

diagbox Package (v2.3)

⇒ 中文版

Making Table Heads with Diagonal Lines

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1 Introduction

`diagbox` is a replacement of old `slashbox` package¹. I write this package simply because that `slashbox` is not available in TeX Live for licensing problems. `slashbox` has no explicit license information available, but `diagbox` is under LPPL.

`diagbox` is a modern alternative of `slashbox`. I changed the user interface to use a key-value syntax, get rid of some restrictions of `slashbox`, use `pict2e` to draw diagonal lines. Especially, this package also provides ability to make a box with two diagonal lines in it. All these can be obtained by a `\diagbox` command.

As a replacement of `slashbox`, `diagbox` package also provides compatible macros of `slashbox`, but the result is a little different.

To use `diagbox`, ε -TeX is needed. And `diagbox` requires `pict2e`, `keyval`, `calc`, and `fp` packages.

2 Usage

2.1 Basic usage

To load the package, just put this in the preamble:

```
\usepackage{diagbox}
```

`\diagbox` `\diagbox` is the main command. It can take two arguments, to produce a box with a diagonal line from north west to south east.

For example:

¹By Koichi Yasuoka and Toru Sato. Available on CTAN://macros/latex/contrib/slashbox/slashbox.sty

Time \ Day	Mon	Tue	Wed
Morning	used	used	
Afternoon		used	used

```

1 \begin{tabular}{|l|ccc|}
2 \hline
3 \diagbox{Time}{Day} & Mon & Tue & Wed \\
4 \hline
5 Morning & used & used & \\
6 Afternoon & & used & used \\
7 \hline
8 \end{tabular}
```

\diagbox can also take three arguments, to draw a table head with two diagonal lines. For example,

```

1 \begin{tabular}{|l|ccc|}
2 \hline
3 \diagbox{Time}{Room}{Day} & Mon & Tue & Wed \\
4 \hline
5 Morning & used & used & \\
6 Afternoon & & used & used \\
7 \hline
8 \end{tabular}
```

Room \ Day	Mon	Tue	Wed
Time			
Morning	used	used	
Afternoon		used	used

2.2 More options

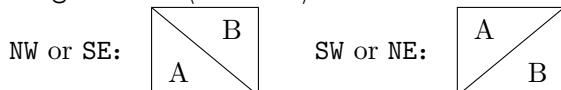
\diagbox can take a key-value list as an optional argument to specify the width and height of the box, the direction of the diagonal line, and the trimming margins:

width Specify the width of the box explicitly. If it is omitted, diagbox will calculate the width automatically.

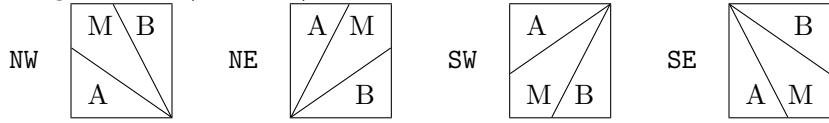
height Specify the height of the box explicitly. If it is omitted, diagbox will calculate the height automatically. In the argument, one can use \line as a line height.

dir Specify the direction of the diagonal line. The value can be NW, NE, SW and SE. Default value is NW. The meaning of the values see below.

- \diagbox[dir=<direction>]{A}{B} in a table looks:

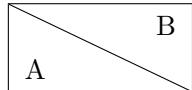


- `\diagbox[dir=<direction>]{A}{M}{B}` in a table looks:



innerwidth Specify the width of the inner content box. `innerwidth` option is useful when specifying column width. For example:

```
\begin{tabular}{|p{2cm}|} \hline
\diagbox[innerwidth=2cm]{A}{B} \\ \hline
\end{tabular}
```

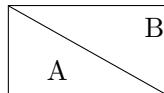


innerleftsep, innerrightsep Specify the distances between the border of the inner content box and the border of the diagonal box. We have:

$$\text{innerleftsep} + \text{innerwidth} + \text{innerrightsep} = \text{width}.$$

For example:

```
\begin{tabular}{|c|} \hline
\diagbox[innerleftsep=.5cm,innerrightsep=0pt]{A}{B} \\ \hline
\end{tabular}
```



outerleftsep, outerrightsep Specify the distances between the border of the diagonal box and the border of the tabular cell. Usually they are negative values, which satisfy

$$\begin{aligned}
\text{outerleftsep} + \text{LEFTtabcolsep} &= 0 \text{ pt}, \\
\text{outerrightsep} + \text{RIGHTtabcolsep} &= 0 \text{ pt}.
\end{aligned}$$

where `LEFTtabcolsep` and `RIGHTtabcolsep` are the distances between vertical lines and the tabular cell content (the diagonal box). For example:

```
\begin{tabular}{|r@{\hspace{20pt}}|l|} \hline
\diagbox[outerrightsep=-20pt]{A}{B} & C \\ \hline
AABB & CC \\ \hline
\end{tabular}
```

A	B	C
AABB		CC

leftsep, rightsep Specify the left and right distances, which are equivalent to:

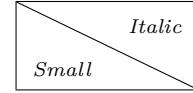
$$\begin{array}{ll} \text{innerleftsep} := \text{leftsep}, & \text{innersrightsep} := \text{rightsep}, \\ \text{outerleftsep} := -\text{leftsep}, & \text{outerrightsep} := -\text{rightsep}. \end{array}$$

trim Specify the margin to be trimmed. The value can be **l**, **r**, and **lr**, **rl**. This helps the slash line exceeds the boundary when **@{}** column specifier is used.

Note: **trim=l** has the same effect as **leftsep=0pt**, and **trim=r** has the same effect as **rightsep=0pt**.

font Specify the font of the cell.

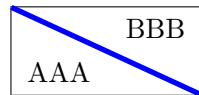
```
\diagbox[font=\footnotesize\itshape]{Small}{Italic}
```



linewidth Specify the line width of the diagonal lines.

linecolor Specify the line color of the diagonal lines. (color or xcolor is needed.)

```
\diagbox[linewidth=2pt,linecolor=blue]{AAA}{BBB}
```



Here is a more complex example to show the usage of the options:

```

1 \begin{tabular}{|@{}l|c|c|r@{|}}
2 \hline
3 \diagbox[width=5em,trim=l]{Time}{Day} & Mon & Tue & Wed \\
4 \hline
5 Morning & used & used & used \\
6 \hline
7 Afternoon & used & \diagbox[dir=SW,height=2em,trim=r]{A}{B} \\
8 \hline
9 \end{tabular}

```

	Day	Mon	Tue	Wed
Time				
Morning	used	used	used	
Afternoon		used	A	B

What's more, you can use **\\"** to break lines in **\diagbox**. Manual setting of the height of the head may be needed. For example,

```

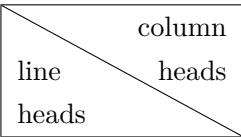
1 \begin{tabular}{|c|}
2 \hline
3 \diagbox[height=3\line]{line\\heads}{column\\heads} \\

```

```

4 | \hline
5 | \end{tabular}

```



2.3 Compatibility with `slashbox`

`diagbox` package emulates `slashbox` and also prevents `slashbox` to be loaded.

`diagbox` package provides `\slashbox` and `\backslashslashbox` which syntax similar to `slashbox` package. However, the results of the two packages are a little different. These two commands are for compatibility only, it is better to use `\diagbox` instead for new documents.

- | | |
|---------------------------------|---|
| <code>\backslashslashbox</code> | <code>\backslashslashbox</code> works as <code>\diagbox</code> , but it takes two optional arguments to specify the <code>width</code> and <code>trim</code> options. |
| <code>\slashbox</code> | <code>\slashbox</code> works as <code>\diagbox[dir=SW]</code> , and takes two optional arguments to specify the <code>width</code> and <code>trim</code> options. |

For example,

		alpha	A	B
		num		
1		A1	B1	
2		A2	B2	

```

1 | \begin{tabular}{|c|c|c|} \hline
2 | \backslashslashbox[2cm]{num}{alpha}
3 |   & A & B \\ \hline
4 | 1 & A1 & B1 \\ \hline
5 | 2 & A2 & B2 \\ \hline
6 | \end{tabular}

```

3 Known issues and TODO

Known issues:

- The result of `\slashbox` and `\backslashslashbox` is different with `slashbox` package. The algorithms to calculate the width and height are different; and the results of the second optional argument of `\slashbox` (i.e. `trim` key in `\diagbox`) in the two packages are differernt.

This is not a bug. Usually the width calculated by `diagbox` is more safe than `slashbox`.

- For a triple box (a table head with two diagonal lines), the first argument must not be too wide and the third argument must not be too high. Otherwise, the layout algorithm cannot calculate the proper width and height of the table head, and a warning will be issued. (Thanks to Frank Mittelbach.)

- The cell with \diagbox should be the widest one of the column. Otherwise the slash line cannot exceeds the boundary. For example,

A	B
Very long term	

```

1 \begin{tabular}{|c|} \hline
2 \diagbox{A}{B} \\\hline
3 Very long term \\ \hline
4 \end{tabular}

```

This can be solved by setting a wider `width` option of `\diagbox` manually.

diagbox 宏包 (v2.3)

⇒ English Version

制做斜线表头

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4 简介

diagbox 设计用来代替旧的 `slashbox` 宏包¹。编写这个宏包的缘起是 `slashbox` 因为缺少明确的自由许可信息，被 TeX Live 排除。这个宏包是在 LPPL 协议下发行的。

diagbox 是 `slashbox` 宏包的一个现代的版本。它采用了新的 key-value 式语法参数，去除了 `slashbox` 原有的一些长度限制，并调用 `pict2e` 宏包画斜线；特别还添加了绘制两条斜线的表头的新功能。

作为 `slashbox` 的代替，`diagbox` 除了提供自己的新命令，也提供了 `slashbox` 原有的两个命令，语法不变，编译结果略有区别。

`diagbox` 依赖 ε-TEx 扩展（这在目前总是可用的），依赖 `pict2e`、`keyval`、`calc` 和 `fp` 宏包。

5 用法说明

5.1 基本用法

要使用本宏包，首先在导言区调用：

```
\usepackage{diagbox}
```

\diagbox \diagbox 是宏包提供的主要命令。它可以带有两个必选参数，表示要生成斜线表头的两部分内容。默认斜线是从西北到东南方向的。

例如：

¹作者 Koichi Yasuoka (安岡孝一) 与 Sato Toru (佐藤徹)。宏包见 CTAN://macros/latex/contrib/slashbox/`slashbox.sty`。

Time \ Day	Mon	Tue	Wed
Morning	used	used	
Afternoon		used	used

```

1 \begin{tabular}{|l|ccc|}
2 \hline
3 \diagbox{Time}{Day} & Mon & Tue & Wed \\
4 \hline
5 Morning & used & used & \\
6 Afternoon & & used & used \\
7 \hline
8 \end{tabular}
```

\diagbox 也可以接受三个参数，这样就会生成带有两条斜线的表头，例如：

```

1 \begin{tabular}{|l|ccc|}
2 \hline
3 \diagbox{Time}{Room}{Day} & Mon & Tue & Wed \\
4 \hline
5 Morning & used & used & \\
6 Afternoon & & used & used \\
7 \hline
8 \end{tabular}
```

Room \ Day	Mon	Tue	Wed
Time	used	used	
Morning		used	used

5.2 更多参数设置

\diagbox 还可以在前面带一个可选参数，里面用 key-value 的语法设置宽度、方向等更多的选项：

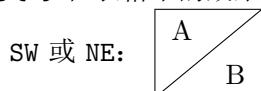
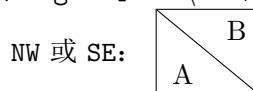
width 明确指定盒子的总宽度。如果省略，则会自动计算能够放下所有内容的宽度。

height 明确指定盒子的总高度。

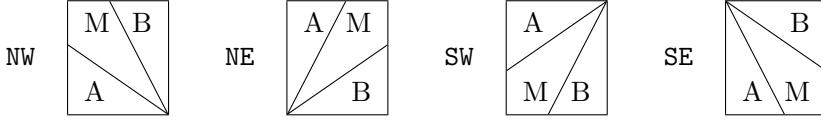
dir 指定斜线方向。可以取 NW（西北）、NE（东北）、SW（西南）、SE（东南）四种方向。

在只有一条斜线的表头中，NE 与 SW、SE 与 NW 是等价的。斜线方向的默认值是 NW。

\diagbox[dir=(方向)]{A}{B} 在表格中的效果：

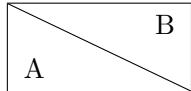


`\diagbox[dir=<方向>]{A}{M}{B}` 在表格中的效果:



innerwidth 设置盒子中内容的宽度。**innerwidth** 选项可以与表格的列宽度一起设置并保持一致。如:

```
\begin{tabular}{|p{2cm}|} \hline
\diagbox[innerwidth=2cm]{A}{B} \\ \hline
\end{tabular}
```

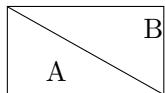


innerleftsep, **innerrightsep** 设置内间距, 即内容盒子与斜线盒子边界之间的距离。我们有关系式:

$$\text{innerleftsep} + \text{innerwidth} + \text{innerrightsep} = \text{width}.$$

例如:

```
\begin{tabular}{|c|} \hline
\diagbox[innerleftsep=.5cm,innerrightsep=0pt]{A}{B} \\ \hline
\end{tabular}
```



outerleftsep, **outerrightsep** 设置外间距, 即斜线盒子边界到表格单元格边界的距离。由于斜线是沿单元格画出而非斜线盒子本身画出, 斜线通常会伸出斜线盒子之外, 此距离为负数, 并满足如下关系式:

$$\begin{aligned}
\text{outerleftsep} + \text{LEFTtabcolsep} &= 0 \text{ pt}, \\
\text{outerrightsep} + \text{RIGHTtabcolsep} &= 0 \text{ pt}.
\end{aligned}$$

其中 **LEFTtabcolsep** 与 **RIGHTtabcolsep** 是表格竖线与表格内容(斜线例子边界)之间的距离。例如:

```
\begin{tabular}{|r@{\hspace{20pt}}|l|} \hline
\diagbox[outerrightsep=-20pt]{A}{B} & C \\ \hline
AABB & CC \\ \hline
\end{tabular}
```

	B	C
AABB		CC

leftsep, rightsep 同时设置左右内外间距，满足关系式：

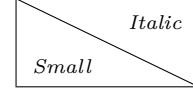
$$\begin{array}{ll} \text{innerleftsep} := \text{leftsep}, & \text{innersrightsep} := \text{rightsep}, \\ \text{outerleftsep} := -\text{leftsep}, & \text{outerrightsep} := -\text{rightsep}. \end{array}$$

trim 设置左边界或右边界不计算额外的空白，可以取值为 l, r, lr 或 rl。这个选项在列格式包含 @{} 时将会有用。

注：trim=l 与 leftsep=0pt 效果相同，而 trim=r 与 rightsep=0pt 效果相同。

font 设置单元格字体。

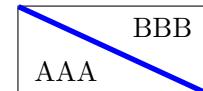
```
\diagbox[font=\footnotesize\itshape]{Small}{Italic}
```



linewidth 设置斜线宽度。

linecolor 设置斜线颜色。(需要自行载入 color 或 xcolor 宏包。)

```
\diagbox[linewidth=2pt,linecolor=blue]{AAA}{BBB}
```



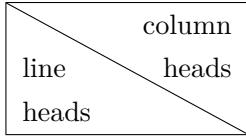
一个更复杂的例子：

```
1 \begin{tabular}{|c|c|c|c|} \hline
2 & & & \\
3 \diagbox[width=5em,trim=l]{Time}{Day} & Mon & Tue & Wed \\ \hline
4 & Morning & used & used \\ \hline
5 Afternoon & used & \diagbox[dir=SW,height=2em,trim=r]{A}{B} \\ \hline
6 & & A & B \\ \hline
7 \end{tabular}
```

Day			
Time	Mon	Tue	Wed
Morning	used	used	used
Afternoon		used	A \diagbox[B]

此外，\diagbox 的表头内容还可以用 \\ 手工换行。此时通常需要对自动计算的表头高度进行手工调整。例如：

```
1 \begin{tabular}{|c|} \hline
2 & \\
3 \diagbox[height=3\line]{line\\\heads}{column\\\heads} \\ \hline
4 & \\
5 \end{tabular}
```



5.3 对 `slashbox` 宏包的兼容性

在使用 `diagbox` 宏包时，会模拟 `slashbox` 宏包的功能，并禁止 `slashbox` 再被调用。

`diagbox` 宏包提供了与 `slashbox` 大致相同的 `\slashbox` 与 `\backslashslashbox` 两个命令。`\slashbox` 与 `\backslashslashbox` 的语法来自 `slashbox` 宏包，排版效果略有区别。这两个命令仅在旧文档中作为兼容命令使用。实际中使用 `\diagbox` 更为方便。

`\backslashslashbox` `\backslashslashbox` 基本功能与 `\diagbox` 类似。它带有两个可选参数，分别表示 `\diagbox` 中的 `width` 与 `trim` 选项。

`\slashbox` `\slashbox` 基本功能与 `\diagbox[dir=SW]` 类似。它也带有两个可选参数，表示 `\diagbox` 中的 `width` 和 `trim` 选项。

例如：

	alpha	A	B
num			
1	A1	B1	
2	A2	B2	

```

1 \begin{tabular}{|c|c|c|} \hline
2 \backslash\backslashbox[2cm]{num}{alpha}
3   & A & B \\ \hline
4 1 & A1 & B1 \\ \hline
5 2 & A2 & B2 \\ \hline
6 \end{tabular}
```

6 已知问题和未来版本

已知问题：

- `\slashbox` 与 `\backslash\backslashbox` 命令的效果与在 `slashbox` 宏包中不同。两个宏包在计算盒子宽度和高度时，使用了不同的算法；同时，在处理 `\slashbox` 第二个可选参数（即 `\diagbox` 的 `trim` 键）时，使用的方式也不一样。

这不是 bug。通常 `diagbox` 计算出的宽度比 `slashbox` 的结果更安全一些。

- 有两条斜线的三部分表头，其所采用的自动布局算法是受限的。特别是，最左的部分不能过宽，最右的部分不能过高，否则将无法计算出合理的结果，宏包会发出警告。（感谢 Frank Mittelbach 指出该问题。）
- `\diagbox` 生成的单元格必须是表列中最宽的一个。如果不能达到最宽，则画出的斜线不能保证在正确的位置。例如：

	B
	A
Very long term	

```

1 \begin{tabular}{|c|} \hline
2 \diagbox{A}{B} \\ \hline
3 Very long term \\ \hline
4 \end{tabular}
```

此时可以手工设置较宽的 \diagbox 的 width 选项，解决此问题。

7 Implementation / 代码实现

7.1 实现依赖的工具包

使用 key-value 界面。

```
1 \RequirePackage{keyval}
```

绘图依赖 pict2e 宏包。

```
2 \RequirePackage{pict2e}
```

长度计算 calc 宏包。

```
3 \RequirePackage{calc}
```

内部控制 array 宏包。

```
4 \RequirePackage{array}
```

7.2 资源分配

分配用到的盒子寄存器。它们分别对应于 \diagbox 三个必选参数的内容。

```
5 \newbox\diagbox@boxa
```

```
6 \newbox\diagbox@boxb
```

```
7 \newbox\diagbox@boxm
```

分配长度变量。

```
8 \newdimen\diagbox@wd
```

```
9 \newdimen\diagbox@ht
```

```
10 \newdimen\diagbox@insepI
```

```
11 \newdimen\diagbox@insepR
```

```
12 \newdimen\diagbox@outsepI
```

```
13 \newdimen\diagbox@outsepR
```

```
14 \def\diagbox@clear{%
```

```
15   \diagbox@wd=\z@
```

```
16   \diagbox@ht=\z@
```

```
17   \diagbox@insepI=\tabcolsep
```

```
18   \diagbox@insepR=\tabcolsep
```

```
19   \diagbox@outsepI=-\tabcolsep
```

```
20   \diagbox@outsepR=-\tabcolsep
```

```
21 }
```

7.3 命令选项定义

下面定义 \diagbox 的键值选项。

斜线盒子的总宽度。

```
22 \define@key{diagbox}{width}{%
```

```
23   \unless\ifdim\diagbox@wd=\z@
```

```
24     \PackageWarning{diagbox}{%
```

```
25       {You should not set width/innerwidth option more than once.}}
```

```

26 \fi
27 \setlength{\diagbox@wd}{#1}

28 \define@key{diagbox}{height}{%
29 \let\diagbox@save@line\line
30 \def\line{\normalbaselineskip}%
31 \setlength{\diagbox@ht}{#1}%
32 \let\line\diagbox@save@line}

```

盒子内容与斜线框左右的距离。

```

33 \define@key{diagbox}{innerleftsep}{%
34 \setlength{\diagbox@insepL}{#1}}
35 \define@key{diagbox}{innerrightsep}{%
36 \setlength{\diagbox@insepR}{#1}}

```

设置盒子内容的宽度（与列格式 `p{宽度}` 对应）。盒子内容宽度加上盒子与斜线框左右距离之和应为斜线盒子总宽度，即有

$$\text{innerleftsep} + \text{innerwidth} + \text{innerrightsep} = \text{width}.$$

`innerwidth` 选项将通过设置盒子总宽度，维护上面的关系式。

```

37 \define@key{diagbox}{innerwidth}{%
38 \unless\ifdim\diagbox@wd=\z@
39 \PackageWarning{diagbox}{%
40 You should not set width/innerwidth option more than once.}%
41 \fi
42 \setlength{\diagbox@wd}{#1+\diagbox@insepL+\diagbox@insepR}}

```

斜线盒子与表格单元边框距离。该外部间距应为实际表列内容与列分隔线之间距离的相反数，以此保证斜线与表格竖线能相接，即应输入参数保证

$$\begin{aligned}\text{outerleftsep} + \text{LEFTtabcolsep} &= 0 \text{ pt}, \\ \text{outerrightsep} + \text{RIGHTtabcolsep} &= 0 \text{ pt}.\end{aligned}$$

```

43 \define@key{diagbox}{outerleftsep}{%
44 \setlength{\diagbox@outsepL}{#1}}
45 \define@key{diagbox}{outerrightsep}{%
46 \setlength{\diagbox@outsepR}{#1}}

```

设置左右边距，它将同时设置盒子内容与斜线框的内部间距，以及斜线盒子与表格单元边框的外部间距。并保持关系：

$$\begin{array}{ll} \text{innerleftsep} := \text{leftsep}, & \text{innerrightsep} := \text{rightsep}, \\ \text{outerleftsep} := -\text{leftsep}, & \text{outerrightsep} := -\text{rightsep}. \end{array}$$

```

47 \define@key{diagbox}{leftsep}{%
48 \setlength{\diagbox@insepL}{#1}%
49 \setlength{\diagbox@outsepL}{(#1)*-1}}

```

```

50 \define@key{diagbox}{rightsep}{%
51   \setlength{\diagbox@insepr}{#1}%
52   \setlength{\diagbox@outsepr}{(#1)*-1}}

```

盒子计算边界时是否忽略左右的空白。`trim=l` 效果等同于 `leftsep=0pt; trim=r` 效果等同于 `rightsep=0pt`。

```

53 \define@key{diagbox}{trim}{%
54   \atfor@\reserveda:=#1\do{%
55     \ifcsname diagbox@insep@\reserveda\endcsname
56       \setlength{\csname diagbox@insep@\reserveda\endcsname}{\z@}%
57       \setlength{\csname diagbox@outsep@\reserveda\endcsname}{\z@}%
58     \else
59       \PackageError{diagbox}{Unknown trim option `#1'.}{l, r, lr and rl are supported.}%
60   \fi}}

```

盒子的方向。

```

61 \define@key{diagbox}{dir}{%
62   \def\diagbox@dir{#1}%
63   \unless\ifcsname diagbox@dir@#1\endcsname
64     \PackageError{diagbox}{Unknown direction `#1'.}{NW, NE, SW, SE are supported.}%
65   \def\diagbox@dia{NW}%
66 \fi}
67 \let\diagbox@dir@SE\relax
68 \let\diagbox@dir@SW\relax
69 \let\diagbox@dir@NE\relax
70 \let\diagbox@dir@NW\relax

```

斜线宽度与颜色。

```

71 \define@key{diagbox}{linewidth}{%
72   \setlength{\@tempskipa}{#1}%
73   \linethickness{\@tempskipa}%
74 \define@key{diagbox}{linecolor}{%
75   \def\diagbox@setlinecolor{\color{#1}}%
76 \let\diagbox@setlinecolor\empty

```

设置内容字体。

```

77 \define@key{diagbox}{font}{%
78   \def\diagbox@font{#1}%
79 \let\diagbox@font\empty

```

7.4 绘制斜线盒子

`\diagbox@pict` 这是带斜线的盒子本身。由一个 `picture` 环境实现。

```

80 \def\diagbox@pict{%
81   \unitlength\p@
82   \begin{picture}%
83     (\strip@pt\dimexpr\diagbox@wd+\diagbox@outsepl+\diagbox@outsepr\relax,\strip@pt\diagbox@ht)

```

```

84      (\strip@pt\dimexpr-\diagbox@outsep\relax,0)
85      \nameuse{\diagbox@\diagbox@part}{\pict@\diagbox@dir}
86  \end{picture}}

```

\diagbox@double@pict@SE 方向为 SE 的斜线盒子内容。

```

87 \def\diagbox@double@pict@SE{%
88  \put(0,0) {\makebox(0,0)[bl]{\box\diagbox@boxa}}
89  \put(\strip@pt\diagbox@wd,\strip@pt\diagbox@ht) {\makebox(0,0)[tr]{\box\diagbox@boxb}}
90  \diagbox@setlinecolor
91  \Line(0,\strip@pt\diagbox@ht)(\strip@pt\diagbox@wd,0)}

```

\diagbox@double@pict@NW 方向 NW 与 SE 相同。

```
92 \let\diagbox@double@pict@NW\diagbox@double@pict@SE
```

\diagbox@double@pict@NE 方向为 NE 的斜线盒子内容。

```

93 \def\diagbox@double@pict@NE{%
94  \put(0,\strip@pt\diagbox@ht) {\makebox(0,0)[tl]{\box\diagbox@boxa}}
95  \put(\strip@pt\diagbox@wd,0) {\makebox(0,0)[br]{\box\diagbox@boxb}}
96  \diagbox@setlinecolor
97  \Line(0,0)(\strip@pt\diagbox@wd,\strip@pt\diagbox@ht)}

```

\diagbox@double@pict@NE 方向 SW 与 NE 相同。

```
98 \let\diagbox@double@pict@SW\diagbox@double@pict@NE
```

\diagbox@double 分成两部分的盒子。三个参数，分别为 key-value 格式的可选项、左半边内容、右半边内容。这里的主要工作是读入参数并计算斜线盒子的大小。

这里自动计算斜线盒子大小的算法为：斜线盒子的宽度取两个子盒宽度较大值的二倍，而高度则直接取两个子盒的总高度。

```

99 \def\diagbox@double#1#2#3{%
100  \begingroup
101  \diagbox@clear
102  \def\diagbox@part{double}%
103  \setkeys{diagbox}{dir=NW,#1}%
104  \setbox\diagbox@boxa=\hbox{%
105   \begin{tabular}{@{\hspace{\diagbox@insep l}}>{\diagbox@font}l@{}}
106     #2
107   \end{tabular}}%
108  \setbox\diagbox@boxb=\hbox{%
109   \begin{tabular}{@{}>{\diagbox@font}r@{\hspace{\diagbox@insep r}}}
110     #3
111   \end{tabular}}%
112  \ifdim\diagbox@wd=\z@
113   \ifdim\wd\diagbox@boxa>\wd\diagbox@boxb
114     \diagbox@wd=\dimexpr2\wd\diagbox@boxa+\diagbox@insep l+\diagbox@insep r\relax
115   \else
116     \diagbox@wd=\dimexpr2\wd\diagbox@boxb+\diagbox@insep l+\diagbox@insep r\relax

```

```

117     \fi
118   \fi
119 \ifdim\diagbox@ht=\z@
120   \diagbox@ht=\dimexpr\ht\diagbox@boxa+\dp\diagbox@boxa+\ht\diagbox@boxb+\dp\diagbox@boxb\relax
121 \fi
122 \$\vcenter{\hbox{\diagbox@pict}}\%
123 \endgroup

diagbox@triple@setbox@NW
124 \def\diagbox@triple@setbox@NW#1#2#3{%
125   \setbox\diagbox@boxa=\hbox{%
126     \begin{tabular}{@{\hspace{\diagbox@insepL}}>{\diagbox@font}l@{}}
127       #1
128     \end{tabular}\%
129   \setbox\diagbox@boxm=\hbox{%
130     \begin{tabular}{@{\hspace{\diagbox@insepL}}>{\diagbox@font}l@{}}
131       #2
132     \end{tabular}\%
133   \setbox\diagbox@boxb=\hbox{%
134     \begin{tabular}{@{}>{\diagbox@font}r@{\hspace{\diagbox@insepR}}}
135       #3
136     \end{tabular}}}

diagbox@triple@setbox@SW
137 \let\diagbox@triple@setbox@SW\diagbox@triple@setbox@NW

diagbox@triple@setbox@SE
138 \def\diagbox@triple@setbox@SE#1#2#3{%
139   \setbox\diagbox@boxa=\hbox{%
140     \begin{tabular}{@{\hspace{\diagbox@insepL}}>{\diagbox@font}l@{}}
141       #1
142     \end{tabular}\%
143   \setbox\diagbox@boxm=\hbox{%
144     \begin{tabular}{@{}>{\diagbox@font}r@{\hspace{\diagbox@insepR}}}
145       #2
146     \end{tabular}\%
147   \setbox\diagbox@boxb=\hbox{%
148     \begin{tabular}{@{}>{\diagbox@font}r@{\hspace{\diagbox@insepR}}}
149       #3
150     \end{tabular}}}

diagbox@triple@setbox@NE
151 \let\diagbox@triple@setbox@NE\diagbox@triple@setbox@SE

\diagbox@triple@pict@NW
152 \def\diagbox@triple@pict@NW{%

```

```

153  \put(0,0)  {\makebox(0,0)[bl]{\box\diagbox@boxa}}
154  \put(0,\y)  {\makebox(0,0)[t1]{\box\diagbox@boxm}}
155  \put(\x,\y) {\makebox(0,0)[tr]{\box\diagbox@boxb}}
156  \diagbox@setlinecolor
157  \Line(0,\ym)(\x,0)
158  \Line(\xm,\y)(\x,0}

\diagbox@triple@pict@NE

159 \def\diagbox@triple@pict@NE{%
160  \put(0,\y)  {\makebox(0,0)[t1]{\box\diagbox@boxa}}
161  \put(\x,\y) {\makebox(0,0)[tr]{\box\diagbox@boxm}}
162  \put(\x,0)  {\makebox(0,0)[br]{\box\diagbox@boxb}}
163  \diagbox@setlinecolor
164  \Line(0,0)(\xxm,\y)
165  \Line(0,0)(\x,\ym)}

\diagbox@triple@pict@SW

166 \def\diagbox@triple@pict@SW{%
167  \put(0,\y)  {\makebox(0,0)[t1]{\box\diagbox@boxa}}
168  \put(0,0)  {\makebox(0,0)[bl]{\box\diagbox@boxm}}
169  \put(\x,0)  {\makebox(0,0)[br]{\box\diagbox@boxb}}
170  \diagbox@setlinecolor
171  \Line(0,\ym)(\x,\y)
172  \Line(\xm,0)(\x,\y)}

\diagbox@triple@pict@SE

173 \def\diagbox@triple@pict@SE{%
174  \put(0,0)  {\makebox(0,0)[bl]{\box\diagbox@boxa}}
175  \put(\x,0)  {\makebox(0,0)[br]{\box\diagbox@boxm}}
176  \put(\x,\y) {\makebox(0,0)[tr]{\box\diagbox@boxb}}
177  \diagbox@setlinecolor
178  \Line(0,\y)(\xxm,0)
179  \Line(0,\y)(\x,\ym)}

```

\diagbox@triplebox 分成三部分的盒子。四个参数，分别为 key-value 格式的可选项、左半边内容、中间内容、右半边内容。

```

180 \def\diagbox@triple#1#2#3#4{%
181  \begingroup
182  \diagbox@clear
183  \def\diagbox@part{\triple}%
184  \setkeys{\diagbox}{dir=NW,#1}%
185  \nameuse{\diagbox@triple@setbox@\diagbox@dir}{#2}{#3}{#4}%

```

在宏包最后定义，需要返回 \x , \xm , \xxm , \y , \ym 和 \ym 。

```

186  \diagbox@solve@equations
187  $ \vcenter{\hbox{\diagbox@pict}} $%
188  \endgroup

```

7.5 用户命令

\diagbox 主要的用户命令。判断使用两部分还是三部分的盒子。

```
189 \newcommand\diagbox[3] []{%
190   \ifnextchar\bgroup
191     {\diagbox@triple{\#1}{\#2}{\#3}}{\diagbox@double{\#1}{\#2}{\#3}}}
```

以下代码用来模拟 \slashbox 宏包的功能。

禁止读入 \slashbox。

```
192 \expandafter\xdef\csname ver@slashbox.\@pkgextension\endcsname{9999/99/99}
```

\slashbox 模拟 \slashbox。

```
193 \def\slashbox{%
194   \def\diagbox@slashbox@options{dir=SW,}%
195   \slashbox@}
```

\backslash slashbox 模拟 \backslash backslashbox。

```
196 \def\backslash slashbox{%
197   \def\diagbox@slashbox@options{dir=NW,}%
198   \slashbox@}
```

\slashbox@

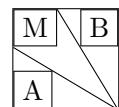
```
199 \newcommand\slashbox@[1] []{%
200   \ifx\relax#1\relax\else
201     \edef\diagbox@slashbox@options{%
202       \unexpanded\expandafter{\diagbox@slashbox@options}%
203       \unexpanded{width=#1,}%
204     \fi
205   \slashbox@@}
```

\slashbox@@

```
206 \newcommand\slashbox@@[3] []{%
207   \edef\diagbox@slashbox@options{%
208     \unexpanded\expandafter{\diagbox@slashbox@options}%
209     \unexpanded{trim=#1,}%
210   \expandafter\diagbox\expandafter[\diagbox@slashbox@options]{#2}{#3}}
```

7.6 解方程组

这里计算双斜线盒子宽、高的算法是简单而直观的。如下图所示，将 A、M、B 三个子盒子分别放在斜线盒的三个角后，斜线正好使 M 盒、A 或 B 盒、斜线盒的一角三点共线。



在 A、M、B 三个盒子内容确定后，斜线盒的宽、高即可通过相似三角形的比例关系求解。设斜线盒的宽、高为 x, y ，而 A、M、B 盒的宽、高分别为 $(x_a, y_a), (x_m, y_m), (x_b, y_b)$ 。则有：

$$\frac{x}{x_a} = \frac{y - y_m}{y - y_m - y_a},$$

$$\frac{y}{y_b} = \frac{x - x_m}{x - x_m - x_b}.$$

该方程组通常可化简为一个一元二次方程求解，两组共轭根中可以只需要较大的一组。通过 Mathematica 软件，容易得到方程组的解为：

$$x = \frac{u + v \pm \sqrt{\Delta}}{2(t - y_b)},$$

$$y = \frac{u - v \mp \sqrt{\Delta}}{2(x_a - s)},$$

$$\Delta := (u + v)^2 + 4x_a(t - y_b)(x_m(y_b - y_m) - x_b y_m),$$

$$u := x_a y_m - x_m y_b,$$

$$v := st - x_a y_b,$$

$$s := x_b + x_m,$$

$$t := y_a + y_m.$$

但须注意上面的方程组并非总有正的实根，经过简单的代数分析可知，要给出几何直观的可行解（正实根），需要同时满足以下条件：

$$x_a < x_m + x_b,$$

$$y_b < y_m + y_a.$$

该条件需要在计算中予以检查。

\diagbox@solve@equations 如果 `expl3` 环境可用，就使用 `l3fp` 计算，否则使用 `fp` 包。

```
211 \ifcsname\detokenize{fp_eval:n}\endcsname
212 \csname fi\endcsname
213 \ExplSyntaxOn
214 \langle\!\langle\diagbox\rangle\!\rangle
215 \cs_new_protected:Npn \@@_solve_equations:
216 {
```

取长宽。

```
217 \fp_set:Nn \l_@@_xa_fp
218 { \dim_to_fp:n { \wd \diagbox@boxa } }
219 \fp_set:Nn \l_@@_ya_fp
220 { \dim_to_fp:n { \ht \diagbox@boxa + \dp \diagbox@boxa } }
221 \fp_set:Nn \l_@@_xb_fp
222 { \dim_to_fp:n { \wd \diagbox@boxb } }
223 \fp_set:Nn \l_@@_yb_fp
```

```

224      { \dim_to_fp:n { \ht \diagbox@boxb + \dp \diagbox@boxb } }
225      \fp_set:Nn \l_@@_xm_fp
226      { \dim_to_fp:n { \wd \diagbox@boxm } }
227      \fp_set:Nn \l_@@_ym_fp
228      { \dim_to_fp:n { \ht \diagbox@boxm + \dp \diagbox@boxm } }
229      \fp_set:Nn \l_@@_s_fp { \l_@@_xb_fp + \l_@@_xm_fp }
230      \fp_set:Nn \l_@@_t_fp { \l_@@_ya_fp + \l_@@_ym_fp }

```

如果宽度和长度都被指定了，就不需要列方程组求解。

```

231      \fp_set_eq:NN \l_@@_delta_fp \c_nan_fp
232      \dim_compare:nNnTF \diagbox@wd = \c_zero_dim
233      { \@@_calculate_width: }
234      { \fp_set:Nn \l_@@_x_fp { \dim_to_fp:n { \diagbox@wd } } }
235      \dim_compare:nNnTF \diagbox@ht = \c_zero_dim
236      { \@@_calculate_height: }
237      { \fp_set:Nn \l_@@_y_fp { \dim_to_fp:n { \diagbox@ht } } }
238      \edef \x { \fp_use:N \l_@@_x_fp }
239      \edef \y { \fp_use:N \l_@@_y_fp }
240      \edef \xm { \fp_use:N \l_@@_xm_fp }
241      \edef \ym { \fp_use:N \l_@@_ym_fp }
242      \edef \xxm { \fp_eval:n { \l_@@_x_fp - \l_@@_xm_fp } }
243      \edef \yym { \fp_eval:n { \l_@@_y_fp - \l_@@_ym_fp } }
244  }

```

检查可行解条件，解二次方程。这里对于无正实根的情形，会给出一个宽松的值作为斜线盒子的宽高：

$$x = 2 \max(x_a + x_m, x_b + x_m), \\ y = 2 \max(y_a + y_m, y_b + y_m).$$

```

245 \cs_new_protected:Npn \@@_calculate_width:
246  {
247      \fp_zero:N \l_@@_x_fp
248      \fp_compare:nNnT \l_@@_yb_fp < \l_@@_t_fp
249      {
250          \@@_calculate_coefficient:
251          \fp_if_nan:nF { \l_@@_sqrt_fp }
252          {
253              \fp_set:Nn \l_@@_x_fp
254              {
255                  ( \l_@@_u_fp + \l_@@_v_fp + \l_@@_sqrt_fp ) /
256                  ( 2 ( \l_@@_t_fp - \l_@@_yb_fp ) )
257              }
258          }
259      }
260      \fp_compare:nNnF \l_@@_x_fp > \c_zero_fp
261      {

```

```

262      \fp_set:Nn \l_@@_x_fp
263          { 2 ( max( \l_@@_xa_fp , \l_@@_xb_fp ) + \l_@@_xm_fp ) }
264          \msg_warning:nxxx { diagbox } { calculate-error }
265          { width } { \fp_use:N \l_@@_x_fp }
266      }
267      \diagbox@wd = \fp_to_dim:N \l_@@_x_fp \scan_stop:
268  }
269 \cs_new_protected:Npn \@@_calculate_height:
270  {
271      \fp_zero:N \l_@@_y_fp
272      \fp_compare:nNnT \l_@@_xa_fp < \l_@@_s_fp
273      {
274          \@@_calculate_coefficient:
275          \fp_if_nan:nF { \l_@@_sqrt_fp }
276          {
277              \fp_set:Nn \l_@@_y_fp
278              {
279                  ( \l_@@_u_fp - \l_@@_v_fp - \l_@@_sqrt_fp ) /
280                  ( 2 ( \l_@@_xa_fp - \l_@@_s_fp ) )
281              }
282          }
283      }
284      \fp_compare:nNnF \l_@@_y_fp > \c_zero_fp
285      {
286          \fp_set:Nn \l_@@_y_fp
287          { 2 ( max( \l_@@_ya_fp , \l_@@_yb_fp ) + \l_@@_ym_fp ) }
288          \msg_warning:nxxx { diagbox } { calculate-error }
289          { height } { \fp_use:N \l_@@_y_fp }
290      }
291      \diagbox@ht = \fp_to_dim:N \l_@@_y_fp \scan_stop:
292  }
293 \cs_new_protected:Npn \@@_calculate_coefficient:
294  {
295      \fp_if_nan:nT { \l_@@_delta_fp }
296      { \@@_calculate_coefficient_aux: }
297  }
298 \cs_new_protected:Npn \@@_calculate_coefficient_aux:
299  {
300      \fp_set:Nn \l_@@_u_fp
301      {
302          \l_@@_xa_fp * \l_@@_ym_fp -
303          \l_@@_xm_fp * \l_@@_yb_fp
304      }
305      \fp_set:Nn \l_@@_v_fp
306      {
307          \l_@@_s_fp * \l_@@_t_fp -

```

```

308          \l_@@_xa_fp * \l_@@_yb_fp
309      }
310      \fp_set:Nn \l_@@_delta_fp
311      {
312          ( \l_@@_u_fp + \l_@@_v_fp )^2 +
313          4 * \l_@@_xa_fp * ( \l_@@_t_fp - \l_@@_yb_fp ) *
314          ( \l_@@_xm_fp * ( \l_@@_yb_fp - \l_@@_ym_fp ) -
315          \l_@@_xb_fp * \l_@@_ym_fp )
316      }
317      \fp_compare:nNnTF \l_@@_delta_fp < \c_zero_fp
318      { \fp_set_eq:NN \l_@@_sqrt_fp \c_nan_fp }
319      { \fp_set:Nn \l_@@_sqrt_fp { sqrt(\l_@@_delta_fp) } }
320  }
321 \cs_new_eq:NN \diagbox@solve@equations \@@_solve_equations:
322 \fp_new:N \l_@@_xa_fp
323 \fp_new:N \l_@@_ya_fp
324 \fp_new:N \l_@@_xb_fp
325 \fp_new:N \l_@@_yb_fp
326 \fp_new:N \l_@@_xm_fp
327 \fp_new:N \l_@@_ym_fp
328 \fp_new:N \l_@@_x_fp
329 \fp_new:N \l_@@_y_fp
330 \fp_new:N \l_@@_s_fp
331 \fp_new:N \l_@@_t_fp
332 \fp_new:N \l_@@_u_fp
333 \fp_new:N \l_@@_v_fp
334 \fp_new:N \l_@@_sqrt_fp
335 \fp_new:N \l_@@_delta_fp
336 \msg_new:nnn { diagbox } { calculate-error }
337  {
338      Cannot~calculate~proper~#1~of~triple~diagbox~
339      \msg_line_context:.. \\
340      Use~#2pt~instead.
341  }
342 \file_input_stop:

```

若 l3fp 不可用，则引入 fp 包计算。

```

343 \fi
344 \RequirePackage{fp}
345 \FPmessagesfalse
346 \def\diagbox@solve@equations{%

```

取长宽

```

347 \edef\xa{\strip@pt\wd\diagbox@boxa}%
348 \edef\ya{\strip@pt\dimexpr\ht\diagbox@boxa+\dp\diagbox@boxa\relax}%
349 \edef\xb{\strip@pt\wd\diagbox@boxb}%
350 \edef\yb{\strip@pt\dimexpr\ht\diagbox@boxb+\dp\diagbox@boxb\relax}%

```

```

351 \edef\xm{\strip@pt\wd\diagbox@boxm}%
352 \edef\ym{\strip@pt\dimexpr\ht\diagbox@boxm+\dp\diagbox@boxm\relax}%

```

列方程，计算方程系数

```

353 \FPneg\bi\yb
354 \FPadd\ci\xb\xm \FPneg\ci\ci
355 \FPmul\di\xm\yb
356 \FPadd\bj\ya\ym \FPneg\bj\bj
357 \FPneg\cj\x{a}
358 \FPmul\dj\x{a}\ym

```

检查可行解条件，解二次方程。这里对于无正实根的情形，会给出一个宽松的值作为斜线盒子的宽高：

$$x = 2 \max(x_a + x_m, x_b + x_m), \\ y = 2 \max(y_a + y_m, y_b + y_m).$$

```

359 \FPsub\u\ dj\di
360 \FPupn{v}{bj ci * bi cj * -}%
361 \FPupn{delta}{bi dj * bj di * - cj ci - * 4 * v u + copy * -}%
362 \newif\ifdeltapositive
363 \FPifneg\delta \deltapositivefalse \else \deltapositivetrue \fi
364 \FPset\x{0}%
365 \FPset\y{0}%
366 \ifdim\diagbox@wd=\z@
367 \ifdim\bi\p@>\bj\p@\ifdeltapositive
368 \FPupn{x}{2 bj bi - 2 delta root v u - + / }%
369 \fi\fi
370 \ifdim\x\p@=\z@
371 \FPupn{x}{xa xm + xb xm + max 2 *}%
372 \PackageWarning{diagbox}{Cannot calculate proper width of triple diagbox.\MessageBreak
373 Use \x pt instead.}%
374 \fi
375 \diagbox@wd=\x\p@
376 \else
377 \edef\x{\strip@pt\diagbox@wd}%
378 \fi
379 \ifdim\diagbox@ht=\z@
380 \ifdim\ci\p@<\cj\p@\ifdeltapositive
381 \FPupn{y}{2 cj ci - 2 delta root v u + - / }%
382 \fi\fi
383 \ifdim\y\p@=\z@
384 \FPupn{y}{ya ym + yb ym + max 2 *}%
385 \PackageWarning{diagbox}{Cannot calculate proper height of triple diagbox.\MessageBreak
386 Use \y pt instead.}%
387 \fi
388 \diagbox@ht=\y\p@

```

```

389 \else
390   \edef\y{\strip@pt\diagbox@ht}%
391 \fi
392 \FPsub\xxm\x\xm
393 \FPsub\ym\y\ym
394 }

```

8 版本历史

v1.0		选项。	14
General: 初始版本。	1	允许在 height 选项中使用 \line 表示行高。	13
v2.0		允许在 width 和 height 的命令选项中写表达式计算长度。	13
General: 变更 trim 选项的行为, 去掉了使用 trim 选项时内部的间距。这与 slashbox 行为不同。	10	增加命令选项 font 支持设置内容字体。	15
增加有三部分、双斜线的表头格式。	8	增加命令选项 linewidth, linecolor 设置斜线宽度与颜色。	15
\diagbox: 判断参数个数, 选择两部分或三部分盒子。	19	左右边距 leftsep, rightsep 命令选项。	14
\diagbox@double: 在使用 trim 选项时去掉内容与盒子边界的间距。这与 slashbox 的行为不同。	16	v2.2	
\diagbox@triplebox: 新增三部分双斜线的盒子	18	General: 避免 fp 包的 nomessages 选项在使用 catoptions 包时冲突	13
v2.1		使用 calc 包计算选项参数, 以支持 \widthof 等命令。	13
General: 盒子内容宽度 innerwidth 命令选项。	14	v2.3	
盒子内容与斜线框距离 innerleftsep, innerrightsep 命令选项。	14	\diagbox@triplebox: 检测二次方程无解、异常解的情形	18
斜线盒子与表格单元边框距离 outerleftsep, outerrightsep 命令		v2.4	
		General: 利用 l3fp 解方程组。	19

9 Index / 代码索引

斜体的数字表示对应项说明所在的页码。下划线的数字表示定义所在的代码行号;而直立体的数字表示对应项使用时所在的行号。

B	\color	75	\diagbox@boxa	
\backslashbox	5, 11, 196		5, 88, 94, 104,	
\bi	353, 367	D	113, 114, 120, 125,	
\bj	356, 367	\delta	139, 153, 160, 167,	
		\deltapositivefalse . . .	174, 218, 220, 347, 348	
C	\deltapositivetrue . . .	363	\diagbox@boxb	
\ci	354, 380	\di	355, 359	6, 89, 95, 108,
\cj	357, 380	\diagbox	1, 7, 189, 210	113, 116, 120, 133,

		M
\diagbox@boxm . . .	7, 129, 143, 154, 161, 168, 175, 226, 228, 351, 352	\diagbox@solve@equations 186, 211
\diagbox@clear	14, 101, 182	\diagbox@triple 180, 191
\diagbox@dia	65	\diagbox@triple@pict@NE 159
\diagbox@dir	62, 85, 185	\diagbox@triple@pict@NW 152
\diagbox@dir@NE	69	\diagbox@triple@pict@SE 24, 39, 372, 385
\diagbox@dir@NW	70	\diagbox@triple@pict@SW 173
\diagbox@dir@SE	67	\diagbox@triple@pict@SW 166
\diagbox@dir@SW	68	\diagbox@triple@setbox@NE 195, 198, 199
\diagbox@double	99, 191	\diagbox@triple@setbox@NW 151
\diagbox@double@pict@NE	93, 98	\diagbox@triple@setbox@NW 205, 206
\diagbox@double@pict@NW	92	\diagbox@triple@setbox@NW 124, 137
\diagbox@double@pict@SE	87, 92	\diagbox@triple@setbox@SE 138, 151
\diagbox@double@pict@SW	98	\diagbox@triple@setbox@SW 137
\diagbox@font	78, 79, 105, 109, 126, 130, 134, 140, 144, 148	\diagbox@triplebox 180
\diagbox@ht	9, 16, 31, 83, 89, 91, 94, 97, 119, 120, 235, 237, 291, 379, 388, 390	\diagbox@wd 8, 15, 23, 27, 38, 42, 83, 89, 91, 95, 97, 112, 114, 116, 232, 234, 267, 366, 375, 377
\diagbox@insepI	10, 17, 34, 42, 48, 105, 114, 116, 126, 130, 140	\dj 358, 359
\diagbox@insepR	11, 18, 36, 42, 51, 109, 114, 116, 134, 144, 148	E
\diagbox@outsepI 12, 19, 44, 49, 83, 84	\empty 76, 79
\diagbox@outsepR 13, 20, 46, 52, 83	\ExplSyntaxOn 213
\diagbox@part	85, 102, 183	F
\diagbox@pict	80, 122, 187	\file 342
\diagbox@save@line	29, 32	\FPifneg 363
\diagbox@setlinecolor	75, 76, 90, 96, 156, 163, 170, 177	\FPmessagesfalse 345
\diagbox@slashbox@options	194, 197,	\FPset 364, 365
		I
		\ifdeltapositive 362, 367, 380
		L
		\line 29, 30, 32
		\linethickness 73
		Y
		\y 154, 155, 158, 160, 161, 164, 167, 171, 172, 176, 178, 179, 239, 365, 383, 386, 388, 390, 393
		\ya 348, 356
		\yb 350, 353, 355
		\ym 171, 179, 241, 352, 356, 358, 393
		\yym 157, 165, 243, 393