The `fouridx` package*

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Abstract

This package enables left subscripts and superscripts in math mode. These subscripts and superscripts are automatically raised for better fitting to the symbol they belong to. This is done in such a way that the left and right subscripts and superscripts are set on the same line, respectivly.

Contents

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1 Introduction

In mathematical equations, it is sometimes necessary to use indices (subscript or superscript) that are positioned at the left side of a symbol. In tensor mathematics, for instance, some notations use a transponed sign at the left side of the symbol:

$$ {}^{\mathrm{t}}(A_{ij}) \quad = \quad (A_{ji}) $$

*This file has version 1.00 last revised 2008/03/27.

For symbols with a normal character height, this can be reached by simply put the indices without an own symbol:

```
${_1^2}a_3^4$
```
${}_1^2a_3^4$

Is the symbol larger, this leads to unsatisfactory results:

```
${^1_2}\left(\frac{1}{b}\right)^3_4$
```
${}^1_2\left(\frac{1}{b}\right)^3_4$

If the subscripts on the left and right side are of different height or the left subscripts and superscripts are of different width, the result is also unsatisfactory:

```
${^{(k)}_n}A^x_{\overline x\vert}$
```
${}^{(k)}_nA^x_{\overline x\vert}$

A better output can be reached by using the package `fouridx.sty`:

```
$\fourIdx{1}{2}{3}{4}{\left(\frac{1}{b}\right)}$
```
$\fourIdx{1}{2}{3}{4}{\left(\frac{1}{b}\right)}$

```
$\fourIdx{(k)}{n}{x}{\overline x\vert}A$
```
$\fourIdx{(k)}{n}{x}{\overline x\vert}A$

1.1 Old bugs/regression

Error	version	old	actual
math style ignored	1.00	$1_{1}{}_{2}5^{3}_{4}$	$1_{1}{}_{2}5^{3}_{4}$
hang over at left after line breaks	1.00	Start of line $1_{2}5^{3}_{4}$	Start of line $1_{2}5^{3}_{4}$
wrong positions if nested	1.00	$\vert^{1}_{2}51^{3}_{4}{}^{3}_{3}1_{2}52^{3}_{4}\vert$	$\vert^{1}_{2}51^{3}_{4}{}^{3}_{3}1_{2}52^{3}_{4}\vert$

1.2 Comparison with sideset

The command sideset from the amsmath package has similiar functionality. It requires that the central box is a math operator an it typesets the left super- and subscript left aligned while fourIdx uses right alignment. Which suits better depends on the purpose.

2 Usage of the package

One command is provided by the package.

`\fourIdx` The `\fourIdx` command has the syntax `\fourIdx{`⟨*left superscript*⟩`}{`⟨*left subscript*⟩`} {`⟨*right superscript*⟩`}{`⟨*right subscript*⟩`}{`⟨*symbol*⟩`}`. This command typesets the symbol ⟨*symbol*⟩ with indices on the left and on the right side. Example:

```
$\fourIdx1234{\left(\frac{1}{b}\right)}$
```
$\fourIdx1234{\left(\frac{1}{b}\right)}$

You may omit left or right indices by using empty arguments.

The next example shows the same in the different mathematical styles:

$$\fourIdx1234{\left(\frac{1}{b}\right)} \quad \fourIdx1234{\left(\frac{1}{b}\right)} \quad \fourIdx1234{\left(\frac{1}{b}\right)} \quad \fourIdx1234{\left(\frac{1}{b}\right)}$$

3 The implementation

Heading of the package:

```
\NeedsTeXFormat{LaTeX2e}[1995/12/01]
\ProvidesPackage{fouridx}[\filedate\space v\fileversion\space Four indices]
```

`\fourIdx` Command for left and right indices.

```
\newcommand{\fourIdx}[5]{%
   \ensuremath{\mathchoice%
      {{\setbox1=\hbox{$\scriptstyle{#1}$}%
       \setbox2=\hbox{$\scriptstyle{#2}$}%
       \setbox5=\hbox{$\displaystyle{#5}$}%
       \hspace*{\ifnum\wd1>\wd2\wd1\else\wd2\fi}%
       \copy5^{\scriptstyle\hspace{-\wd1}\hspace{-\wd5}#1\hspace{\wd5}#3}%
             _{\scriptstyle\hspace{-\wd2}\hspace{-\wd5}#2\hspace{\wd5}#4}%
      }}% display
      {{\setbox1=\hbox{$\scriptstyle{#1}$}%
       \setbox2=\hbox{$\scriptstyle{#2}$}%
       \setbox5=\hbox{$\textstyle{#5}$}%
       \hspace*{\ifnum\wd1>\wd2\wd1\else\wd2\fi}%
       \copy5^{\scriptstyle\hspace{-\wd1}\hspace{-\wd5}#1\hspace{\wd5}#3}%
             _{\scriptstyle\hspace{-\wd2}\hspace{-\wd5}#2\hspace{\wd5}#4}%
      }}% text
      {{\setbox1=\hbox{$\scriptscriptstyle{#1}$}%
       \setbox2=\hbox{$\scriptscriptstyle{#2}$}%
       \setbox5=\hbox{$\scriptstyle{#5}$}%
       \hspace*{\ifnum\wd1>\wd2\wd1\else\wd2\fi}%
       \copy5^{\scriptscriptstyle\hspace{-\wd1}\hspace{-\wd5}#1\hspace{\wd5}#3}%
             _{\scriptscriptstyle\hspace{-\wd2}\hspace{-\wd5}#2\hspace{\wd5}#4}%
      }}% script
      {{\setbox1=\hbox{$\scriptscriptstyle{#1}$}%
       \setbox2=\hbox{$\scriptscriptstyle{#2}$}%
       \setbox5=\hbox{$\scriptscriptstyle{#5}$}%
       \hspace*{\ifnum\wd1>\wd2\wd1\else\wd2\fi}%
       \copy5^{\scriptscriptstyle\hspace{-\wd1}\hspace{-\wd5}#1\hspace{\wd5}#3}%
             _{\scriptscriptstyle\hspace{-\wd2}\hspace{-\wd5}#2\hspace{\wd5}#4}%
      }}% scriptscript
}}
```