The altsubsup package*

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Abstract

A LaTeX package to customize subscripts and superscripts. An alternative formatting is used when the subscript or the superscript is written in square brackets. By default, it allows to quickly get an upright format.

Example:

```
$ x_[roman]^{italic} \qquad x_{italic}^[roman] $
```

$$x^{italic}_{\text{roman}} \qquad x^{\text{roman}}_{italic}$$

Contents

1 Introduction **2**

2 Motivations **2**

3 User interface **2**
3.1 Usage . . . 2
3.2 Options . . . 2
3.2.1 Available options . . . 3
3.2.2 `spbmark` option . . . 3

4 Examples **4**
4.1 Default . . . 4
4.2 Set new formatting commands . . . 4

5 Complements **4**
5.1 Known issue . . . 4
5.2 Alternative . . . 5
5.3 Changelog . . . 5

6 Implementation **5**

Index **8**

*This document corresponds to altsubsup v1.1, dated 2022/03/15.

1 Introduction

The altsubsup package provides an alternative formatting for subscripts and superscripts when written with square brackets in math mode, like for

```
$ x_[my~subscript] $\quad or \quad $x^[my~superscript] $.
```

$$x_{\text{my subscript}} \quad \text{or} \quad x^{\text{my superscript}}.$$

The commands used to typeset the alternative forms of subscripts and superscripts are set, respectively, with `\SetAltSubscriptCommand` and `\SetAltSuperscriptCommand`. By default, the command `\text` (from the amsmath/amstext package) is used.

This package redefines `_` and `^` symbols (their catcode and mathcode are modified to make them active in math mode). Options allow to redefine `both` →P. 3 (by default), only `subscript` →P. 3 `_` symbol, or only `superscript` →P. 3 `^` symbol.

2 Motivations

Common typographic conventions[1] use italic (sloping) type for physical quantities or mathematical variables and roman (upright) type for words or fixed numbers. For example, the heat capacity at constant pressure should be printed C_p, but the kinetic energy E_k (instead of E_k) and the relative permeability μ_r (instead of μ_r). This can be obtained in LaTeX with[2] `$E_{\mathrm{k}}$` and `$\mu_{\mathrm{r}}$`. This package allows to write them simply `$E_[k]$` and `$\mu_[r]$`.

3 User interface

3.1 Usage

`\SetAltSubscriptCommand{`⟨*command*⟩`}`
`\SetAltSuperscriptCommand{`⟨*command*⟩`}`

Set to ⟨*command*⟩ the command used to format the alternative forms of subscript or superscript written with square brackets, like `_[...]` or `^[...]`.

`\SetAltSubSupCommands{`⟨*command*⟩`}`

Sets to the same ⟨*command*⟩ the commands used to format the subscripts and superscripts written with square brackets.

3.2 Options

To load the altsubsup, simply add in preamble, before the "`\begin{document}`":

```
\usepackage{altsubsup}
```

[1] See, for example: International Organization for Standardization. (2009). *Quantities and units – Part 1: General* (ISO Standard No. 80000-1:2009). https://www.iso.org/standard/30669.html.

[2] Instead of `\mathrm`, a best choice is the `\` macro provided by the amsmath package, which, for example, handle spaces. It's the formatting macro used by default by the altsubsup package.

Options can be given, in a comma-separated list. For example, to redefine only the subscript `_` symbol, write:

```
\usepackage[subscript]{overarrows}
```

3.2.1 Available options

subscript

Redefine only the `_` subscript symbol.

superscript

Redefine only the `^` superscript symbol.

both

Redefine both `_` and `^` symbols (default).

spbmark

Use the spbmark package to handle the alternative forms of superscripts and superscripts written in square brackets (see below).

3.2.2 `spbmark` option

The spbmark package (`https://www.ctan.org/pkg/spbmark`), by Qu Yi, allows a complete customisation of subscripts and superscripts. With the macros of the spbmark package to handle subscripts and superscripts `spbmark` option, the altsubsup package use the `\sub` and `\super` written in square brackets.

Theses two macros are called with the respective `altsub` and `altsup` spbmark styles. These styles are initially created empty, set them to get the desired output. For example, to display subscripts in blue and superscripts in red, use:

```
\defspbstyle{altsub}{cmd=\color{blue}}
\defspbstyle{altsup}{cmd=\color{red}}
```

A major limitation of the `spbmark` option is the bad alignment generated when a subscript and a superscript are simultaneously used (the spbmark macro for this is `\supersub`). For example, `x_[sub]^[super]` gives $x_{\text{sub}}{}^{\text{super}}$ instead of $x_{\text{sub}}^{\text{super}}$.

4 Examples

4.1 Default

```
\[
  x_a^b \quad
  x_{braces~sub}^{braces~sup} \quad
  x_[brackets~sub]^{braces~sup} \quad
  x_{braces~sub}^[brackets~sup] \quad
  x_[brackets~sub]^[brackets~sup]
\]
```

$$x_a^b \quad x_{braces\ sub}^{braces\ sup} \quad x_{\text{brackets sub}}^{braces\ sup} \quad x_{braces\ sub}^{\text{brackets sup}} \quad x_{\text{brackets sub}}^{\text{brackets sup}}$$

4.2 Set new formatting commands

The command `\text` comes from amstext package (part of amsmath) and the command `\color` from the xcolor package.

```
\newcommand{\bluecolor}[1]{\text{\color{blue}#1}}
\newcommand{\redcolor}[1] {\text{\color{red}#1}}
\SetAltSubscriptCommand{\bluecolor}
\SetAltSuperscriptCommand{\redcolor}
\[
  x_a^b \quad
  x_{braces~sub}^{braces~sup} \quad
  x_[brackets~sub]^{braces~sup} \quad
  x_{braces~sub}^[brackets~sup] \quad
  x_[brackets~sub]^[brackets~sup]
\]
```

$$x_a^b \quad x_{braces\ sub}^{braces\ sup} \quad x_{\text{brackets sub}}^{braces\ sup} \quad x_{braces\ sub}^{\text{brackets sup}} \quad x_{\text{brackets sub}}^{\text{brackets sup}}$$

Setting simultaneously the same command for subscripts and superscripts:

```
\SetAltSubSupCommands{\mathbf}
\[
  x_a^b \quad
  x_{braces~sub}^{braces~sup} \quad
  x_[brackets~sub]^{braces~sup} \quad
  x_{braces~sub}^[brackets~sup] \quad
  x_[brackets~sub]^[brackets~sup]
\]
```

$$x_a^b \quad x_{braces\ sub}^{braces\ sup} \quad x_{\mathbf{brackets\ sub}}^{braces\ sup} \quad x_{braces\ sub}^{\mathbf{brackets\ sup}} \quad x_{\mathbf{brackets\ sub}}^{\mathbf{brackets\ sup}}$$

5 Complements

5.1 Known issue

The use of the prime symbol `'` can raise the *Double superscript* error message. This is normally fixed (`x'^2` gives x'^2 correctly). If needed, enclose the expres-

sion with `{...}`. In particular, `x'^[sup]` doesn't work, and should be written: `{x'}^[sup]`.

5.2 Alternative

the subtext package (`https://www.ctan.org/pkg/subtext`), by Palle Jørgensen, formats `_[...]` subscripts with `\text`. The altsubsup package works both for subscripts and superscripts, allows to customise the commands, and redefine symbols only in math mode.

5.3 Changelog

v1.1

- Backup standard subscript `_` and superscript `^` commands to handle packages that redefine `\sb` or `\sp` macros, like spbmark.
- Add option `spbmark` → P. 3 to handle alternative subscripts and superscripts form with the spbmark package.

v1.0 Initial version.

6 Implementation

Flags declaration

Determine the commands that will be redefined

```
\newif\ifaltsbsp@subscript    \altsbsp@subscripttrue
\newif\ifaltsbsp@superscript  \altsbsp@superscripttrue
```

Use the spbmark mechanism

```
\newif\ifaltsbsp@spbmark      \altsbsp@spbmarkfalse
```

Options declarations and processing

```
\DeclareOption{subscript}   {\altsbsp@subscripttrue   \altsbsp@superscriptfalse}
\DeclareOption{superscript} {\altsbsp@subscriptfalse  \altsbsp@superscripttrue }
\DeclareOption{both}        {\altsbsp@subscripttrue   \altsbsp@superscripttrue }
\DeclareOption{spbmark}     {\altsbsp@spbmarktrue}
\DeclareOption*{\PackageWarning{altsubsup}{Unknown option \CurrentOption}}
\ProcessOptions\relax
\ifaltsbsp@spbmark
  \RequirePackage{spbmark}
\fi
```

Backup standard superscript and subscript commands

```
\AtBeginDocument{%
  \begingroup\catcode`\_=8 \global\let\altsbsp@standardsub=_\endgroup
  \begingroup\catcode`\^=7 \global\let\altsbsp@standardsup=^\endgroup
```

Redefine catcodes and make symbols active in mathmode

```
  \ifaltsbsp@subscript
```

The standard catcode of `_` is 8 (subscript). Display a warning if it was already altered.

```
    \ifnum\catcode`\_=8\else
      \PackageWarning{altsubsup}{The character "_" does not have
        its standard catcode\MessageBreak before the package altsubsup modifies
        it. Something\MessageBreak might go wrong}
    \fi
```

Make `_` active in math mode.

```
    \catcode`\_=12 \mathcode`\_="8000
  \fi%
  \ifaltsbsp@superscript
```

The standard catcode of `^` is 7 (superscript). Display a warning if it was already altered.

```
    \ifnum\catcode`\^=7\else
      \PackageWarning{altsubsup}{The character "^" does not have
        its standard catcode\MessageBreak before the package altsubsup modifies
        it. Something\MessageBreak might go wrong}
    \fi
```

Make `^` active in math mode.

```
  \catcode`\^=12 \mathcode`\^="8000
\fi%
}
```

Redefinition of the subscript symbol

```
\ifaltsbsp@subscript%
\begingroup\lccode`\~=`\_\lowercase{\endgroup%
  \def~}{\@ifnextchar[% dummy bracket ]
  {\altsbsp@subwrapper}% bracket wrapper
  {\altsbsp@standardsub}% standard form
}%
\fi
```

Redefinition of the superscript symbol

```
\ifaltsbsp@superscript%
\begingroup\lccode`\~=`\^\lowercase{\endgroup%
  \def~}{\@ifnextchar[% dummy bracket ]
  {\altsbsp@supwrapper}% bracket wrapper
  {\altsbsp@standardsup}% standard form
}%
\fi
```

User macros

`\SetAltSubscriptCommand`

```
\def\SetAltSubscriptCommand#1{\let\altsbsp@altsubcmd#1}%
```

```
\ifaltsbsp@spbmark%
  \defspbstyle{altsub}{}
  \def\altsbsp@subwrapper[#1]{\sub[style=altsub]{\altsbsp@altsubcmd{#1}}}%
\else
  \def\altsbsp@subwrapper[#1]{\altsbsp@standardsub{\altsbsp@altsubcmd{#1}}}%
\fi
```

`\SetAltSuperscriptCommand`

```
\def\SetAltSuperscriptCommand#1{\let\altsbsp@altsupcmd#1}%
```

```
\ifaltsbsp@spbmark%
  \defspbstyle{altsup}{}
  \def\altsbsp@supwrapper[#1]{\super[style=altsup]{\altsbsp@altsupcmd{#1}}}%
\else
  \def\altsbsp@supwrapper[#1]{\altsbsp@standardsup{\altsbsp@altsupcmd{#1}}}%
\fi
```

\SetAltSubSupCommands

```
\newcommand{\SetAltSubSupCommands}[1]{%
  \SetAltSubscriptCommand{#1}%
  \SetAltSuperscriptCommand{#1}%
}
```

Set default commands

```
\RequirePackage{amstext}%
\SetAltSubSupCommands{\text}%
```

Fix prime symbol

```
\ifaltsbsp@superscript%
\begingroup \catcode`\^=12%
\gdef\altsbsp@pr@m@s{% copy of \@pr@m@s code from latex.ltx
  \ifx'\@let@token
    \expandafter\pr@@@s
  \else
    \ifx^\@let@token
      \expandafter\expandafter\expandafter\pr@@@t
    \else
      \egroup
    \fi
  \fi}
\endgroup
\let\pr@m@s\altsbsp@pr@m@s
\fi
```

Index

Entries listed in the categories “commands” and “internal macros” also include references to package implementation.

Package options
  both, 3
  spbmark, 3
  subscript, 3
  superscript, 3

both package option, 3

Commands
  \SetAltSubscriptCommand, 2, 6, 7
  \SetAltSubSupCommands, 2, 7
  \SetAltSuperscriptCommand, 2, 6, 7

Internal macros
  \altsbsp@altsubcmd, 6
  \altsbsp@altsupcmd, 6
  \altsbsp@pr@m@s, 7
  \altsbsp@spbmarkfalse, 5
  \altsbsp@spbmarktrue, 5
  \altsbsp@standardsub, 5, 6
  \altsbsp@standardsup, 5, 6
  \altsbsp@subscriptfalse, 5
  \altsbsp@subscripttrue, 5
  \altsbsp@subwrapper, 6
  \altsbsp@superscriptfalse, 5
  \altsbsp@superscripttrue, 5
  \altsbsp@supwrapper, 6
  \ifaltsbsp@spbmark, 5, 6
  \ifaltsbsp@subscript, 5, 6
  \ifaltsbsp@superscript, 5–7

\SetAltSubscriptCommand, 2
\SetAltSubSupCommands, 2
\SetAltSuperscriptCommand, 2
spbmark package option, 3
subscript package option, 3
superscript package option, 3

Change History

v1.0
General: Initial version. 1
v1.1
General: Add sbpmark option 5
Backup standard superscript and superscript commands . . . 5
v1.2
General: Add warnings. 5