The delim package*

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Abstract

This package simplifies typesetting of variable-size delimiters (like parentheses) in mathematical expressions.

LaTeX provides some commands for the correct typesetting of delimiters in mathematical expressions. Consider the following equation:

$(a + \frac{b}{c}) \cdot d$ `(a + \frac bc) \cdot d`

By default, the parentheses will not scale up correctly. The `\left` and `\right` commands fix this problem:

$\left(a + \frac{b}{c}\right) \cdot d$ `\left(a + \frac bc\right) \cdot d`

But because it's cumbersome to write `\left` and `\right` every time, we define and use a macro:

```
\delimdef\p#1{\dleft(#1\dright)}
```

$\left(a + \frac{b}{c}\right) \cdot d$ `\p{a + \frac bc} \cdot d`

`\delimdef` `\dleft` `\dmiddle` `\dright`

We did not use `\def`, but `\delimdef` which is defined by this package. Also, we substituted `\dleft` and `\dright` for `\left` and `\right`. There's also `\dmiddle`, as in this example:

```
\delimdef\braket#1#2{\dleft\langle#1\dmiddle\vert#2\dright\rangle}
```

$\langle\psi_n(t)|\psi\rangle$ `\braket{\psi_n(t)}\psi`

But why wouldn't we want to use `\def`? Because `\left`, `\middle` and `\right` are not always what you want. For example, if you want the delimiters to be

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a bit bigger in the last example, you would substitute `\bigl`, `\bigm` and `\bigr` for `\left`, `\middle` and `\right`. This is not possible with a simple `\def` macro. Macros defined by `\delimdef` can substitute `\dleft` etc. for any common set of delimiter commands, by using a *size prefix*:

$\bigl\langle \psi_n(t) \bigm| \psi \bigr\rangle$ `\mbig\braket{\psi_n(t)}\psi`

Let's look at another example:

$\left(\underbrace{a_1 + a_2}_{=b}\right)$ `\p{\underbrace{a_1 + a_2}_{=b}}`

We want to use our `\p` macro, but the parentheses should be reset to their normal size. The size prefix `\mnorm` does just that:

$(\underbrace{a_1 + a_2}_{=b})$ `\mnorm\p{\underbrace{a_1 + a_2}_{=b}}`

`\mnorm` `\mbig` `\mBig` `\mbigg` `\mBigg` `\mauto`

The following size prefixes are defined by this package:

$(\frac{a}{b})$ `\mnorm` (normal character size)

$\bigl(\frac{a}{b}\bigr)$ `\mbig` = `\bigl` etc.

$\Bigl(\frac{a}{b}\Bigr)$ `\mBig` = `\Bigl` etc.

$\biggl(\frac{a}{b}\biggr)$ `\mbigg` = `\biggl` etc.

$\Biggl(\frac{a}{b}\Biggr)$ `\mBigg` = `\Biggl` etc.

$\left(\frac{a}{b}\right)$ `\mauto` = `\left` etc. (default behavior)

`\delim@load` If no prefix is given, `\mauto` is used. New size prefixes can be defined using the `\delim@load` macro; refer to the implementation of the existing prefixes for details.

Implementation

`\delim@load` Size prefixes use this macro to enter a new delimiter level and define the delimiter commands for that level. `\delim@loaded` signals that delimiter commands have been provided for this level. Its exact content is irrelevant, only the fact that it is defined is needed (see below).

```
\def\delim@load#1#2#3{%
 \begingroup%
 \def\dleft{#1}%
 \def\dmiddle{#2}%
 \def\dright{#3}%
 \def\delim@loaded{}%
}%
```

`\mauto` `\mnorm` `\mbig` `\mBig` `\mbigg` `\mBigg` The size prefixes are defined using `\delim@load`.

```
\newcommand\mauto{\delim@load\left\middle\right}%
\newcommand\mnorm{\delim@load\relax\relax\relax}%
\newcommand\mbig{\delim@load\bigl\bigm\bigr}%
\newcommand\mBig{\delim@load\Bigl\Bigm\Bigr}%
\newcommand\mbigg{\delim@load\biggl\biggm\biggr}%
\newcommand\mBigg{\delim@load\Biggl\Biggm\Biggr}%
```

`\delimdef` This defines a new delimiter macro. The macro substitution text is extended by a grouping level, with additional logic being collected in `\delim@begingroup`.

```
\def\delimdef#1#{\delim@def{#1}}%
\def\delim@def#1#2{\def#1{\delim@begingroup#2\endgroup}}%
```

Special thanks go to Martin Scharrer for pointing out to me the capabilities of `\def` used in this implementation (see `http://tex.stackexchange.com/questions/28207/`).

`\delim@begingroup` `\delim@begingroup` ensures that delimiters are loaded (default is `\mauto`) and the `\delim@loaded` flag is cleared (for cascaded delimiter macros to work properly). The `\begingroup` is contained in the delimiter macro, see the definition of `\delim@load`.

```
\def\delim@begingroup{%
 \ifx\delim@loaded\undefined\mauto\fi%
 \let\delim@loaded\undefined%
}%
```