 \expandafter\edef\csname Fig#1\endcsname{TRUE}
357 \fi\fi\d@d}

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