

# The `overarrows` package\*

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January 19, 2023

## Abstract

A  $\text{\LaTeX}$  package to create custom arrows over math expressions, mainly for vectors (but arrows can as well be drawn below). Arrows stretch with content, scale with math styles, and have a correct kerning when a subscript follows.

Short example:

```
\NewOverArrowCommand{overrightarrow}{%  
  end=\rightharpoonup  
}  
  
\begin{align*}  
  &\overrightarrow{v} \quad \overrightarrow{v}_{\text{subscript}} \quad \overrightarrow{ABCD} \quad \overrightarrow{v}_{\text{subscript}} \\  
&\overrightarrow{ABCD} \quad \overrightarrow{v}_{\text{subscript}}\end{align*}
```

$$\begin{array}{cc} \overrightarrow{v} & \overrightarrow{v}_{\text{subscript}} \\ \overrightarrow{ABCD} & \overrightarrow{v}_{\text{subscript}} \end{array}$$

Predefined commands are also provided:

- to typeset vectors:

$$\overrightarrow{v} \quad \overrightarrow{AB},$$

- to draw arrows of various shapes above math expressions:

$$\overrightarrow{AB} \quad \overleftarrow{AB} \quad \overleftrightarrow{AB} \quad \overrightarrow{AB} \quad \overleftarrow{AB} \quad \overrightarrow{AB} \quad \overleftarrow{AB} \quad \overrightarrow{AB},$$

- to draw arrows of various shapes under math expressions:

$$\underline{\overrightarrow{AB}} \quad \underline{\overleftarrow{AB}} \quad \underline{\overleftrightarrow{AB}} \quad \underline{\overrightarrow{AB}} \quad \underline{\overleftarrow{AB}} \quad \underline{\overrightarrow{AB}} \quad \underline{\overleftarrow{AB}} \quad \underline{\overrightarrow{AB}}.$$

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\*This document corresponds to `overarrows` v1.0, dated 2023/01/18.

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# 1 Presentation of the package

The `overarrows` package allows to create commands for drawing arrows over math expressions. These arrows:

- are fully customisable, at command definition, through a key-value interface;
- stretch with the content and can cover many characters, like in  $\overrightarrow{AB}$ ;
- scale with math styles<sup>1</sup>, like in  $\overrightarrow{v}_{\vec{u}}$ .

Commands created with the `overarrows` package are provided with a starred variant, that removes the extra end space generated by the arrow. This is particularly useful when the command is followed by a subscript. For example, the velocity of the center of mass can be written with exactly the same kerning when scalar  $v_{\text{cm}}$  or vector  $\vec{v}_{\text{cm}}$  (no extra space before the subscript, unlike the output of the unstarred variant:  $\vec{v}_{\text{cm}}$ ).

The `overarrows` package was primitively written for vectors, but in a highly customisable way. It can be used to define a large variety of arrows, using math symbols, or PGF/TikZ commands. It's also possible to create commands that draw the arrows under. Some predefined commands are provided, giving<sup>2</sup>, for arrow over:

$$\overrightarrow{\alpha + \beta} \quad \overleftarrow{\alpha + \beta} \quad \overleftrightarrow{\alpha + \beta} \quad \overrightarrow{\alpha + \beta} \quad \overleftarrow{\alpha + \beta} \quad \overrightarrow{\alpha + \beta} \quad \overleftarrow{\alpha + \beta} \quad \overrightarrow{\alpha + \beta}$$

and for arrow under :

$$\underline{\alpha + \beta} \quad \underline{\alpha + \beta} \quad \underline{\alpha + \beta} \quad \underline{\alpha + \beta} \quad \underline{\alpha + \beta} \quad \underline{\alpha + \beta} \quad \underline{\alpha + \beta} \quad \underline{\alpha + \beta}$$

## 2 Introduction

### 2.1 Vector arrows

Vectors are commonly typeset in bold face, or with an arrow above<sup>3</sup>. For this second convention,  $\text{\TeX/L\TeX}$  provides the command `\vec`, which accents its content (using the `\mathaccent` command) with the character  $\vec{\phantom{x}}$  (`\mathchar"017E` in Computer Modern font). But  $\vec{\phantom{x}}$  isn't extensible, and gives:  $\vec{v}$ ,  $\vec{AB}$  or  $\vec{\text{grad}}$  (there's no command `\widevec` analogous to `\widehat`).

An extensible alternative is given by the command `\overrightarrow`, available in  $\text{\TeX/L\TeX}$ , and which is redefined by the commonly used `amsmath` package. But its arrow, built with the `\rightarrow` symbol  $\rightarrow$ , is too large with the default *Computer Modern* font:  $\overrightarrow{AB}$ . Another alternative is the `esvect` package, which provides the `\vv` command and a set of custom arrows:  $\overrightarrow{AB}$ ,  $\overrightarrow{AB}$ ,  $\overrightarrow{AB}$ ,  $\overrightarrow{AB}$ ,  $\overrightarrow{AB}$ ,  $\overrightarrow{AB}$ ,  $\overrightarrow{AB}$ ,  $\overrightarrow{AB}$ .

<sup>1</sup>`\displaystyle`, `\textstyle`, `\scriptstyle` and `\scriptscriptstyle`.

<sup>2</sup>Displayed here with the `old-arrows`<sup>P.14</sup> option.

<sup>3</sup>See, for example: International Organization for Standardization. (2019). *Quantities and units – Part 2: Mathematics* (ISO Standard No. 80000-2:2019). <https://www.iso.org/standard/64973.html>.

## 2.2 Stack and arrow macros

It's worth looking at the definition of `amsmath \overrightarrow` command:

```
\long macro:->\mathpalette {\overarrow@ \rightarrowfill@ }
```

Three macros are used here:

`\mathpalette` adapts the output to the current math style;

`\overarrow@` is the *stack macro*, that puts the arrow above the content;

`\rightarrowfill@` is the *arrow macro*, that holds the content of the arrow.

The command `\vv` from `esvec` is defined with a very similar way, using its own stack macro (`\overvect@`) and arrow macro (`\vectfill@`).

The `overarrows` package uses the same mechanism. Arrow and stack macros are set, at command creation, through a key-value interface provided by the `pgfkeys` package (after creation, however, the command definition is static and the key-value interface is not used).

## 2.3 Extensible arrows

Arrows drawn by the commands `\overrightarrow` or `\vv` are built by joining math symbols, and made extensible by repetition of the central symbol<sup>4</sup>. Thus, the line of the macro `\overrightarrow` is made by repetition of command `\relbar` — (which simply corresponds to the minus sign), while `\vv` use its own command `\relbareda` -.

This method may generate some undesirable spacing issues, when symbols badly overlap. See, for example, the output of `amsmath \overrightarrow` (left) and `esvect \vv` (right) in `\scriptscriptstyle` math style (scaled by a factor 4):

$\overrightarrow{\text{long vector}}$        $\overrightarrow{\text{long vector}}$

While the arrow on the left lets guess where the symbols — overlap, the arrow on the right present unwanted spaces and show clearly its composition as association of the symbols —, - and →.

By default, the `overarrows` package uses the same mechanism to extend arrows according to their contents. Settings and tools are provided to perform fine tuning and avoid spacing issues. As example, see below the `\overrightarrow` and `\vv` commands, as redefined by `overarrows` (in `\scriptscriptstyle` and scaled by a factor 4):

$\overrightarrow{\text{long vector}}$        $\overrightarrow{\text{long vector}}$

The `overarrows` package also provides an alternative mechanism. When used, the length `\overarrowlength` is set, according to the arrow command content, and can be employed, for example, to draw arrows using PGF/TikZ or the `LATEX` picture environment.

<sup>4</sup>Using the `TEX \cleaders` command.

## 3 Quick start

### 3.1 Loading the package `overarrows`

To load the `overarrows`, simply add in preamble, before the “`\begin{document}`”:

```
\usepackage{overarrows}
```

Options can be given, in a comma-separated list. For example, to use the predefined commands shown in the section 1, page 3, write:

```
\usepackage[allcommands, old-arrows]{overarrows}
```

This define the commands (described in section 4.2.5, page 18):

- |   |   |
|---|---|
| • <code>\overrightarrow</code> <sup>→P. 18</sup>            | • <code>\underrightarrow</code> <sup>→P. 19</sup>           |
| • <code>\overleftarrow</code> <sup>→P. 19</sup>             | • <code>\underleftarrow</code> <sup>→P. 19</sup>            |
| • <code>\overleftrightarrow</code> <sup>→P. 19</sup>        | • <code>\underleftrightarrow</code> <sup>→P. 19</sup>       |
| • <code>\overrightarrowharpoonup</code> <sup>→P. 19</sup>   | • <code>\underrightharpoonup</code> <sup>→P. 19</sup>       |
| • <code>\overrightarrowharpoondown</code> <sup>→P. 19</sup> | • <code>\underrightharpoondown</code> <sup>→P. 20</sup>     |
| • <code>\overleftarrowharpoonup</code> <sup>→P. 19</sup>    | • <code>\underleftarrowharpoonup</code> <sup>→P. 20</sup>   |
| • <code>\overleftarrowharpoondown</code> <sup>→P. 19</sup>  | • <code>\underleftarrowharpoondown</code> <sup>→P. 20</sup> |
| • <code>\overbar</code> <sup>→P. 19</sup>                   | • <code>\underbar</code> <sup>→P. 20</sup>                  |

Note that the `old-arrows`<sup>→P. 14</sup> option may give bad results, if math fonts have been changed. Simply remove the option in this case.

Many other options are available. See the complete list, page 11.

### 3.2 Commands creation

Commands are created with `\NewOverArrowCommand`<sup>→P. 15</sup>. This macro take two mandatory arguments : the name of the command (without backslash), and the arrow configuration as comma-separated list of key-values. By default, a right arrow is set:

```
\NewOverArrowCommand{myovercmd}{  
$ \myovercmd{test}$
```



$$\overrightarrow{test}$$

Commands are defined with a starred variant, designed to handle subscripts:

```
$ v_{sub} \quad \backslashqqquad \backslashmyovercmd{v}_{sub} \quad \backslashqqquad \backslashmyovercmd*{v}_{sub} $
```

$$v_{sub} \quad \overrightarrow{v}_{sub} \quad \overrightarrow{v}_{sub}$$

### 3.3 Start and end of the arrow

Extremities of the arrow are set by the keys `start`<sup>→P. 22</sup> and `end`<sup>→P. 22</sup>. For example, an arrow starting with a hook (symbols `\hook` ) and ending with two heads (symbol `\twoheadrightarrow` ) is defined by:

```
\NewOverArrowCommand{\overhooktwoheadrightarrow}{%
  start=\lhook, end=\twoheadrightarrow,
}
```

Note that `\twoheadrightarrow` must be defined, as it is not in  $\text{\LaTeX}$ . This can be done with the package `amssymb`, by adding in preamble:

```
\usepackage{amssymb}
```

With the previous definition, the result of the command `\overhooktwoheadrightarrow` is faulty:

```
$ \overhooktwoheadrightarrow{v} \quad \overhooktwoheadrightarrow{AB} $
```

$$\overhooktwoheadrightarrow{v} \quad \overhooktwoheadrightarrow{AB}$$

The problem comes from symbols junction and the trimming used to obtain their overlap. It can be solved with the keys `trim start`<sup>P.23</sup> and `trim end`<sup>P.23</sup>, which are numbers and set the corresponding trimming in math units (typically  $1/18 \text{ em}$ ). Appropriate values gives better results:

```
\NewOverArrowCommand{\overhooktwoheadrightarrow}{%
  start=\lhook, end=\twoheadrightarrow,
  trim start=1.5, trim end=2,
}
$ \overhooktwoheadrightarrow{v} \quad \overhooktwoheadrightarrow{AB} $
```

$$\overhooktwoheadrightarrow{v} \quad \overhooktwoheadrightarrow{AB}$$

If the math font differs from the default *Computer Modern*, the central part of the arrow may have inappropriate position or line width. This is because the default symbol used for the arrow line is `\relbareda` from the `esvect` package. If needed, try to set the `middle`<sup>P.22</sup> key with the symbol `\relbar`. The trimming should also be adapted:

```
\NewOverArrowCommand{\overhooktwoheadrightarrow}{%
  start=\lhook, end=\twoheadrightarrow, middle=\relbar, %
  trim start=0, trim end=3, trim middle=5,
}
$ \overhooktwoheadrightarrow{v} \quad \overhooktwoheadrightarrow{AB} $
```

$$\overhooktwoheadrightarrow{v} \quad \overhooktwoheadrightarrow{AB}$$

Finding the correct values for `trim start`<sup>P.23</sup>, `trim end`<sup>P.23</sup> and `trim middle`<sup>P.23</sup> may need many trials. For this purpose, the macro `\TestOverArrow`<sup>P.16</sup> displays the result of a command for different lengths and math styles:

```
\TestOverArrow{\overhooktwoheadrightarrow}
```

<code>\displaystyle</code>	<code>\textstyle</code>	<code>\scriptstyle</code>	<code>\scriptscriptstyle</code>
$\overhooktwoheadrightarrow{v}$	$\overhooktwoheadrightarrow{v}$	$\overhooktwoheadrightarrow{v}$	$\overhooktwoheadrightarrow{v}$
$\overhooktwoheadrightarrow{AB}$	$\overhooktwoheadrightarrow{AB}$	$\overhooktwoheadrightarrow{AB}$	$\overhooktwoheadrightarrow{AB}$
$\overhooktwoheadrightarrow{\text{grad}}$	$\overhooktwoheadrightarrow{\text{grad}}$	$\overhooktwoheadrightarrow{\text{grad}}$	$\overhooktwoheadrightarrow{\text{grad}}$
$\overhooktwoheadrightarrow{\text{my long vector}}$	$\overhooktwoheadrightarrow{\text{my long vector}}$	$\overhooktwoheadrightarrow{\text{my long vector}}$	$\overhooktwoheadrightarrow{\text{my long vector}}$

### 3.4 Size and position of the arrow

A command `\OverRightarrow`, built with the symbols `\Relbar`  $\Rightarrow$  and `\Rightarrow`  $\Rightarrow$ , gives:

```
\NewOverArrowCommand{\OverRightarrow}{%
  start=\Relbar,
  middle=\Relbar,
  end=\Rightarrow,
  trim=4,
}
$ \OverRightarrow{v} \quad \OverRightarrow{AB} $
```

$\overrightarrow{v}$        $\overrightarrow{AB}$

The key `trim`<sup>→P.23</sup> sets `trim start`<sup>→P.23</sup>, `trim middle`<sup>→P.23</sup> and `trim end`<sup>→P.23</sup> with the same value.

The previous arrow is visually too big. The macro `\smallermathstyle`<sup>→P.17</sup> allows to obtain a better result:

```
\NewOverArrowCommand{\OverRightarrow}{%
  start={\smallermathstyle\Relbar},
  middle={\smallermathstyle\Relbar},
  end=\Rightarrow,
  trim=4,
}
$ \OverRightarrow{v} \quad \OverRightarrow{AB} $
```

$\overrightarrow{v}$        $\overrightarrow{AB}$

Note that `\smallermathstyle`<sup>→P.17</sup> should not be used for `end`<sup>→P.22</sup>, because this last is formatted with the same math style as `start`<sup>→P.22</sup>.

It would be better to add an extra space between the arrow and the content of the command. This can be done with the key `space after arrow`<sup>→P.22</sup>:

```
\NewOverArrowCommand{\OverRightarrow}{%
  start={\smallermathstyle\Relbar},
  middle={\smallermathstyle\Relbar},
  end=\Rightarrow,
  trim=4,
  space after arrow=0.25ex,
}
$ \OverRightarrow{v} \quad \OverRightarrow{AB} $
```

$\overrightarrow{v}$        $\overrightarrow{AB}$

Default arrows are slightly shifted to the right. For a left arrow, this should be reversed, using the keys `shift left`<sup>→P.21</sup> and `shift right`<sup>→P.21</sup>. These keys set the corresponding shifts, in math units. Example:

```

\NewOverArrowCommand{OverLeftarrow}{%
  start={\smallermathstyle\Leftarrow},
  middle={\smallermathstyle\Relbar},
  end=\Relbar,
  trim=4,
  space after arrow=0.25ex,
  shift left=0, shift right=2,
}
$ \OverLeftarrow{v} \quad \OverLeftarrow{AB} $

```

$\overleftarrow{v}$        $\overleftarrow{AB}$

Finally, the key `arrow under`<sup>P.20</sup> places the arrow below the content, instead of above (and `space before arrow`<sup>P.22</sup> sets the space upon it):

```


\NewOverArrowCommand{OverLeftRightarrow}{%
  start={\smallermathstyle\Leftarrow},
  middle={\smallermathstyle\Relbar},
  end=\Rightarrow,
  trim=4,
  arrow under,
  space before arrow=0.5ex,
  shift left=0, shift right=0,
}
$ \OverLeftRightarrow{v} \quad \OverLeftRightarrow{AB} $

```

$\overleftrightarrow{v}$        $\overleftrightarrow{AB}$

### 3.5 Symbols assemblage

Many L<sup>A</sup>T<sub>E</sub>X math symbols are built by assemblage, using the macro `\joinrel`<sup>5</sup> which remove 3 math units of horizontal space. The `overarrows` package provides a flexible version of `\joinrel`, called `\xjoinrel`<sup>P.16</sup>, which remove an arbitrary number of math units, given as optional argument.

Symbols association is then simple. As example, one can define a triple tail macro `\tttail` from the symbol `\succ` :




```

\newcommand*{\tttail}{\succ\xjoinrel[10]\succ\xjoinrel[10]\succ}
$ \tttail $

```



Thus defined, the macro `\tttail` can be used in arrow definition:

<sup>5</sup>For example, the symbol `\models`  is defined as `\mathrel{||}\joinrel\Relbar` and corresponds to the assemblage of a vertical line  and the symbol `\Relbar` . The command `\mathrel` modifies the spacing according to the math relation class ; `\Relbar` corresponds to the equal sign (it's definition is `\mathrel{=}`).



```

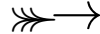
\NewOverArrowCommand{\overttailrightarrow}{%
  start={\tttail},
  end={\rightarrow},
  trim start=12,
  shift left=0, shift right=0,
  space after arrow=.2ex,
  min length=24,
}
$ \overttailrightarrow{v} \quad \overttailrightarrow{AB} $

```



Here the `min length`<sup>P. 20</sup> key was added to ensure a minimum length (in math units) when the content of the command is small (as for a single character).

The previous arrow would be better with a smaller tail, and this can be done with the macro `\smallermathstyle`<sup>P. 17</sup>. But a small tail and a normal sized head are not aligned; as `{\smallermathstyle\tttail}\xjoinrel[8]\rightarrow` gives:



The solution comes from the command `\vcenter` which centers materials on math axis. The tail must then be wrapped in a `\hbox`:

```

\NewOverArrowCommand{\overttailrightarrow}{%
  start={\vcenter{\hbox{$\smallermathstyle\tttail$}}},
  end={\rightarrow},
  trim start=12,
  shift left=0, shift right=0,
  space after arrow=.2ex,
  min length=24,
}
$ \overttailrightarrow{v} \quad \overttailrightarrow{AB} $

```



Text symbols, namely symbols that are not defined in math mode, can also be used. They should yet be enclosed in the `\text` macro, from the `amsmath` package, to be correctly displayed and correctly scaled according to math style. With, for example, the arrow heads given by the symbols 40 and 41 of the *lasy* font:

```

\newcommand*{\leftarrowhead}{\usefont{U}{lasy}{m}{n}\symbol{40}}
\newcommand*{\rightarrowhead}{\usefont{U}{lasy}{m}{n}\symbol{41}}
\NewOverArrowCommand{\overrightarrow}{%
  start=\text{\rightarrowhead},
  end=\text{\leftarrowhead},
  trim start=0.7, trim end=0.7,
  min length=20,
  shift leftright=-2,
}
$ \overrightarrow{AB} \quad \scriptstyle\overrightarrow{AB} $

```



### 3.6 Drawing the arrow with TikZ

In addition to the default method presented previously (assemblage of symbols, as described in section 2.3, page 4), the `overarrows` package has an alternative method to draw the arrow. This one allows the use of graphic languages such as PGF/TikZ.

Drawing arrows with TikZ requires to load the `tikz` package and its library `arrows.meta`. This can be simply done by passing the `tikz`<sup>→P.15</sup> option to the `overarrows` package<sup>6</sup>:

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

To use PGF/TikZ language, the optional argument `tikz` must be passed to `\NewOverArrowCommand`<sup>→P.15</sup>. TikZ picture are not extensible. That's why the `overarrows` package provides three lengths that can be used in TikZ commands:

- `\overarrowlength`<sup>→P.17</sup> for the arrow length,
- `\overarrowthickness`<sup>→P.17</sup> and `\overarrowsmallerthickness`<sup>→P.18</sup> for the arrow thickness.

These lengths are computed at each utilisation of a command created with the `tikz` optional argument.

Without any other configuration, a right arrow is drawn:

```
\NewOverArrowCommand[tikz]{overtikzarrow}{%
$ \overtikzarrow{v} \quad \overtikzarrow{AB} $
```

$\vec{v}$        $\overrightarrow{AB}$

Keys to use Tikz are described in section 4.3.4, page 24. Main keys are: `tikz options`<sup>→P.24</sup>, `path options`<sup>→P.25</sup> and `path`<sup>→P.25</sup>. It's also possible to append settings with `add tikz options`<sup>→P.25</sup> and `add path options`<sup>→P.25</sup>. The full TikZ command used to draw the arrow can as well be entirely redefined with the key `tikz command`<sup>→P.25</sup>

Here is a example of an arrow drawn with TikZ<sup>7</sup>:

```
\NewOverArrowCommand[tikz]{overarchedleftrightarrow}{%
add tikz options={y=\overarrowlength},
add tikz options={line width={\overarrowsmallerthickness}},
path options={arrows={<[scale=0.5]->[scale=0.5]}},
path={(0,0) arc (-250:70:0.5 and 0.1)},
center arrow,
min length=25,
space after arrow=0.4ex,
}
$ \overarchedleftrightarrow{v} \quad \overarchedleftrightarrow{ABCD} $
```

$\overleftrightarrow{v}$        $\overleftrightarrow{ABCD}$

<sup>6</sup>Note that the `tikz`<sup>→P.15</sup> option isn't mandatory to use TikZ commands in `overarrows`. The `tikz` package and its library `arrows.meta` can be loaded independently.

<sup>7</sup>TikZ arrows are very powerfull, but much slower to draw than the default method using assemblage of math symbols.

### 3.7 Drawing the arrow with L<sup>A</sup>T<sub>E</sub>X picture environment

As well as TikZ, the L<sup>A</sup>T<sub>E</sub>X `picture` environment can be used to draw the arrow. For this, the optional argument `picture` must be passed to `\NewOverArrowCommand`<sup>→P. 15</sup>. Like for TikZ, the three lengths `\overarrowlength`<sup>→P. 17</sup>, `\overarrowthickness`<sup>→P. 17</sup> and `\overarrowsmallerthickness`<sup>→P. 18</sup> can be used in `picture` commands. By default, a right vector is drawn:

```
\NewOverArrowCommand[picture]{overpictarrow}{-}
$ \overpictarrow{v} \quad \overpictarrow{AB} $
```

$\vec{v}$        $\overrightarrow{AB}$

If `overarrows` is loaded with the option `pstarrows`<sup>→P. 15</sup>, the package `pict2e` is used and a PSTricks style vector arrows is set. This gives:

```
\NewOverArrowCommand[picture]{overpictarrow}{-}
$ \overpictarrow{v} \quad \overpictarrow{AB} $
```

$\vec{v}$        $\overrightarrow{AB}$

Keys to use L<sup>A</sup>T<sub>E</sub>X `picture` environment are described in section 4.3.5, page 25. The main keys are `picture command`<sup>→P. 26</sup>, `geometry`<sup>→P. 26</sup> and `line thickness`<sup>→P. 26</sup>. Here is an example:

```
\NewOverArrowCommand[picture]{overbandedarrow}{-}
  picture command={%
    \qbezier
    (0.0\overarrowlength,0)
    (0.5\overarrowlength,0)
    (0.9\overarrowlength,0.2\overarrowlength)
    \put(0.9\overarrowlength,0.2\overarrowlength)
    {\vector(2,1){0.2\overarrowlength}}
  },
  geometry={(\overarrowlength,0.4\overarrowlength)(0,0)},
  line thickness={\overarrowsmallerthickness},
  center arrow,
  space after arrow=0.4ex,
}
$ \overbandedarrow{v} \quad \overbandedarrow{AB} $
```

$\vec{v}$        $\overrightarrow{AB}$

## 4 User interface

### 4.1 Package options

The `overarrows` package accepts many options, given as a comma-separated list `<options>` at package loading: `\usepackage[<options>]{overarrows}`.

The option `esvect` is set by default. This can be overridden with `noesvect`.

#### 4.1.1 esvect configuration

**esvect**

Loads the `esvect` package and redefines its vector commands  $\backslash\mathbf{vv}^{\rightarrow\text{P.18}}$  through the `overarrows` mechanism. Original `esvect`  $\backslash\mathbf{vv}$  macro is still available with  $\backslash\text{esvect}\mathbf{vv}^{\rightarrow\text{P.18}}$ .

The `esvect` package provides the symbol `\relbareda`  $\overrightarrow{\hspace{0.5em}}$  which is smaller and often more flexible than the classic one `\relbar`  $\overrightarrow{\hspace{0.5em}}$ . `\relbareda` fits with the standard *Computer Modern* math font, but can be unsuitable with other fonts.

The `esvect` package also provides the right arrow command `\fldr`. The shape of the arrow depends on the option passed to the `esvect` package:  $\rightarrow$  (option a),  $\rightarrow$  (option b),  $\rightarrow$  (option c),  $\rightarrow$  (option d),  $\rightarrow$  (option e),  $\rightarrow$  (option f),  $\rightarrow$  (option g) or  $\rightarrow$  (option h). Note that by default `overarrows` loads the `esvect` package with the option `f` (while `esvect` default is `d`). This can be changed with one of the eight options described below: `esvecta`, `esvectb`, `esvectc`, `esvectd`, `esvecte`, `esvectf`, `esvectg` and `esvecth`.

This option is set by default and can be unset with `noesvect`.

#### `noesvect`

Prevents the loading of the `esvect` package and the definition of the command  $\backslash\mathbf{vv}^{\rightarrow\text{P.18}}$ .

#### `esvecta`

Loads the `esvect` package with the `a` option.

`\fldr` corresponds the to the symbol  $\rightarrow$ .  $\backslash\mathbf{vv}$  command gives :  $\vec{v}$   $\overrightarrow{AB}$   $\overrightarrow{\text{grad}}$ .

#### `esvectb`

Loads the `esvect` package with the `b` option.

`\fldr` corresponds the to the symbol  $\rightarrow$ .  $\backslash\mathbf{vv}$  command gives :  $\vec{v}$   $\overrightarrow{AB}$   $\overrightarrow{\text{grad}}$ .

#### `esvectc`

Loads the `esvect` package with the `c` option.

`\fldr` corresponds the to the symbol  $\rightarrow$ .  $\backslash\mathbf{vv}$  command gives :  $\vec{v}$   $\overrightarrow{AB}$   $\overrightarrow{\text{grad}}$ .

#### `esvectd`

Loads the `esvect` package with the `d` option.

`\fldr` corresponds the to the symbol  $\rightarrow$ .  $\backslash\mathbf{vv}$  command gives :  $\vec{v}$   $\overrightarrow{AB}$   $\overrightarrow{\text{grad}}$ .

#### `esvecte`

Loads the `esvect` package with the `e` option.

`\fldr` corresponds the to the symbol  $\rightarrow$ .  $\backslash\mathbf{vv}$  command gives :  $\vec{v}$   $\overrightarrow{AB}$   $\overrightarrow{\text{grad}}$ .

#### `esvectf`

Loads the `esvect` package with the `f` option.

`\fldr` corresponds the to the symbol  $\rightarrow$ .  $\backslash\mathbf{vv}$  command gives :  $\vec{v}$   $\overrightarrow{AB}$   $\overrightarrow{\text{grad}}$ .


#### `esvectg`

Loads the `esvect` package with the `g` option.

`\fldr` corresponds the to the symbol  $\rightarrow$ .  $\backslash\mathbf{vv}$  command gives :  $\vec{v}$   $\overrightarrow{AB}$   $\overrightarrow{\text{grad}}$ .

### esvecth

Loads the esvect package with the `h` option.

`\fldr` corresponds to the symbol . `\vv` command gives:  $\vec{v}$   $\overrightarrow{AB}$   $\overrightarrow{\text{grad}}$ .

### 4.1.2 Predefined commands

The `overarrows` package provides sixteen predefined commands, eight with the arrow over, and eight with the arrow under. By default, these commands are not defined, and must be activated by the corresponding option. Beware that commands are created without checking if already defined by another package (`\overleftarrow`, `\overrightarrow`, `\overleftrightarrow`, `\underleftarrow`, `\underrightarrow` and `\underleftrightarrow` are, for example, part of the `amsmath` package).

Three options are also available to define set of commands.

#### Set of commands

##### allcommands

Defines all sixteen predefined commands.

##### overcommands

Defines all eight predefined commands with arrow over.

##### undercommands

Defines all eight predefined commands with arrow under.

#### Over arrows

##### overrightarrow

Defines the `\overrightarrow`<sup>P.18</sup> command:  $\vec{v}$ ,  $\overrightarrow{AB}$ ,  $\overrightarrow{\text{grad}}$ .

##### overleftarrow

Defines the `\overleftarrow`<sup>P.19</sup> command:  $\overleftarrow{v}$ ,  $\overleftarrow{AB}$ ,  $\overleftarrow{\text{grad}}$ .

##### overleftrightarrow

Defines the `\overleftrightarrow`<sup>P.19</sup> command:  $\overleftrightarrow{v}$ ,  $\overleftrightarrow{AB}$ ,  $\overleftrightarrow{\text{grad}}$ .

##### overrightarrowharpoonup

Defines the `\overrightarrowharpoonup`<sup>P.19</sup> command:  $\overrightarrow{v}$ ,  $\overrightarrow{AB}$ ,  $\overrightarrow{\text{grad}}$ .

##### overrightarrowharpoondown

Defines the `\overrightarrowharpoondown`<sup>P.19</sup> command:  $\overrightarrow{v}$ ,  $\overrightarrow{AB}$ ,  $\overrightarrow{\text{grad}}$ .

##### overleftarrowharpoonup

Defines the `\overleftarrowharpoonup`<sup>P.19</sup> command:  $\overleftarrow{v}$ ,  $\overleftarrow{AB}$ ,  $\overleftarrow{\text{grad}}$ .

#### overleftharpoondown

Defines the `\overleftharpoondown`<sup>→P.19</sup> command:  $\overleftarrow{v}$ ,  $\overleftarrow{AB}$ ,  $\overleftarrow{\text{grad}}$ .

#### overbar

Defines the `\overbar`<sup>→P.19</sup> command:  $\overline{v}$ ,  $\overline{AB}$ ,  $\overline{\text{grad}}$ .

### Under arrows

#### underrightarrow

Defines the `\underrightarrow`<sup>→P.19</sup> command:  $\underline{\rightarrow}v$ ,  $\underline{\rightarrow}AB$ ,  $\underline{\rightarrow}\text{grad}$ .

#### underleftarrow

Defines the `\underleftarrow`<sup>→P.19</sup> command:  $\underline{\leftarrow}v$ ,  $\underline{\leftarrow}AB$ ,  $\underline{\leftarrow}\text{grad}$ .

#### underleftrightharpoon

Defines the `\underleftrightharpoon`<sup>→P.19</sup> command:  $\underline{\leftrightharpoon}v$ ,  $\underline{\leftrightharpoon}AB$ ,  $\underline{\leftrightharpoon}\text{grad}$ .

#### underrightharpoonup

Defines the `\underrightharpoonup`<sup>→P.19</sup> command:  $\underline{\rightarrow}v$ ,  $\underline{\rightarrow}AB$ ,  $\underline{\rightarrow}\text{grad}$ .

#### underrightharpoondown

Defines the `\underrightharpoondown`<sup>→P.20</sup> command:  $\underline{\rightarrow}v$ ,  $\underline{\rightarrow}AB$ ,  $\underline{\rightarrow}\text{grad}$ .

#### underleftharpoonup

Defines the `\underleftharpoonup`<sup>→P.20</sup> command:  $\underline{\rightarrow}v$ ,  $\underline{\rightarrow}AB$ ,  $\underline{\rightarrow}\text{grad}$ .

#### underleftharpoondown

Defines the `\underleftharpoondown`<sup>→P.20</sup> command:  $\underline{\rightarrow}v$ ,  $\underline{\rightarrow}AB$ ,  $\underline{\rightarrow}\text{grad}$ .

#### underbar

Defines the `\underbar`<sup>→P.20</sup> command:  $\underline{v}$ ,  $\underline{AB}$ ,  $\underline{\text{grad}}$ .

### 4.1.3 Other options

#### old-arrows

Loads the `old-arrows` package with its option `old`. This provides the symbols `\varleftarrow`  $\leftarrow$  and `\varrightarrow`  $\rightarrow$ , used then by default for predefined command.

When the `old-arrows` option is set, the commands `\overrightarrow`<sup>→P.18</sup>, `\overleftarrow`<sup>→P.19</sup>, `\overleftrightharpoon`<sup>→P.19</sup>, `\underrightarrow`<sup>→P.19</sup>, `\underleftarrow`<sup>→P.19</sup> and `\underleftrightharpoon`<sup>→P.19</sup> give respectively :  $\overrightarrow{AB}$ ,  $\overleftarrow{AB}$ ,  $\overleftrightharpoon{AB}$ ,  $\underline{\rightarrow}AB$  and  $\underline{\leftrightharpoon}AB$

### tikz

Loads the package `tikz` with its library `arrows.meta`.

Note that TikZ arrows, drawn with the `tikz` method, are always available, even if this option is not set, provided the `tikz` package and its library are loaded independently.

### pstarrows

Loads the `pict2e` package, with its option `pstarrows`. Vectors using  $\LaTeX$  `picture` environment gives then  $\overrightarrow{AB}$  instead of  $\vec{AB}$ .

Note that this affect all vectors drawn in  $\LaTeX$  `picture` environments, and that this setting can be changed on the fly with the commands `\pstarrows` and `\ltstarrows` from the `pict2e` package.

### subscripts

Sets the default value of the key `detect subscripts`<sup>P.22</sup> to `true`.

This option also impacts the command `\vv`<sup>P.18</sup> and all predefined commands, so that they automatically use their starred variant when a subscript follows.

### debug

Writes the meaning of defined commands in  $\LaTeX$  log.

## 4.2 Commands

### 4.2.1 Macro for commands creation

```
\NewOverArrowCommand[method]{name}{keys}  
\RenewOverArrowCommand[method]{name}{keys}  
\ProvideOverArrowCommand[method]{name}{keys}  
\DeclareOverArrowCommand[method]{name}{keys}
```

Creates the command `\<name>` and its starred variant `\<name>*`. The starred variant `\<name>*` removes the extra end space generated by the arrow, which is suitable, as example, when a subscript follows.

`\NewOverArrowCommand` raises an error if `\<name>` is already defined.

`\RenewOverArrowCommand` raises an error if `\<name>` is undefined.

`\ProvideOverArrowCommand` sets `\<name>` if the command is undefined and does nothing if it is already defined, without raising any error.

`\DeclareOverArrowCommand` sets `\<name>`, whether the command is already defined or not, without raising any error.

The `<method>` used to draw the arrow must be:

**symb** to draw the arrow by symbols assemblage (default);

**tikz** to draw the arrow with PGF/TikZ;

**picture** to draw the arrow with the  $\LaTeX$  `picture` environment.

With no  $\langle method \rangle$  argument, the `symp` method is chosen.

$\langle keys \rangle$  is a comma-separated list of keys-values. Available keys depends of the  $\langle method \rangle$  chosen and are described in section 4.3, page 20.

```
\NewOverArrowCommand[tikz]{myoverarrow}{arrows={Bar-Bar}, center arrow}
$ \myoverarrow{v} \quad \myoverarrow{ABCD} $
```

$$\overrightarrow{v} \quad \overrightarrow{ABCD}$$

`\TestOverArrow` $[\langle pattern \rangle]$  $\{\langle name \rangle\}$

`\TestOverArrow*` $[\langle pattern \rangle]$  $\{\langle name \rangle\}$

Displays the result of the command  $\langle name \rangle$  for patterns of various lengths and for the four math styles. A custom  $\langle pattern \rangle$  can be added to the predefined ones.

The starred variant `\TestOverArrow*` displays a full report, including kerning tests of the commands  $\langle name \rangle$  and  $\langle name \rangle^*$ .

```
\TestOverArrow*[my-pattern]{vv}
```

### Test of `\vv` and `\vv*` macros

#### `\vv` for different math styles

$\backslash displaystyle$	$\backslash textstyle$	$\backslash scriptstyle$	$\backslash scriptscriptstyle$
$\overrightarrow{v}$	$\overrightarrow{v}$	$\overrightarrow{v}$	$\overrightarrow{v}$
$\overrightarrow{AB}$	$\overrightarrow{AB}$	$\overrightarrow{AB}$	$\overrightarrow{AB}$
$\overrightarrow{\text{grad}}$	$\overrightarrow{\text{grad}}$	$\overrightarrow{\text{grad}}$	$\overrightarrow{\text{grad}}$
$\overrightarrow{\text{my long vector}}$	$\overrightarrow{\text{my long vector}}$	$\overrightarrow{\text{my long vector}}$	$\overrightarrow{\text{my long vector}}$
$\overrightarrow{\text{my pattern}}$	$\overrightarrow{\text{my pattern}}$	$\overrightarrow{\text{my pattern}}$	$\overrightarrow{\text{my pattern}}$

#### `\vv` kerning

$$\overrightarrow{t} \overrightarrow{u} \overrightarrow{v} \quad \overrightarrow{t}_0 \quad \overrightarrow{v} = \overrightarrow{v}_x + \overrightarrow{v}_y + \overrightarrow{v}_z = v_x \overrightarrow{i} + v_y \overrightarrow{j} + v_z \overrightarrow{k}$$

#### `\vv*` kerning

$$\overrightarrow{t}_{\overrightarrow{u} \overrightarrow{v}} \quad \overrightarrow{t}_0 \quad \overrightarrow{v} = \overrightarrow{v}_x + \overrightarrow{v}_y + \overrightarrow{v}_z = v_x \overrightarrow{i} + v_y \overrightarrow{j} + v_z \overrightarrow{k}$$

## 4.2.2 Useful macros for symbols assemblage

Math symbols assemblage is the default method used to draw arrows. The macros `\xjoinrel` and `\smallermathstyle` are designed to help combine and format math symbols.

`\xjoinrel` $[\langle number \rangle]$

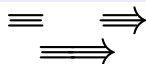
Removes an horizontal space of  $\langle number \rangle$  math units (3.5 mu by default). Must be used in math mode. Useful to assemble math symbols and create new ones.



```

\newcommand*\triplebar{\Relbar\xjoinrel[14]\relbar}
\newcommand*\triplebararrow{\Relbar\xjoinrel[15]\rightarrow}
\scalebox{2}{\triplebar \quad \triplebararrow} \par
\scalebox{2}{\triplebar\xjoinrel\triplebararrow}

```



### `\smallermathstyle`

Applies the next math style, smaller than the current. That is:

- sets `\scriptstyle` if the current math style is `\displaystyle` or `\textstyle`;
- sets `\scriptscriptstyle` if the current math style is `\scriptstyle`;
- does nothing if the current math style is `\scriptscriptstyle`.

```

$ \displaystyle AB \quad \textstyle AB
\quad \scriptstyle AB \quad \scriptscriptstyle AB $ \par
$ \displaystyle AB \quad \smallermathstyle AB
\quad \smallermathstyle AB \quad \smallermathstyle AB $

```

$AB$     $AB$     $AB$     $AB$   
 $AB$     $AB$     $AB$     $AB$

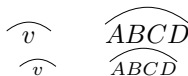
### 4.2.3 Useful lengths for TikZ or picture environment

Arrows drawn with graphic languages, like PGF/TikZ or the L<sup>A</sup>T<sub>E</sub>X `picture` environment, are not extensible. The three lengths `\overarrowlength`, `\overarrowthickness` and `\overarrowsmallerthickness` are computed at each utilisation of a command set with the `tikz` or `picture` method, so they can be used in drawing commands.

```

\NewOverArrowCommand[tikz]{overparabola}{%
  path options={x=\overarrowlength, line width=\overarrowsmallerthickness},
  path={(0,0) parabola[parabola height=0.2\overarrowlength] (1,0)},
  arrows={-}, center arrow, min length=30,
}
$ \displaystyle \overparabola{v} \quad \overparabola{ABCD} $ \par
$ \scriptstyle \overparabola{v} \quad \overparabola{ABCD} $ \par

```



### `\overarrowlength`

Is set to the width of the arrow command content, or, if larger, to the minimal arrow length set through the key `min length`<sup>P.20</sup>.

### `\overarrowthickness`

Is set to the default rule thickness of the current math style. That is:

- `\fontdimen 8 \textfont 3 in \displaystyle` or `\textstyle`;
- `\fontdimen 8 \scriptfont 3 in \scriptstyle`;
- `\fontdimen 8 \scriptscriptfont 3 in \scriptscriptstyle`.

### `\overarrowsmallerthickness`

Is set to the default rule thickness of the next smaller math style. That is:

- `\fontdimen 8 \scriptfont 3 in \displaystyle` or `\textstyle`;
- `\fontdimen 8 \scriptscriptfont 3 in \scriptstyle` or `\scriptscriptstyle`.

### 4.2.4 Vectors macros

The macro `\vv`, dedicated to vectors, is automatically defined when the option `esvect`<sup>P.11</sup> is set (which is the default). It is a clone of the `\vv` command provided by the `esvect` package, but its starred variant has a correct kerning when followed by a subscript.

`\vv{<content>}`  
`\vv*{<content>}`

Draws a vector arrow upon math `<content>`. The shape of the arrow depends on the corresponding options described in section 4.1.1, page 11 : `esvecta`<sup>P.12</sup>, `esvectb`<sup>P.12</sup>, `esvectc`<sup>P.12</sup>, `esvectd`<sup>P.12</sup>, `esvecte`<sup>P.12</sup>, `esvectf`<sup>P.12</sup>, `esvectg`<sup>P.12</sup>, `esvecth`<sup>P.13</sup>.

The starred variant `\vv*` suppresses the end space created by the arrow.

```
$ \vv{\imath}_{0} \quad \vv{e}_r \quad \vv{L}_{\Delta} $\par
$ \vv*{\imath}_{0} \quad \vv*{e}_r \quad \vv*{L}_{\Delta} $
```

$$\begin{array}{ccc} \vec{i}_0 & \vec{e}_r & \vec{L}_\Delta \\ \overrightarrow{i}_0 & \overrightarrow{e}_r & \overrightarrow{L}_\Delta \end{array}$$

### `\esvectvv`

Is simply the backup of the original `esvect` `\vv` command.

```
$ \esvectvv{\imath}_{0} \quad \esvectvv{e}_r \quad \esvectvv{L}_{\Delta} $\par
$ \esvectvv*{\imath}_{0} \quad \esvectvv*{e}_r \quad \esvectvv*{L}_{\Delta} $
```

$$\begin{array}{ccc} \vec{i}_0 & \vec{e}_r & \vec{L}_\Delta \\ \overrightarrow{i}_0 & \overrightarrow{e}_r & \overrightarrow{L}_\Delta \end{array}$$

### 4.2.5 Predefined commands

Predefined commands are defined if the corresponding option is set (see section 4.1.2, page 13). The commands `\overrightarrow`, `\overleftarrow`, `\overleftrightarrow`, `\underrightarrow`, `\underleftarrow` and `\underleftrightarrow` are affected by the option `old-arrows`<sup>P.14</sup>.

#### Over arrows

##### `\overrightarrow`

$$\overrightarrow{v} \quad \overrightarrow{AB} \quad \overrightarrow{\text{grad}}$$

The shape of the arrow is smaller if the option `old-arrows`<sup>P.14</sup> is set.

`\overleftarrow`

$$\overleftarrow{v} \quad \overleftarrow{AB} \quad \overleftarrow{\text{grad}}$$

The shape of the arrow is smaller if the option `old-arrows→P.14` is set.

`\overleftrightharpoonup`

$$\overleftrightharpoonup{v} \quad \overleftrightharpoonup{AB} \quad \overleftrightharpoonup{\text{grad}}$$

The shape of the arrows is smaller if the option `old-arrows→P.14` is set.

`\overrightarrow`

$$\overrightarrow{v} \quad \overrightarrow{AB} \quad \overrightarrow{\text{grad}}$$

`\overrightarrow`

$$\overrightarrow{v} \quad \overrightarrow{AB} \quad \overrightarrow{\text{grad}}$$

`\overleftarrow`

$$\overleftarrow{v} \quad \overleftarrow{AB} \quad \overleftarrow{\text{grad}}$$

`\overleftarrow`

$$\overleftarrow{v} \quad \overleftarrow{AB} \quad \overleftarrow{\text{grad}}$$

`\overbar`

$$\overbar{v} \quad \overbar{AB} \quad \overbar{\text{grad}}$$

**Under arrows**

`\underrightarrow`

$$\underrightarrow{v} \quad \underrightarrow{AB} \quad \underrightarrow{\text{grad}}$$

The shape of the arrow is smaller if the option `old-arrows→P.14` is set.

`\underleftarrow`

$$\underleftarrow{v} \quad \underleftarrow{AB} \quad \underleftarrow{\text{grad}}$$

The shape of the arrow is smaller if the option `old-arrows→P.14` is set.

`\underleftrightharpoonup`

$$\underleftrightharpoonup{v} \quad \underleftrightharpoonup{AB} \quad \underleftrightharpoonup{\text{grad}}$$

The shape of the arrows is smaller if the option `old-arrows→P.14` is set.

`\underrightharpoonup`

$$\underrightharpoonup{v} \quad \underrightharpoonup{AB} \quad \underrightharpoonup{\text{grad}}$$

`\underrightharpoonup`

$\overrightarrow{v}$      $\overrightarrow{AB}$      $\overrightarrow{\text{grad}}$

`\underleftharpoonup`

$\overleftarrow{v}$      $\overleftarrow{AB}$      $\overleftarrow{\text{grad}}$

`\underleftharpoonupdown`

$\overleftarrow{\downarrow} v$      $\overleftarrow{\downarrow} AB$      $\overleftarrow{\downarrow} \text{grad}$

`\underbar`

$\underline{v}$      $\underline{AB}$      $\underline{\text{grad}}$

## 4.3 Keys

The customisation of arrows is done at command creation through a key-value interface provided by the `pgfkeys` package (with `/overarrows/` as key path).

### 4.3.1 Arrow position and length settings

These keys are available whatever the method chosen at command creation (see section 4.2.1, page 15 for the documentation of commands creation).

#### Length

`min length={⟨number⟩}` (no default, see below for the initial value)

Sets the minimal arrow length to  $\langle number \rangle$  math units. The arrow length is set from content width, or, if larger, to this value.

The initial value of `min length` depends on the  $\langle method \rangle$  chosen at command creation (see section 4.2.1, page 15 for the documentation of commands creation):

- $\langle number \rangle = 0$  for the `symb` method (default);
- $\langle number \rangle = 12$  for the `tikz` method;
- $\langle number \rangle = 18$  for the `picture` method.

```
\NewOverArrowCommand{overlongarrow}{min length=50}
$ \overlongarrow{v} \quad \overlongarrow{ABCDEF} $
```

$\overlongarrow{v}$      $\overlongarrow{ABCDEF}$

#### Placement

`arrow under` (default `autoconfig`, initially unset)

`arrow under=autoconfig|noconfig`

Places the arrow under, instead of over.

**arrow under** or **arrow under=autoconfig** also configures suitably the key `detect subscripts`<sup>→P. 22</sup> to `false` and the key `before arrow`<sup>→P. 22</sup> to get an additional space over the arrow.

**arrow under=noconfig** does not do any additional configuration.

```
\NewOverArrowCommand{underhooks}{%
  start={\lhook}, end={\rhook}, trim=1,
  arrow under, shift leftright=-4,
}
$ \underhooks{v} \quad \underhooks{AB} $
```

$\underline{v}$       $\underline{AB}$

## Horizontal shifts

**shift left**={ $\langle number \rangle$ } (no default, initially 2)

Shifts the left side of the arrow by  $\langle number \rangle$  math units (positive number means a shift to the right).

**shift right**={ $\langle number \rangle$ } (no default, see below for the initial value)

Shifts the right side of the arrow by  $\langle number \rangle$  math units (positive number means a shift to the left).

The initial value of **shift right** depends on the  $\langle method \rangle$  chosen at command creation (see section 4.2.1, page 15 for the documentation of commands creation):

- $\langle number \rangle = 0$  for the `symb` method (default);
- $\langle number \rangle = -2$  for the `tikz` and `picture` methods.

```
\NewOverArrowCommand{lookback}{%
  start={\leftarrow}, end={\rightharpoonowdown},
  shift left=-50, shift right=-10,
}
$ \lookback{\text{look back}} $
```

$\overleftarrow{\text{look back}}$

**shift leftright**=[ $\langle number \rangle$ ] (no default)

Sets **shift left** and **shift right** to the same  $\langle number \rangle$  value.

**center arrow**

Sets **shift left** and **shift right** to zero.

**left arrow** (default 2)

Sets **shift left** to zero and **shift right** to  $\langle number \rangle$ .

**right arrow** (default 2)

Sets **shift right** to zero and **shift left** to  $\langle number \rangle$ .

## Vertical adjunct

**before arrow**={ $\langle vertical material \rangle$ } (initially empty)  
**after arrow**={ $\langle vertical material \rangle$ } (initially empty)

Adds the  $\langle vertical material \rangle$  before or after the arrow.

Over and under arrow commands are typeset through the  $\text{\TeX}$  `\ialign` command, which aligns contents, like a tabular. The  $\langle vertical material \rangle$  is inserted *between* the rows, with  $\text{\TeX}$  `\noalign` command.

These keys are essentially used to add some extra space between the arrow and the content of the command. They can be set in a handier way with the keys **space before arrow** and **space after arrow**.

**space before arrow**={ $\langle length \rangle$ } (no default)

Adds a space of  $\langle length \rangle$  before the arrow. This sets the keys **before arrow**.

**space after arrow**={ $\langle length \rangle$ } (no default)

Adds a space of  $\langle length \rangle$  after the arrow. This sets the keys **after arrow**.

```
\NewOverArrowCommand{overharpoonsdown}{%
  start=\leftharpoondown, end=\rightharpoondown, center arrow,
  space before arrow=-0.2ex, space after arrow=0.3ex,
}
$ \dot{\overharpoonsdown{v}} \quad \ddot{\overharpoonsdown{AB}} $
```

$$\dot{\overrightarrow{v}} \quad \ddot{\overrightarrow{AB}}$$

### 4.3.2 Subscripts detection setting

This key is available whatever the method chosen at command creation (see section 4.2.1, page 15 for the documentation of commands creation).

**detect subscripts**=true|false (default true, see below for the initial value)

Removes automatically the extra end space created by the arrow, if a subscript immediately follows the command.

By default, the initial value of **detect subscripts** is false. When the option **subscripts**<sup>→P. 15</sup> is set, the initial value of **detect subscripts** is true.

```
\NewOverArrowCommand{autosub}{detect subscripts}
$ \imath_0 \quad \autosub{\imath}_0 \quad \quad
{\autosub{\imath}}_0 \quad {\autosub*{\imath}}_0 $
```

$$\imath_0 \quad \overrightarrow{\imath}_0 \quad \overrightarrow{\imath}_0 \quad \overrightarrow{\imath}_0$$

### 4.3.3 Symbols assemblage settings

The following keys are available for arrows drawn with the default **symp** method (see section 4.2.1, page 15 for the documentation of commands creation).

**start**={ $\langle command \rangle$ } (no default, initially `\relbar`)  
**middle**={ $\langle command \rangle$ } (no default, initially set by **middle config=auto**)  
**end**={ $\langle command \rangle$ } (no default, see below for the initial value)

Sets the  $\langle command \rangle$  used to draw the start (left), middle (center) or end (right) part of the arrow. The **middle** one is repeated, if necessary, to extend

the arrow. It is set, initially by `middle config=auto`. By default, the `end` symbols is initially `\rightarrow`  $\rightarrow$ . When the option `old-arrows`<sup>P.14</sup> is set, the initial value of `end` is `\varrightarrow`  $\rightarrow$ .

`start` and `end` symbols are typeset in the same group. `middle` is typeset alone. This means that, if a command, like `\smallermathstyle`<sup>P.17</sup>, is used to alter the symbols, it should be applied both to `start` and `middle` (but not to `end`).

```
\NewOverArrowCommand{smalleroverrightarrow}{%
  start={\smallermathstyle\relbar},
  middle={\smallermathstyle\relbareda},
  end={\rightarrow},
  space after arrow={0.2ex},
}
$ \smalleroverrightarrow{v} \quad \smalleroverrightarrow{AB} $
```

$\vec{v}$        $\overrightarrow{AB}$

`trim start={⟨number⟩}` (no default, initially 7)

Trims `⟨number⟩` math units from the right side of the `start`<sup>P.22</sup> symbol.

`trim middle={⟨number⟩}` (no default, initially set by `middle config=auto`)

Trims `⟨number⟩` math units from both left and right sides of the `middle`<sup>P.22</sup> symbol.

`trim end={⟨number⟩}` (no default, initially 7)

Trims `⟨number⟩` math units from the left side of the `end`<sup>P.22</sup> symbol.

`trim={⟨number⟩}` (no default)

Sets `trim start`, `trim middle` and `trim end` to the same `⟨number⟩` value.

`no trimming`

Clears `trim start`, `trim middle` and `trim end`.

`middle config=auto|relbar|relbareda` (no default)

Sets a suitable configuration for the keys `middle`<sup>P.22</sup> and `trim middle`:

For `middle config = relbar`, `middle`<sup>P.22</sup> is set to `\relbar`  $\text{—}$  and `trim middle` to 2.5.

For `middle config = relbareda`, `middle`<sup>P.22</sup> is set to `\relbareda`  $\text{—}$  and `trim middle` to 1.

For `middle config = auto`, `middle`<sup>P.22</sup> is set with `middle config = relbareda` if the option `esvect`<sup>P.11</sup> is set (which is the default) and `middle config = relabar` if not.

`amsmath` (default mimic)

`amsmath=mimic|strict`

Loads a configuration coherent with `amsmath \overrightarrow` command.

`amsmath` or `amsmath=mimic` sets the corresponding keys suitably:

```

start={\relbar}      middle={\relbar}      end={\rightarrow}
trim start=7         trim middle=2         trim end=7
shift leftright=0    after arrow={}        before arrow={}

```

**amsmath=strict** makes, in addition, the command uses the internal macros of `amsmath\overrightarrow` (no trimming, fill macro=`\arrowfill@`), `stack macro=\overarrow@`). Note that many configuration keys becomes ineffective.

**esvect** (default mimic)  
**esvect=mimic|strict**

Loads a configuration coherent with `amsmath\vv` command.

**esvect** or **esvect=mimic** sets the corresponding keys suitably:

```

start={\relbaredd}      middle={\relbareda}      end={\fldr}
trim start=1.5          trim middle=0            trim end=1.5
space before arrow=-.7pt space after arrow=-.3pt right arrow=2

```

**esvect=strict** makes, in addition, the command uses the internal macros of `esvect\vv` (no trimming, fill macro=`\traitfill@`), `stack macro=\overvect@`). Note that many configuration keys becomes ineffective.

#### 4.3.4 TikZ settings

If, at command creation (see section 4.2.1, page 15 for the documentation of commands creation), the `tikz` method is chosen, then the arrow is drawn by the command:

```
\tikz[tikz options]{tikz command}
```

where `tikz options` and `tikz command`<sup>P.25</sup> are two keys described below. When `tikz command` is let unset, the drawing command turns into:

```
\tikz[tikz options]{\draw[path options] path;}
```

The best way to customise `tikz` arrows is then to set the keys `tikz options`, `path options`<sup>P.25</sup> and `path`<sup>P.25</sup>, preferably through the handy alternatives: add `tikz options`<sup>P.25</sup>, add `path options`<sup>P.25</sup>, `arrows`<sup>P.25</sup>, `line thickness`<sup>P.25</sup> or `thinner`<sup>P.25</sup>.

```

\NewOverArrowCommand[tikz]{overdotteddoublearrow}{%
  add tikz options={blue}, add path options={densely dotted},
  arrows={->[scale=0.5]>[scale=0.5]}, thinner,
  min length=20, space after arrow={0.3ex},
}
$ \overdotteddoublearrow{v} \quad \overdotteddoublearrow{AB} $

```



The following keys are available when the `tikz` method is chosen.

**tikz options**= $\langle$ *TikZ options* $\rangle$   
 (no default, initially `x=\overarrowlength`, `line width=\overarrowthickness`)

Sets TikZ options to  $\langle$ *TikZ options* $\rangle$ .



**path options**={ $\langle path options \rangle$ }  
 (no default, initially `arrows=--Classical TikZ Rightarrow, cap=round`)  
 Sets TikZ path options to  $\langle path options \rangle$ .

**path**={ $\langle path specification \rangle$ } (no default, initially `(0,0)--(1,0)`)  
 Sets TikZ path specification to  $\langle path \rangle$  (the ending semicolon is automatically appended).

**add tikz options**={ $\langle TikZ options \rangle$ } (no default)  
 Appends the options  $\langle TikZ options \rangle$  to the key `tikz options`<sup>→P.24</sup>.

**add path options**={ $\langle path options \rangle$ } (no default)  
 Appends the options  $\langle path options \rangle$  to the key `path options`.

**arrows**={ $\langle arrow specification \rangle$ } (no default)  
 Appends the option `arrows={ $\langle arrow specification \rangle$ }` to the key `path options`.

**line thickness**={ $\langle length \rangle$ } (no default)  
 Appends the option `line width={ $\langle length \rangle$ }` to the key `path options`.

**thinner**  
 Sets the keys `line thickness` with `\overarrowsmallerthickness`.

**tikz command**={ $\langle TikZ command \rangle$ } (initially unset)  
 Sets the  $\langle TikZ command \rangle$  used to draw the arrow. If left unset, the value `\draw[path options] path;` is used.

#### 4.3.5 Picture environment settings

If, at command creation (see section 4.2.1, page 15 for the documentation of commands creation), the `picture` method is chosen, then the arrow is drawn with by:

```
\begin{picture}geometry%
  \linethickness{line thickness}%
  picture command%
\end{picture}%
```

where `geometry`<sup>→P.26</sup>, `line thickness`<sup>→P.26</sup> and `picture command` are three keys described below.

```

% ^^A \arc and \roundcap commands are from the pict2e package
% ^^A this example needs \usepackage{pict2e} in the preamble
\NewOverArrowCommand[picture]{overarc}{%
  picture command={%
    \roundcap
    \put(0.5\overarrowlength,0){\arc[180,0]{0.6\overarrowlength}}
  },
  geometry={%
    (1.2\overarrowlength,0.5\overarrowlength)(-0.1\overarrowlength,0.2ex)
  },
  thinner, center arrow,
}
$ \overarc{v} \quad \quad \quad \overarc{AB} $

```



The following keys are available when the `picture` method is chosen.

**picture command**={*picture command*}

(no default, initially `\put(0,0){\vector(1,0){\overarrowlength}}`)

Sets picture command to *picture command*.

**geometry**={*picture geometry specification*}

(no default, initially `(\overarrowlength,1ex)(0,-0.5ex)`)

Sets picture geometry to *picture geometry specification*.

**line thickness**={*length*}

(no default)

Sets the picture line thickness to *length*.

**thinner**

(no default)

Sets the keys `line thickness` with `\overarrowsmallerthickness`.

## 4.4 Advanced commands and keys

The following commands and keys are used in the implementation of the `overarrows` package. They can also be employed for an advanced configuration of the commands created, although unnecessary in the vast majority of cases.

### 4.4.1 Advanced commands

**\SetOverArrowsMethod**[*stack mechanism*]{*name*}[*pre code*]{*keys def*}

**\SetOverArrowsMethod\***{*name*}[*pre code*]{*keys def*}

Defines the method *name*, to be used in commands `\NewOverArrowCommand`<sup>P.15</sup>, `\RenewOverArrowCommand`<sup>P.15</sup>, `\ProvideOverArrowCommand`<sup>P.15</sup> or `\DeclareOverArrowCommand`. When the *name* method is chosen, corresponding keys are defined by *keys def*. This must set, in particular, the keys `no stack macro hook`<sup>P.27</sup> and `no arrow macro hook`<sup>P.27</sup>. Optional code *pre code* is evaluated before the keys definition.

The unstarred variant automatically defines the key `no stack macro hook`<sup>P.27</sup>, according to the value of the optional *stack mechanism*. This one must be:

**fill** if **arrow macro**<sup>→P.27</sup> creates extensible arrows (typically with `\cleaders`).

In this case, the arrow macro (defined by **no arrow macro hook**<sup>→P.27</sup>) is called with the math style, passed as argument (it can be, for example, the macro `\rightarrowfill@` used by `amsmath \overrightarrow`). **fill** is the mechanism used by the **symb** method.

**lens** if **arrow macro** creates fixed-length arrows, and needs the computation of lengths `\overarrowlength`<sup>→P.17</sup>, `\overarrowthickness`<sup>→P.17</sup> and `\overarrowsmallerthickness`<sup>→P.18</sup>. In this case, the arrow macro (defined by **no arrow macro hook**) is called without argument. **lens** is the mechanism used by the **tikz** and **picture** methods.

Without optional *⟨stack mechanism⟩*, **fill** is used. The starred variant does not set the key **no stack macro hook**.

#### 4.4.2 Advanced keys

**stack macro**=*⟨stack definition⟩* (no default, initially unset)

Defines the stack macro to be *⟨stack definition⟩*. Stack macro is a command which takes three arguments: the arrow macro set by **arrow macro**, the math style, and the command content (under or over the arrow). *⟨stack definition⟩* can be, for example, the macro `\overarrow@` used by `amsmath \overrightarrow`.

**arrow macro**=*⟨arrow definition⟩* (no default, initially unset)

Defines the arrow macro (used in the stack macro) by to be *⟨arrow definition⟩*.

**no stack macro hook**=*⟨code⟩* (no default)

Sets the *⟨code⟩* executed if **stack macro** is left unset, after user evaluation of *⟨keys⟩* in `\NewOverArrowCommand`<sup>→P.15</sup>, `\RenewOverArrowCommand`<sup>→P.15</sup>, `\ProvideOverArrowCommand`<sup>→P.15</sup> or `\DeclareOverArrowCommand`<sup>→P.15</sup>.

*⟨code⟩* must configure **stack macro** accordingly to the user keys setting.

**no arrow macro hook**=*⟨code⟩* (no default)

Sets the *⟨code⟩* executed if **arrow macro** is left unset, after user evaluation of *⟨keys⟩* in `\NewOverArrowCommand`<sup>→P.15</sup>, `\RenewOverArrowCommand`<sup>→P.15</sup>, `\ProvideOverArrowCommand`<sup>→P.15</sup> or `\DeclareOverArrowCommand`<sup>→P.15</sup>.

*⟨code⟩* must configure **arrow macro** accordingly to the user keys setting.

**fill macro**=*⟨definition⟩* (no default, initially unset)

Defines the fill macro to be *⟨definition⟩*. The fill macro is used by arrows created with the **symb** method, to set **arrow macro** in **no arrow macro hook**. It is called with four arguments: start, middle and end symbols used to draw the arrow, and the math style. *⟨definition⟩* can be, for example, the macro `\arrowfill@` used by `amsmath \overrightarrow`.

## 5 Complements

### 5.1 Math font issue

If the math font differs from the default *Computer Modern*, arrow drawn with the `symb` method may have a central part of the arrow with inappropriate position or line width. This is because the default symbol used for the arrow line is `\relbareda` from the `esvect` package. This can be fixed with the `noesvect` option.

### 5.2 Package dependencies

The following packages are used by `overarrows`:

- `amsmath`
- `etoolbox`
- `pgfkeys`
- `esvect` (unless the option `noesvect` is used)
- `old-arrows` (when the option `old-arrows` is used)
- `tikz` (when the `tikz` method or the option `tikz` is used)
- `pict2e` (when the option `pstarrows` is used)

L<sup>A</sup>T<sub>E</sub>X distributions prior to 2020/10/01 must load the `xparse` package before `overarrows`.

### 5.3 Alternatives

**esvect package** (<https://www.ctan.org/pkg/esvect>), by Eddie Sautrais, provides the fine vector macro `\vv`. This package is loaded by default by `overarrows`.

**letterswitharrows package** (<https://www.ctan.org/pkg/letterswitharrows>), by Max Teegen, provides left and right over arrows commands, which can extend to multiple characters.

**overrightarrow package** (<https://www.ctan.org/pkg/overrightarrow>), by Robin Fairbairns, provides the `\Overrightarrow` which is an amalgam of `\overrightarrow` and `\Rightarrow`.

**harpoon package** (<https://ctan.org/pkg/harpoon>), by Tobias Kuipers, provides over- and under-harpoon symbol commands.

### 5.4 Changelog

**v1.0** Initial version.

## 6 Implementation

### Management of options

#### Declaration of conditionals

```
1 \newif\ifovar@option@oldarrows@
2 \newif\ifovar@option@esvect@ \ovar@option@esvect@true \PassOptionsToPackage{f}{esvect}
3 \newif\ifovar@option@tikz@
4 \newif\ifovar@option@pstarrows@
5 \newif\ifovar@option@detectsubscripts@
6 \newif\ifovar@option@debug@
```

Following conditionals are for predefined commands.

```
7 \newif\ifovar@option@overrightarrow@
8 \newif\ifovar@option@underrightarrow@
9 \newif\ifovar@option@overleftarrow@
10 \newif\ifovar@option@underleftarrow@
11 \newif\ifovar@option@overleftrightharpoon@
12 \newif\ifovar@option@underleftrightharpoon@
13 \newif\ifovar@option@overrightarrowharpoonup@
14 \newif\ifovar@option@underrightharpoonup@
15 \newif\ifovar@option@overrightarrowharpoondown@
16 \newif\ifovar@option@underrightharpoondown@
17 \newif\ifovar@option@overleftarrowharpoonup@
18 \newif\ifovar@option@underleftarrowharpoonup@
19 \newif\ifovar@option@overleftarrowharpoondown@
20 \newif\ifovar@option@underleftarrowharpoondown@
21 \newif\ifovar@option@overbar@
22 \newif\ifovar@option@underbar@
```

#### Declaration of options

```
23 \DeclareOption{esvect}{\ovar@option@esvect@true}
24 \DeclareOption{noesvect}{\ovar@option@esvect@false}
25 \DeclareOption{esvecta}{\ovar@option@esvect@true\PassOptionsToPackage{a}{esvect}}
26 \DeclareOption{esvectb}{\ovar@option@esvect@true\PassOptionsToPackage{b}{esvect}}
27 \DeclareOption{esvectc}{\ovar@option@esvect@true\PassOptionsToPackage{c}{esvect}}
28 \DeclareOption{esvectd}{\ovar@option@esvect@true\PassOptionsToPackage{d}{esvect}}
29 \DeclareOption{esvecte}{\ovar@option@esvect@true\PassOptionsToPackage{e}{esvect}}
30 \DeclareOption{esvectf}{\ovar@option@esvect@true\PassOptionsToPackage{f}{esvect}}
31 \DeclareOption{esvectg}{\ovar@option@esvect@true\PassOptionsToPackage{g}{esvect}}
32 \DeclareOption{esvecth}{\ovar@option@esvect@true\PassOptionsToPackage{h}{esvect}}
33 \DeclareOption{old-arrows}{\ovar@option@oldarrows@true}
34 \DeclareOption{tikz}{\ovar@option@tikz@true}
35 \DeclareOption{pstarrows}{\ovar@option@pstarrows@true}
36 \DeclareOption{subscripts}{\ovar@option@detectsubscripts@true}
37 \DeclareOption{debug}{\ovar@option@debug@true}
```

Following options are for predefined commands.

```
38 \DeclareOption{overrightarrow}{\ovar@option@overrightarrow@true}
39 \DeclareOption{underrightarrow}{\ovar@option@underrightarrow@true}
40 \DeclareOption{overleftarrow}{\ovar@option@overleftarrow@true}
41 \DeclareOption{underleftarrow}{\ovar@option@underleftarrow@true}
42 \DeclareOption{overleftrightharpoon}{\ovar@option@overleftrightharpoon@true}
43 \DeclareOption{underleftrightharpoon}{\ovar@option@underleftrightharpoon@true}
44 \DeclareOption{overrightarrowharpoonup}{\ovar@option@overrightarrowharpoonup@true}
45 \DeclareOption{underrightharpoonup}{\ovar@option@underrightharpoonup@true}
46 \DeclareOption{overrightarrowharpoondown}{\ovar@option@overrightarrowharpoondown@true}
47 \DeclareOption{underrightharpoondown}{\ovar@option@underrightharpoondown@true}
48 \DeclareOption{overleftarrowharpoonup}{\ovar@option@overleftarrowharpoonup@true}
```

```

49 \DeclareOption{underleftharpoonup}{\over@option@overleftharpoonup@true}
50 \DeclareOption{overleftharpoondown}{\over@option@overleftharpoondown@true}
51 \DeclareOption{underleftharpoondown}{\over@option@overleftharpoondown@true}
52 \DeclareOption{overbar}{\over@option@overbar@true}
53 \DeclareOption{underbar}{\over@option@overbar@true}

```

Following options are for sets of predefined commands.

```

54 \DeclareOption{overcommands}{%
55   \over@option@overrightarrow@true
56   \over@option@overleftarrow@true
57   \over@option@overleftrightarrow@true
58   \over@option@overrightarrowharpoonup@true
59   \over@option@overrightarrowharpoondown@true
60   \over@option@overleftharpoonup@true
61   \over@option@overleftharpoondown@true
62   \over@option@overbar@true
63 }
64 \DeclareOption{undercommands}{%
65   \over@option@underrightarrow@true
66   \over@option@underleftarrow@true
67   \over@option@underleftrightarrow@true
68   \over@option@underrightharpoonup@true
69   \over@option@underrightharpoondown@true
70   \over@option@underleftharpoonup@true
71   \over@option@underleftharpoondown@true
72   \over@option@underbar@true
73 }
74 \DeclareOption{allcommands}{%
75   \over@option@overrightarrow@true
76   \over@option@underrightarrow@true
77   \over@option@overleftarrow@true
78   \over@option@underleftarrow@true
79   \over@option@overleftrightarrow@true
80   \over@option@underleftrightharpoonup@true
81   \over@option@underrightharpoonup@true
82   \over@option@underrightharpoondown@true
83   \over@option@underrightharpoondown@true
84   \over@option@overleftharpoonup@true
85   \over@option@underleftharpoonup@true
86   \over@option@overleftharpoondown@true
87   \over@option@underleftharpoondown@true
88   \over@option@overbar@true
89   \over@option@underbar@true
90 }
91 }

```

### Options processing

```

92 \DeclareOption*{\PackageWarning{overarrows}{Unknown option: '\CurrentOption'}}
93 \ProcessOptions\relax

```

### Package dependencies

L<sup>A</sup>T<sub>E</sub>X distributions prior to 2020/10/01 must add the xparse package.

```

94 \RequirePackage{amsmath}
95 \RequirePackage{etoolbox}

```

Option `old-arrows`<sup>→P.14</sup>. Configuration of arrows used for predefined commands.

```

96 \let\over@rightarrow\rightarrow
97 \let\over@leftarrow\leftarrow
98 \ifover@option@oldarrows@

```

```

99 \RequirePackage[old]{old-arrows}
100 \let\ovar@rightarrow\varrightarrow
101 \let\ovar@leftarrow\varleftarrow
102 \fi

```

Option `esvect`  $\rightarrow$  P. 11.

```

103 \ifovar@option@esvect@
104 \RequirePackage{esvect}
105 \fi

```

Option `tikz`  $\rightarrow$  P. 15.

```

106 \ifovar@option@tikz@
107 \RequirePackage{tikz}
108 \usetikzlibrary{arrows.meta}
109 \fi

```

Option `pstarrows`  $\rightarrow$  P. 15.

```

110 \ifovar@option@pstarrows@
111 \RequirePackage[pstarrows]{pict2e}
112 \fi

```

## Management of keys

### Family declaration and setters

```

113 \RequirePackage{pgfkeys}
114 \pgfkeys{overarrows/.is family}
\ovar@set 115 \newcommand{\ovar@set}[1]{\pgfkeys{/overarrows}{#1}}
\SetOverArrowsMethod 116 \NewDocumentCommand{\SetOverArrowsMethod}{ s O{fill} m O{} m }{%
117 \IfBooleanTF{#1}{%
118 \csgdef{\ovar@set@#3}{#4\ovar@set@#5}}%
119 }{%
120 \csgdef{\ovar@set@#3}{#4\ovar@set@%
121 no stack macro hook/.code={%
122 \ovar@set{stack macro/.expanded={%
123 \expandafter\expandonce\csname ovar@stack@#2\endcsname%
124 {\expandonce\ovar@length@min}%
125 {\expandonce\ovar@before@arrow}{\expandonce\ovar@after@arrow}%
126 }}}%
127 },#5}}%
128 }%
129 }

```

### Common keys

```

130 \SetOverArrowsMethod*{common}[\undef{\ovar@macro@stack}\undef{\ovar@macro@arrow}]{%
131 detect subscripts/.is if=ovar@detectsubscripts@,

```

`stack macro`  $\rightarrow$  P. 27 and `arrow macro`  $\rightarrow$  P. 27.

```

132 stack macro/.store in=\ovar@macro@stack,
133 arrow macro/.store in=\ovar@macro@arrow,
134 stack macro/.value required,
135 arrow macro/.value required,

```

`no stack macro hook`  $\rightarrow$  P. 27, `no arrow macro hook`  $\rightarrow$  P. 27. These two keys must be redefined by the command `\ovar@set{<method>}`.

```

136 no stack macro hook/.code={%
137 \PackageError{overarrows}{Undefined stack macro}
138 {The requested method is perhaps misspelled}

```

```

139   },
140   no arrow macro hook/.code={%
141     \PackageError{overarrows}{Undefined arrow macro}
142     {The requested method is perhaps misspelled}
143   },

min length→ P.20.

144   min length/.store in=\ovar@length@min,
145   min length/.value required,
146   min length=0,

before arrow→ P.22, after arrow→ P.22, space before arrow→ P.22, space after
arrow→ P.22.

147   before arrow/.store in=\ovar@before@arrow,
148   after arrow/.store in=\ovar@after@arrow,
149   before arrow/.value required,
150   after arrow/.value required,
151   before arrow=\empty,
152   after arrow=\empty,
153   space before arrow/.code=\pgfkeysalso{before arrow={\kern ##1}},
154   space after arrow/.code=\pgfkeysalso{after arrow={\kern ##1}},

shift left→ P.21, shift right→ P.21, shift leftright→ P.21, center arrow→ P.21,
left arrow→ P.21, right arrow→ P.21.

155   shift left/.store in=\ovar@shift@left,
156   shift right/.store in=\ovar@shift@right,
157   shift left/.value required,
158   shift right/.value required,
159   shift leftright/.code=\pgfkeysalso{%
160     shift left=##1, shift right=##1,
161   },
162   center arrow/.code=\pgfkeysalso{shift leftright=0},
163   shift leftright/.value required,
164   center arrow/.value forbidden,
165   left arrow/.code=\pgfkeysalso{%
166     shift left=0, shift right=##1,
167   },
168   right arrow/.code=\pgfkeysalso{%
169     shift left=##1, shift right=0,
170   },
171   left arrow/.default=2,
172   right arrow/.default=2,
173   right arrow,

arrow under→ P.20.

174   arrow under/.is choice,
175   arrow under/noconfig/.code={
176     \def\ovar@stack@fill{\ovar@stackunder@fill}
177     \def\ovar@stack@lens{\ovar@stackunder@lens}
178   },
179   arrow under/autoconfig/.code={
180     \pgfkeysalso{%
181       arrow under=noconfig,
182       detect subscripts=false,
183       before arrow={\kern 1.3\ex@ \relax},% like underarrow@ from amsmath
184     }
185   },
186   arrow under/.default=autoconfig,
187 }

```

Keys for the symb method



```
188 \SetOverArrowsMethod{symp}[\undef{\ovar@macro@arrowfill}]{%
```

Fill macro.

```
189 fill macro/.store in=\ovar@macro@arrowfill,
190 fill macro/.value required,
```

Arrow macro.

```
191 no arrow macro hook/.code={%
192 \ifdef{\ovar@macro@arrowfill}{%
193 \ovar@set{%
194 fill macro/.expanded={%
195 \noexpand\ovar@arrow@fill%
196 {\expandonce\ovar@shift@left}{\expandonce\ovar@shift@right}%
197 }
198 }
199 }
200 \ovar@set{%
201 arrow macro/.expanded={%
202 \expandonce{\ovar@macro@arrowfill}%
203 {\expandonce{\ovar@arrow@start}\expandonce{\ovar@trim@start}}%
204 {\expandonce{\ovar@trim@middle}\expandonce{\ovar@arrow@middle}}%
205 \expandonce{\ovar@trim@middle}}%
206 {\expandonce{\ovar@trim@end}\expandonce{\ovar@arrow@end}}%
207 }
208 }
209 },
```

start<sup>→P. 22</sup>, middle<sup>→P. 22</sup>, end<sup>→P. 22</sup>.

```
210 start/.store in=\ovar@arrow@start,
211 middle/.store in=\ovar@arrow@middle,
212 end/.store in=\ovar@arrow@end,
213 start/.value required,
214 middle/.value required,
215 end/.value required,
```

trim start<sup>→P. 23</sup>, trim middle<sup>→P. 23</sup>, trim end<sup>→P. 23</sup>, trim<sup>→P. 23</sup>, no trimming<sup>→P. 23</sup>.

```
216 trim start/.code={\def\ovar@trim@start{\xjoinrel[##1]}},
217 trim middle/.code={\def\ovar@trim@middle{\xjoinrel[##1]}},
218 trim end/.code={\def\ovar@trim@end{\xjoinrel[##1]}},
219 trim start/.value required,
220 trim middle/.value required,
221 trim end/.value required,
222 trim/.code={\pgfkeysalso{trim start={##1}, trim middle={##1}, trim end={##1}}},
223 trim/.value required,
224 no trimming/.code={%
225 \let\ovar@trim@start\empty
226 \let\ovar@trim@middle\empty
227 \let\ovar@trim@end\empty
228 },
229 no trimming/.value forbidden,
```

middle config<sup>→P. 23</sup>.

```
230 middle config/.is choice,
231 middle config/.value required,
232 middle config/relbar/.code={\pgfkeysalso{%
233 middle={\relbar},
234 trim middle={2.5},
235 },
236 middle config/relbareda/.code={%
237 \ifdef{\relbareda}{%
238 \PackageWarning{overarrows}{Key 'middle config=relbareda' used,
```

```

239 \MessageBreak%
240 but \protect\relbareda\space is undefined; ignored.
241 \MessageBreak%
242 Load 'esvect' package, or use 'esvect' option \MessageBreak%
243 to remove this warning}
244 }{%
245 \pgfkeysalso{%
246 middle={\relbareda},
247 trim middle={1},
248 }
249 }
250 },
251 middle config/auto/.code={%
252 \ifovar@option@esvect@
253 \pgfkeysalso{middle config=relbareda}
254 \else
255 \pgfkeysalso{middle config=relbar}
256 \fi
257 },

```

`amsmath` → P. 23.

```

258 amsmath/.is choice,%
259 amsmath/mimic/.code=\pgfkeysalso{%
260 start={\relbar}, middle={\relbar}, end={\rightarrow},
261 trim start=7,
262 trim middle=2,
263 trim end=7,
264 shift leftright=0,
265 after arrow={}, before arrow={},
266 },
267 amsmath/strict/.code=\pgfkeysalso{%
268 amsmath=mimic,
269 no trimming,
270 fill macro={\arrowfill@}, stack macro={\overarrow@},
271 },
272 amsmath/.default=mimic,

```

`esvect` → P. 24.

```

273 esvect/.is choice,%
274 esvect/mimic/.code=\pgfkeysalso{%
275 start={\relbared}, middle={\relbareda}, end={\fldr},
276 trim start=1.5,
277 trim end=1.5,
278 trim middle=0,
279 right arrow=2,
280 space before arrow=-.7pt,
281 space after arrow=-.3pt,
282 },
283 esvect/strict/.code=\pgfkeysalso{%
284 esvect=mimic,
285 no trimming,
286 fill macro={\traitfill@}, stack macro={\overvect@},
287 },
288 esvect/.default=mimic,

```

Initial configuration.

```

289 amsmath, middle config=auto, end=\ovar@rightarrow, right arrow,
290 }

```

Keys for the `tikz` method

```

291 \SetOverArrowsMethod[lens]{tikz}[\undef{\ovar@tikz@command}]{%

```

Arrow macro.

```

292 no arrow macro hook/.code={%
293   \ifdef{\ovar@tikz@command}{%
294     \pgfkeysgetvalue{/overarrows/path options}{\ovar@tikz@pathoptions}
295     \ovar@set{%
296       tikz command/.expanded={%
297         \noexpand\draw[\expandonce\ovar@tikz@pathoptions]\expandonce\ovar@tikz@path;
298       }
299     }
300   }
301   \pgfkeysgetvalue{/overarrows/tikz options}{\ovar@tikz@options}
302   \ovar@set{%
303     arrow macro/.expanded={%
304       $ \noexpand\mkern \expandonce{\ovar@shift@left} mu\noexpand\relax$%
305       \noexpand\tikz[\expandonce{\ovar@tikz@options}]{\expandonce{\ovar@tikz@command}}%
306       $ \noexpand\mkern \expandonce{\ovar@shift@right} mu\noexpand\relax$%
307     }
308   }
309 },

```

TikZ parts: tikz command<sup>→ P. 25</sup>, tikz options<sup>→ P. 24</sup>, path options<sup>→ P. 25</sup>, path<sup>→ P. 25</sup>.

```

310 tikz command/.store in=\ovar@tikz@command,
311 tikz options/.initial={x=\overarrowlength, line width=\overarrowthickness},
312 path options/.initial={arrows={-Classical TikZ Rightarrow}, cap=round},
313 path/.store in=\ovar@tikz@path,
314 path={({0,0}--(1,0)},
315 tikz command/.value required,
316 tikz options/.value required,
317 path options/.value required,
318 path/.value required,

```

TikZ handy keys: add path options<sup>→ P. 25</sup>, add tikz options<sup>→ P. 25</sup>, arrows<sup>→ P. 25</sup>, line thickness<sup>→ P. 25</sup>, thinner<sup>→ P. 25</sup>.

```

319 add path options/.code=\pgfkeysalso{%
320   path options/.append={, ##1}},%
321 add tikz options/.code=\pgfkeysalso{%
322   tikz options/.append={, ##1}},%
323 arrows/.code=\pgfkeysalso{add path options={arrows={##1}}},%
324 line thickness/.code=\pgfkeysalso{add path options={line width=##1}},%
325 thinner/.code=\pgfkeysalso{line thickness={\overarrowsmallerthickness}},%
326 add path options/.value required,%
327 add tikz options/.value required,%
328 arrows/.value required,%
329 line thickness/.value required,%
330 thinner/.value forbidden,%

```

Initial configuration.

```

331 shift right=-2,
332 min length=12,
333 }

```

Keys for the picture method

```

334 \SetOverArrowsMethod[lens]{picture}{%

```

Arrow macro.

```

335 no arrow macro hook/.code={%
336   \ovar@set{%
337     arrow macro/.expanded={%
338       $ \noexpand\mkern \expandonce{\ovar@shift@left} mu\noexpand\relax$%

```

```

339 \noexpand\begin{picture}\expandonce{\ovar@picture@geometry}%
340 \noexpand\linethickness{\expandonce{\ovar@picture@linethickness}}%
341 \expandonce{\ovar@picture@command}%
342 \noexpand\end{picture}%
343 $\noexpand\mkern \expandonce{\ovar@shift@right} \mu\noexpand\relax$%
344 }
345 }
346 },

```

Picture parts: `picture` command<sup>→ P. 26</sup>, `geometry`<sup>→ P. 26</sup>, `line thickness`<sup>→ P. 26</sup>.

```

347 picture command/.store in=\ovar@picture@command,
348 geometry/.store in=\ovar@picture@geometry,
349 line thickness/.store in=\ovar@picture@linethickness,
350 picture command/.value required,
351 geometry/.value required,
352 line thickness/.value required,

```

Picture handy key: `thinner`<sup>→ P. 26</sup>.

```

353 thinner/.code=\pgfkeysalso{line thickness={\overarrowsmallerthickness}},

```

Initial configuration.

```

354 shift right=-2,
355 min length=18,
356 geometry={(\overarrowlength,1ex)(0,-0.5ex)},%
357 line thickness={\overarrowthickness},%
358 picture command={\put(0,0){\vector(1,0){\overarrowlength}}},%
359 }

```

## Commands

### Macros for symbols assemblage

```

\joinrel
360 \ifdef{\xjoinrel}{%
361 \PackageWarning{overarrows}{Command \protect\xjoinrel\space already defined.
362 \MessageBreak%
363 Previous definition will be overridden}
364 }{}

```

Use a default value of 3.5 mu, as recommended by egreg (see <https://tex.stackexchange.com/a/471736>). `\joinrel` uses a value of 3 mu.

```

365 \DeclareRobustCommand{\xjoinrel}[1][3.5]{\mathrel{\mkern-#1mu}}

```

```

\smallermathstyle
366 \newcommand*{\smallermathstyle}{%
367 \mathchoice{\scriptstyle}{\scriptstyle}{\scriptscriptstyle}{\scriptscriptstyle}}
368 }

```

`\ovar@arrow@fill` Macro used for default fill macro<sup>→ P. 27</sup>.

#1: left shift  
 #2: right shift  
 #3: arrow start  
 #4: arrow middle  
 #5: arrow end  
 #6: math style

```

369 \def\ovar@arrow@fill#1#2#3#4#5#6{%
370 $\m@th\thickmuskip0mu\medmuskip\thickmuskip\thinmuskip\thickmuskip\relax%
371 \mkern #1 \mu\relax#6#3%
372 \cleaders\hbox{${#6#4$}}\hfill%
373 #5\mkern #2 \mu\relax$%
374 }

```

## Macros for fixed length arrows

Lengths declaration.

```
375 \newlength{\overarrowlength}
376 \newlength{\overarrowthickness}
377 \newlength{\overarrowsmallerthickness}
378 \newlength{\ovar@extralength}
379 \newlength{\ovar@tempdim}
```

`\ovar@set@arrowlength`

Sets `\overarrowlength` <sup>→ P. 17</sup>.

#1: min length, in math units

#2: math style

#3: content

```
380 \def\ovar@set@arrowlength#1#2#3{%
381   \settowidth{\ovar@tempdim}{\m@th#2\mskip #1 mu\relax$}%
382   \settowidth{\overarrowlength}{\m@th#2#3$}%
383   \ifdim \overarrowlength < \ovar@tempdim \overarrowlength=\ovar@tempdim\fi%
384 }
```

`\ovar@set@arrowthickness`

Sets `\overarrowthickness` <sup>→ P. 17</sup> and `\overarrowsmallerthickness` <sup>→ P. 18</sup>.

#1: arrow length

#2: math style

```
385 \def\ovar@set@arrowthickness#1{% use rule thickness=\fontdimen 8 font family 3
386   \ifx#1\displaystyle%
387     \overarrowthickness = \fontdimen 8 \textfont 3%
388     \overarrowsmallerthickness = \fontdimen 8 \scriptfont 3%
389   \else\ifx#1\textstyle%
390     \overarrowthickness = \fontdimen 8 \textfont 3%
391     \overarrowsmallerthickness = \fontdimen 8 \scriptfont 3%
392   \else\ifx#1\scriptstyle%
393     \overarrowthickness = \fontdimen 8 \scriptfont 3%
394     \overarrowsmallerthickness = \fontdimen 8 \scriptscriptfont 3%
395   \else%
396     \overarrowthickness = \fontdimen 8 \scriptscriptfont 3%
397     \overarrowsmallerthickness = \overarrowthickness%
398   \fi\fi\fi%
399 }
```

## Stack macros

`\ovar@stackover@@`

`\ovar@stackunder@@`

Bases of all stack macros.

#1: min length, in math units

#2: vertical mode material before arrow

#3: vertical mode material after arrow

#4: arrow

#5: math style

#6: content

```
400 \def\ovar@stackover@@#1#2#3#4#5#6{\vbox{\ialign{##\crrc%
401   $#5\mskip #1 mu\relax$\crrc%
402   \noalign{#2\nointerlineskip}#4\crrc%
403   \noalign{#3\nointerlineskip}%
404   $\m@th\hfil#5#6\hfil$\crrc%
405   }%
406   }%
407 }
408 \def\ovar@stackunder@@#1#2#3#4#5#6{\vtop{\ialign{##\crrc%
409   $\m@th\hfil#5#6\hfil$\crrc%
```

```

410 \noalign{#2\nointerlineskip}#4\cr\cr%
411 \noalign{#3\nointerlineskip}%
412 $#5\mskip #1 mu\relax$\cr\cr%
413 }%
414 }%
415 }

\ovar@stackover@
\ovar@stackunder@
Stack macros without min arrow length.
#1: vertical mode material before arrow
#2: vertical mode material after arrow
#3: arrow macro
#4: math style
#5: content
416 \def\ovar@stackover@#1#2#3#4#5{\ovar@stackover@@{0}{#1}{#2}{#3}{#4}{#5}}
417 \def\ovar@stackunder@#1#2#3#4#5{\ovar@stackunder@@{0}{#1}{#2}{#3}{#4}{#5}}

\ovar@stackover@fill
\ovar@stackunder@fill
\ovar@stack@fill
Stack macros for extensible arrows.
#1: min length, in math units
#2: vertical mode material before arrow
#3: vertical mode material after arrow
#4: arrow filler macro
#5: math style
#6: content
418 \def\ovar@stackover@fill#1#2#3#4#5#6{\ovar@stackover@@{#1}{#2}{#3}{#4#5}{#5}{#6}}
419 \def\ovar@stackunder@fill#1#2#3#4#5#6{\ovar@stackunder@@{#1}{#2}{#3}{#4#5}{#5}{#6}}

\ovar@stack@fill matches the macro \ovar@stackover@fill by default, or
\ovar@stackunder@fill with arrow under→ P. 20.
420 \def\ovar@stack@fill{\ovar@stackover@fill}

\ovar@stackover@lens
\ovar@stackunder@lens
\ovar@stack@lens
Stack macros for fixed-length arrows (these call \ovar@set@arrowlength and
\ovar@set@arrowthickness).
#1: min length, in math units
#2: vertical mode material before arrow
#3: vertical mode material after arrow
#4: arrow content macro
#5: math style
#6: content
421 \def\ovar@stackover@lens#1#2#3#4#5#6{%
422 \ovar@set@arrowlength{#1}{#5}{#6}%
423 \ovar@set@arrowthickness{#5}%
424 \ovar@stackover@{#2}{#3}{#4}{#5}{#6}%
425 }
426 \def\ovar@stackunder@lens#1#2#3#4#5#6{%
427 \ovar@set@arrowlength{#1}{#5}{#6}%
428 \ovar@set@arrowthickness{#5}%
429 \ovar@stackunder@{#2}{#3}{#4}{#5}{#6}%
430 }

\ovar@stack@lens matches the macro \ovar@stackover@lens by default, or
\ovar@stackunder@lens with arrow under→ P. 20.
431 \def\ovar@stack@lens{\ovar@stackover@lens}

```

## Macro for commands creation

\DeclareOverArrowCommand

```

432 \NewDocumentCommand{\DeclareOverArrowCommand}{ O{ symb } m m }{%
433   \begingroup
434   \ovar@set@common
435   \ifcsdef{ovar@set@#1}{%
436     \csuse{ovar@set@#1}
437   }{%
438     \PackageError{overarrows}{Unknown method #1}
439     {Try with 'symb', 'tikz' or 'picture'}
440   }
441   \ovar@set{#3 }
442   \ifdef{\ovar@macro@arrow}{ }{%
443     \ovar@set{no arrow macro hook}
444   }
445   \ifdef{\ovar@macro@stack}{ }{%
446     \ovar@set{no stack macro hook}
447   }
448   \csxdef{ovar@#2@normal}{%
449     \noexpand\mathpalette{%
450       \expandonce{\ovar@macro@stack}{\expandonce{\ovar@macro@arrow}}%
451     }
452   }
453   \csxdef{ovar@#2@starred}{%
454     \noexpand\mathpalette{%
455       \noexpand\ovar@starversion{%
456         \expandonce{\ovar@macro@stack}{\expandonce{\ovar@macro@arrow}}%
457       }
458     }
459   }
460   \ifovar@detectsubscripts@%
461   \csgdef{ovar@#2@auto}##1{%
462     \@ifnextchar _{%
463       \csuse{ovar@#2@starred}{##1}%
464     }{%
465       \csuse{ovar@#2@normal}{##1}%
466     }%
467   }
468   \csgdef{#2}{%
469     \@ifstar{\csuse{ovar@#2@starred}}{\csuse{ovar@#2@auto}}%
470   }
471   \else
472   \csgdef{#2}{%
473     \@ifstar{\csuse{ovar@#2@starred}}{\csuse{ovar@#2@normal}}%
474   }
475   \fi
476   \ifovar@option@debug@
477   \PackageInfo{overarrows}{%
478     Meaning of \protect\ovar@#2@normal\MessageBreak
479     used for \@backslashchar#2:\MessageBreak%
480     \expandafter\meaning\csname ovar@#2@normal\endcsname}
481   \fi
482 \endgroup
483 }
\ProvideOverArrowCommand
484 \NewDocumentCommand{\ProvideOverArrowCommand}{ O{ symb } m m }{%
485   \ifcsdef{#2}{ }{
486     \DeclareOverArrowCommand[#1]{#2}{#3}
487   }
488 }
\NewOverArrowCommand
489 \NewDocumentCommand{\NewOverArrowCommand}{ O{ symb } m m }{%
490   \ifcsdef{#2}{%
491     \PackageError{overarrows}{Command \csname #2\endcsname already defined}%
492     {You have used \protect\NewOverArrowCommand\space with a command that
493       already has a definition. \MessageBreak%

```

```

494 Choose another name, or use instead \protect\DeclareOverArrowCommand.}
495 }{%
496 \DeclareOverArrowCommand[#1]{#2}{#3}
497 }
498 }
\RenewOverArrowCommand
499 \NewDocumentCommand{\RenewOverArrowCommand}{ O{ symb } m m }{%
500 \ifcsundef{#2}{%
501 \PackageError{overarrows}{Command \csname #2\endcsname undefined}{%
502 {You have used \protect\RenewOverArrowCommand\space with a command that was
503 never defined. \MessageBreak%
504 Check the requested name, or use instead \protect\NewOverArrowCommand.}
505 }{%
506 \DeclareOverArrowCommand[#1]{#2}{#3}
507 }
508 }

```

### Starred variant

\ovar@starversion

#1: definition (stack macro + arrow macro)  
#2: math style  
#3: content

```

509 \def\ovar@starversion#1#2#3{%
510 #1#2{#3}%
511 \settowidth{\ovar@extralength}{\$ \m@th#1#2{#3}$}
512 \settowidth{\ovar@tempdim}{\$ \m@th#2{#3}$}
513 \deflength{\ovar@extralength}{0.5\ovar@extralength-0.5\ovar@tempdim}%
514 \kern-\ovar@extralength%
515 }

```

### \vv vector command

\vv

\esvectvv

Backup and redefinition of esvect  $\vv \rightarrow P.18$  vector command.

```

516 \ifovar@option@esvect@
517 \let\esvectvv\vv
518 \undef\vv
519 \NewOverArrowCommand{vv}{esvect, middle config=auto}
520 \fi

```

### Predefined commands

\overrightarrow

```

521 \ifovar@option@overrightarrow@
522 \DeclareOverArrowCommand{overrightarrow}{%
523 amsmath, middle config=relbar,
524 end=\ovar@rightarrow,
525 right arrow,
526 }
527 \fi

```

\underrightarrow

```

528 \ifovar@option@underrightarrow@
529 \DeclareOverArrowCommand{underrightarrow}{%
530 amsmath, middle config=relbar,
531 end=\ovar@rightarrow,
532 right arrow,
533 arrow under,
534 }
535 \fi

```

\overleftarrow



```

536 \ifovar@option@overleftarrow@
537 \DeclareOverArrowCommand{overleftarrow}{%
538   amsmath, middle config=relbar,
539   start=\ovar@leftarrow,
540   end=\relbar,
541   left arrow,
542 }
543 \fi

\underrleftarrow 544 \ifovar@option@underrleftarrow@
545 \DeclareOverArrowCommand{underrleftarrow}{%
546   amsmath, middle config=relbar,
547   start=\ovar@leftarrow,
548   end=\relbar,
549   left arrow,
550   arrow under,
551 }
552 \fi

\overleftrightharrow 553 \ifovar@option@overleftrightharrow@
554 \DeclareOverArrowCommand{overleftrightharrow}{%
555   amsmath, middle config=relbar,
556   start=\ovar@leftarrow,
557   end=\ovar@rightarrow,
558   center arrow,
559 }
560 \fi

\underrleftrightharrow 561 \ifovar@option@underrleftrightharrow@
562 \DeclareOverArrowCommand{underrleftrightharrow}{%
563   amsmath, middle config=relbar,
564   start=\ovar@leftarrow,
565   end=\ovar@rightarrow,
566   center arrow,
567   arrow under,
568 }
569 \fi

\overrightharpoonup 570 \ifovar@option@overrightharpoonup@
571 \DeclareOverArrowCommand{overrightharpoonup}{%
572   amsmath, middle config=relbar,
573   end=\rightharpoonup,
574   right arrow,
575 }
576 \fi

\underrightharpoonup 577 \ifovar@option@underrightharpoonup@
578 \DeclareOverArrowCommand{underrightharpoonup}{%
579   amsmath, middle config=relbar,
580   end=\rightharpoonup,
581   right arrow,
582   arrow under,
583 }
584 \fi

\overrightharpoondown 585 \ifovar@option@overrightharpoondown@
586 \DeclareOverArrowCommand{overrightharpoondown}{%
587   amsmath, middle config=relbar,
588   end=\rightharpoondown,
589   right arrow,
590 }
591 \fi

\underrightharpoondown 592 \ifovar@option@underrightharpoondown@
593 \DeclareOverArrowCommand{underrightharpoondown}{%

```

```

594     amsmath, middle config=relbar,
595     end=\rightharpoonupdown,
596     right arrow,
597     arrow under,
598   }
599 \fi

\overleftharpoonup 600 \ifovar@option@overleftharpoonup@
601   \DeclareOverArrowCommand{overleftharpoonup}{%
602     amsmath, middle config=relbar,
603     start=\leftharpoonup,
604     end=\relbar,
605     left arrow,
606   }
607 \fi

\underleftharpoonup 608 \ifovar@option@underleftharpoonup@
609   \DeclareOverArrowCommand{underleftharpoonup}{%
610     amsmath, middle config=relbar,
611     start=\leftharpoonup,
612     end=\relbar,
613     left arrow,
614     arrow under,
615   }
616 \fi

\overleftharpoonupdown 617 \ifovar@option@overleftharpoonupdown@
618   \DeclareOverArrowCommand{overleftharpoonupdown}{%
619     amsmath, middle config=relbar,
620     start=\leftharpoonupdown,
621     end=\relbar,
622     left arrow,
623   }
624 \fi

\underleftharpoonupdown 625 \ifovar@option@underleftharpoonupdown@
626   \DeclareOverArrowCommand{underleftharpoonupdown}{%
627     amsmath, middle config=relbar,
628     start=\leftharpoonupdown,
629     end=\relbar,
630     left arrow,
631     arrow under,
632   }
633 \fi

\overbar 634 \ifovar@option@overbar@
635   \DeclareOverArrowCommand{overbar}{%
636     amsmath, middle config=relbar,
637     start={\std@minus}, end={\std@minus},% \relbar is defined with \mathsm@sh
638     shift leftright=0,
639     space after arrow=-0.3ex,
640   }
641 \fi

\underbar 642 \ifovar@option@underbar@
643   \DeclareOverArrowCommand{underbar}{%
644     amsmath, middle config=relbar,
645     start={\std@minus}, end={\std@minus},% \relbar is defined with \mathsm@sh
646     shift leftright=0,
647     arrow under,
648     space before arrow=-0.3ex,
649   }
650 \fi

```

## Test macros

\ovar@testmathstyles

Tabular containing the output of a command for the four math styles and different patterns.

```

651 \newcommand{\ovar@testmathstyles}[2][]{%
652   \begingroup
653   \newcommand*{\ovar@row@teststyle}[1]{%
654     $\displaystyle ##1$
655     & $\textstyle ##1$
656     & $\scriptstyle ##1$
657     & $\scriptscriptstyle ##1$
658     \\
659   }
660   \renewcommand*{\arraystretch}{1.5}
661   \begin{tabular*}{0.95\linewidth}{@{\extracolsep{\fill}} cccc}
662     \hline
663     \footnotesize\texttt{\texttt{\textbackslash displaystyle}}
664     & \footnotesize\texttt{\texttt{\textbackslash textstyle}}
665     & \footnotesize\texttt{\texttt{\textbackslash scriptstyle}}
666     & \footnotesize\texttt{\texttt{\textbackslash scriptscriptstyle}}
667     \\
668     \hline
669     \ovar@row@teststyle{\csuse{#2}{v}}
670     \ovar@row@teststyle{\csuse{#2}{AB}}
671     \ovar@row@teststyle{\csuse{#2}{\mathrm{grad}}}
672     \ovar@row@teststyle{\csuse{#2}{my~long~vector}}
673     \IfValueT{#1}{\ovar@row@teststyle{\csuse{#2}{#1}}}
674     \hline
675   \end{tabular*}
676   \endgroup
677 }
```

\TestOverArrow

```

678 \NewDocumentCommand{\TestOverArrow}{s o m}{%
679   \ifcsdef{#3}{\{%
680     \PackageWarning{overarrows}{Unknown name '#3' passed to
681       \protect\TestOverArrow}
682   }
683   \IfBooleanTF{#1}{\%
684     \noindent\framebox{%
685       \begin{minipage}{0.95\linewidth}
686         \centering
687         \noindent\textbf{\large%
688           Test of \texttt{\textbackslash#3} and \texttt{\textbackslash#3*} macros}
689         \bigskip\par
690         \textbf{\texttt{\textbackslash#3} for different math styles}
691         \smallskip\par
692         \ovar@testmathstyles[#2]{#3}%
693         \bigskip\par
694         \textbf{\texttt{\textbackslash#3} kerning}
695         \begin{displaymath}
696           \csuse{#3}{t}_{\csuse{#3}{u}}_{\csuse{#3}{v}}
697           \quad
698           \csuse{#3}{\imath}_0
699           \quad
700           \csuse{#3}{v}
701           = \csuse{#3}{v}_x + \csuse{#3}{v}_y + \csuse{#3}{v}_z
702           = v_x \csuse{#3}{\imath} + v_y \csuse{#3}{\jmath} + v_z \csuse{#3}{k}
703         \end{displaymath}
704         \textbf{\texttt{\textbackslash#3*} kerning}
705         \begin{displaymath}
706           \csuse{#3}{t}_{\csuse{#3}{u}}_{\csuse{#3}{v}}
707           \quad
\end{pre}
```

```

708     \csuse{#3}*{\imath}_0
709     \qqquad
710     \csuse{#3}*{v}
711     = \csuse{#3}*{v}_x + \csuse{#3}*{v}_y + \csuse{#3}*{v}_z
712     = v_x \csuse{#3}*{\imath} + v_y \csuse{#3}*{\jmath} + v_z \csuse{#3}*{k}
713     \end{displaymath}
714   \end{minipage}%
715 } \bigskip \par
716 }{%
717   \ovar@testmathstyles[#2]{#3}%
718 }
719 }

```

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