The \texttt{delim} package\footnote{This document corresponds to \texttt{delim} 1.0, dated 2011/09/13.}

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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:

\[
(a + \frac{b}{c}) \cdot d \qquad (a + \frac{bc}{c}) \cdot d
\]

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

\[
\left(a + \frac{bc}{c}\right) \cdot d \qquad \left(a + \frac{bc}{c}\right) \cdot d
\]

But because it’s cumbersome to write \texttt{\left} and \texttt{\right} every time, we define and use a macro:

\[
\texttt{\delimdef}\texttt{p}\texttt{#1}\{\texttt{\dleft}\texttt{#1}\texttt{\dright}}\}
\]

\[
(a + \frac{b}{c}) \cdot d \quad \texttt{p}(a + \frac{bc}{c}) \cdot d
\]

\texttt{\delimdef} \texttt{\dleleft} \texttt{\dmiddle} \texttt{\drigright} \texttt{\braket}\texttt{#1\#2}\{\texttt{\dleleft}\texttt{#1}\texttt{\drigright}]\}

\[
\langle \psi_n(t) | \psi \rangle \quad \texttt{\braket}\texttt{\psi_n(t)}\texttt{\psi}
\]

But why wouldn’t we want to use \texttt{\def}? Because \texttt{\left}, \texttt{\middle} and \texttt{\right} are not always what you want. For example, if you want the delimiters to be
a bit bigger in the last example, you would substitute \bigl, \bigr and \bigm 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:

\[ \langle \psi_n(t) | \psi \rangle \]
\[ \mbig\braket{\psi_n(t)}\psi \]

Let’s look at another example:

\[
\begin{pmatrix}
a_1 + a_2 \\
\end{pmatrix}
\]
\[ \p{\underbrace{a_1 + a_2}_{=b}} \]

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

\[
\begin{pmatrix}
a_1 + a_2 \\
\end{pmatrix}_{=b}
\]
\[ \mnorm\p{\underbrace{a_1 + a_2}_{=b}} \]

The following size prefixes are defined by this package:

- \mnorm (normal character size)
- \mbig = \bigl etc.
- \mBig = \Bigl etc.
- \mbigg = \biggl etc.
- \mBigg = \Biggl etc.
- \mauto = \left etc. (default behavior)

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).

\begin{verbatim}
1 \def\delim@load#1#2#3{% 
2 \begingroup% 
3 \def\dleft{#1}% 
4 \def\dmiddle{#2}% 
5 \def\dright{#3}% 
6 \def\delim@loaded{}% 
7 }%
\end{verbatim}

The size prefixes are defined using \delim@load.

\begin{verbatim}
8 \newcommand\mauto{\delim@load\left\middle\right}%
9 \newcommand\mnorm{\delim@load\relax\relax\relax}%
10 \newcommand\mbig{\delim@load\bigl\bigm\bigr}%
11 \newcommand\mBig{\delim@load\Bigl\Bigm\Bigr}%
12 \newcommand\mbigg{\delim@load\biggl\biggm\biggr}%
13 \newcommand\mBigg{\delim@load\Biggl\Biggm\Biggr}%
\end{verbatim}

\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.

\begin{verbatim}
14 \def\delimdef#1#{\delim@def{#1}}%
15 \def\delim@def#1#2{\def#1{\delim@begingroup#2\endgroup}}%
\end{verbatim}

Special thanks go to Martin Scharrer for pointing out to me the capabilities of \def used in this implementation (see \url{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.

\begin{verbatim}
16 \def\delim@begingroup{% 
17 \ifx\delim@loaded\undefined\mauto\fi%
18 \let\delim@loaded\undefined%
19 }%
\end{verbatim}