hsrstud — HSR-Stud Style and Macros*

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Contents

1 Introduction

This package is made for the HSR Studenten organization to provide a consistent style and source syntax across documents.

2 Package Options

arrowvec Tells the package to use a vector notation with a small arrow over the variables, as it were handwritten.

textvecdiff Disables the "Nabla" or "Del" notation for vector derivatives. Instead the symbols $\nabla, \nabla\cdot, \nabla\times, \nabla^2$ are be replaced with grad, div, curl and div grad.

```
\newif\if@arrowvec\@arrowvecfalse
\DeclareOption{arrowvec}{\@arrowvectrue}

\newif\if@textvecdiff\@textvecdifffalse
\DeclareOption{textvecdiff}{\@textvecdifftrue}

\ProcessOptions\relax
```

*This file describes version v0.1, last revised 2020/04/16.

3 Mathematics

3.1 Vectors

`\vec, \v` Vectors notation. If the option `arrowvec` described in §2 is enabled, the notation with a small arrow over the varible will be used, otherwise the vector is bold. Takes one option {⟨*letter*⟩}.

$\mathbf{F} = m\mathbf{a}$ $\vec{\mathrm{F}} = m\vec{\mathrm{a}}$ `\vec{F} = m\vec{a}`

```
\newcommand{\hsrvecbold}[1]{\mathbf{\boldsymbol{#1}}}
\newcommand{\hsrvecarrow}[1]{\vv{\mathrm{#1}}} % from esvect
\newcommand{\@hsrvecf}[1]{\hsrvecbold{#1}}
\if@arrowvec
    \renewcommand{\@hsrvecf}[1]{\hsrvecarrow{#1}}
\fi

% save previous command
\newcommand{\vaccent}{\v}
\newcommand{\oldvec}{\vec}
% redefine
\renewcommand{\v}[1]{\@hsrvecf{#1}}
\renewcommand{\vec}[1]{\@hsrvecf{#1}}
```

`\uvec, \uv` Unit vector notation. Takes {⟨*letter*⟩}. It is implemented in terms of `\vec`, which means that the style is inherited.

$\hat{\mathbf{x}} = \mathbf{x}/x$ $\hat{\mathrm{x}} = \vec{\mathrm{x}}/x$ `\uvec{x} = \vec{x}/x`

```
\newcommand{\hsruvecbold}[1]{\vec{\hat{#1}}}
\newcommand{\hsruvecarrow}[1]{\hat{\mathrm{#1}}}
\newcommand{\@hsruvecf}[1]{\hsruvecbold{#1}}
\if@arrowvec
    \renewcommand{\@hsruvecf}[1]{\hsruvecarrow{#1}}
\fi

\newcommand{\uv}[1]{\@hsruvecf{#1}}
\newcommand{\uvec}[1]{\@hsruvecf{#1}}
```

`\dotp` Dot product between vectors.

$\mathbf{u} \cdot \mathbf{v}$ `\vec{u}\dotp\vec{v}`

3.1.1 Products

```
\newcommand{\dotp}{\boldsymbol\cdot}
```

`\crossp, \cross` Cross product between vectors.

$\mathbf{u} \times \mathbf{v}$ `\vec{u}\cross\vec{v}`

```
\newcommand{\crossp}{\boldsymbol\times}
\newcommand{\cross}{\boldsymbol\times}
```

3.2 Matrices and Tensors

`\mtx` Matrix notation. Takes {⟨*letter*⟩}.

$\mathrm{J} = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$

```
\mtx{J} = \begin{pmarix}
            0 & 1  \\
            1 & 0
          \end{pmatrix}
```

```
33 \newcommand{\mtx}[1]{\mathrm{#1}}
```

`\ten` Tensor notation. Takes `{`⟨*letter*⟩`}`.

$$\mathbf{T}^{(\mathbf{n})} = \hat{\mathbf{n}} \cdot \underline{\boldsymbol{\sigma}}$$

```
\vec{T}^{(\vec{n})} =
    \uvec{n}\cdot\ten{\sigma}
```

```
34 \newcommand{\ten}[1]{\underline{\mathbf{\boldsymbol{#1}}}}
```

3.3 Equalities

`\heq` L'Hôpital limit equality symbol.

$$\lim_{x\to\infty} \frac{x}{x^2 - 1} \overset{\hat{\mathrm{H}}}{=} \lim_{x\to\infty} \frac{1}{2x} = 0$$

```
\lim_{x\to\infty} \frac{x}{x^2 - 1}
  \heq \lim_{x\to\infty} \frac{1}{2x}
  = 0
```

```
35 \newcommand{\heq}{\stackrel{\hat{\texttt{H}}}{=}}
```

3.4 Derivatives

3.4.1 Differentials

`\dd` The differential element. It needs a `{`⟨*var*⟩`}` and has the optional argument `[`⟨*order*⟩`]`.

$$\mathrm{d}x \qquad \mathrm{d}^4x$$

```
\dd{x} \dd[4]{x}
```

```
36 \newcommand{\dd}[2][]{\mathrm{d}^{#1} #2}
```

`\di` This is the same as `\dd` but with a small space in front, it is intended to be used in integrals for a nicer typesetting.

$$I = \int \mathbf{J} \cdot \mathrm{d}\mathbf{s} = \iint \mathbf{J} \cdot \hat{\mathbf{n}} \, \mathrm{d}x \, \mathrm{d}y$$

```
% no spacing needed (because of dotp)
I = \int\vec{J}\dotp\dd{\vec{s}}
% needs spacing between dx and dy
  = \iint\vec{J}\dotp\uvec{n}\di{x}\di{y}
```

```
37 \newcommand{\di}[2][]{\,\dd[#1]{#2}}
```

3.4.2 Classical

`\deriv` The derivative has arguments `{`⟨*function*⟩`}`, `{`⟨*var*⟩`}` and the optional argument `[`⟨*order*⟩`]`.

$$\frac{\mathrm{d}y}{\mathrm{d}x} \qquad \frac{\mathrm{d}^3y}{\mathrm{d}x^3}$$

```
\deriv{y}{x}
\deriv[3]{y}{x}
```

```
38 \newcommand{\deriv}[3][]{\frac{\dd[#1]{#2}}{\dd[]{#3^{#1}}}}
```

`\pderiv` The partial derivative has arguments `{`⟨*function*⟩`}`, `{`⟨*var*⟩`}` and the optional argument `[`⟨*order*⟩`]`.

$$\frac{\partial y}{\partial x} \qquad \frac{\partial^2 y}{\partial x^2}$$

```
\deriv{f}{x}
\deriv[2]{f}{x}
```

```
39 \newcommand{\pderiv}[3][]{\frac{\partial^{#1} #2}{\partial #3^{#1}}}
```

3.4.3 Vector

`\grad` The gradient operator.

∇f `\grad f`

```
\if@textvecdiff
    \newcommand{\grad}{\text{grad }}
\else
    \newcommand{\grad}{\nabla}%
\fi
```

`\div` The divergence operator, `\div` is renamed to `\divsymb`.

$\nabla \cdot f$ `\div f`

```
\let\divsymb=\div
\if@textvecdiff
    \renewcommand{\div}{\text{div}}
\else
    \renewcommand{\div}{\nabla\cdot}
\fi
```

`\curl` The curl operator.

$\nabla \times f$ `\curl f`

```
\if@textvecdiff
    \newcommand{\curl}{\text{curl }}
\else
    \newcommand{\curl}{\nabla\times}
\fi
```

`\laplace` The laplace operator.

$\nabla^2 f$ `\laplace f`

```
\if@textvecdiff
    \newcommand{\laplace}{\text{div grad}}
\else
    \newcommand{\laplace}{\nabla^2}
\fi
```

4 Colors

hsr-blue	80	60	40	20
hsr-mauve	80	60	40	20
hsr-lakegreen	80	60	40	20
hsr-reed	80	60	40	20
hsr-petrol	80	60	40	20
hsr-basswood	80	60	40	20
hsr-lightgrey	80	60	40	20
hsr-black	80	60	40	20

```
\definecolor{hsr-blue}{HTML}{0065A3}
\definecolor{hsr-blue80}{HTML}{3384B5}
\definecolor{hsr-blue60}{HTML}{66A3C8}
\definecolor{hsr-blue40}{HTML}{99C1DA}
\definecolor{hsr-blue20}{HTML}{CCE0ED}

\definecolor{hsr-mauve}{HTML}{6E1C50}
\definecolor{hsr-mauve80}{HTML}{8B4973}
\definecolor{hsr-mauve60}{HTML}{A87796}
\definecolor{hsr-mauve40}{HTML}{C5A4B9}
\definecolor{hsr-mauve20}{HTML}{E2D2DC}

\definecolor{hsr-lakegreen}{HTML}{548C86}
\definecolor{hsr-lakegreen80}{HTML}{76A39E}
\definecolor{hsr-lakegreen60}{HTML}{98BAB6}
\definecolor{hsr-lakegreen40}{HTML}{BBD1CF}
\definecolor{hsr-lakegreen20}{HTML}{DDE8E7}

\definecolor{hsr-reed}{HTML}{7B6951}
\definecolor{hsr-reed80}{HTML}{958774}
\definecolor{hsr-reed60}{HTML}{B0A597}
\definecolor{hsr-reed40}{HTML}{CAC3B9}
\definecolor{hsr-reed20}{HTML}{E5E1DC}

\definecolor{hsr-petrol}{HTML}{00738D}
\definecolor{hsr-petrol80}{HTML}{338FA4}
\definecolor{hsr-petrol60}{HTML}{66ABBB}
\definecolor{hsr-petrol40}{HTML}{99C7D1}
\definecolor{hsr-petrol20}{HTML}{CCE3E8}

\definecolor{hsr-basswood}{HTML}{BABD5D}
\definecolor{hsr-basswood80}{HTML}{C8CA7D}
\definecolor{hsr-basswood60}{HTML}{D6D79E}
\definecolor{hsr-basswood40}{HTML}{E3E5BE}
\definecolor{hsr-basswood20}{HTML}{F1F2DF}

\definecolor{hsr-lightgrey}{HTML}{C6C7C8}
\definecolor{hsr-lightgrey80}{HTML}{D1D2D3}
\definecolor{hsr-lightgrey60}{HTML}{DDDDDE}
\definecolor{hsr-lightgrey40}{HTML}{E8E8E9}
\definecolor{hsr-lightgrey20}{HTML}{F4F4F4}

\definecolor{hsr-black}{HTML}{1A171B}
\definecolor{hsr-black80}{HTML}{484549}
\definecolor{hsr-black60}{HTML}{767476}
\definecolor{hsr-black40}{HTML}{A4A2A4}
\definecolor{hsr-black20}{HTML}{D1D1D1}
```

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