hsrstud — HSR-Stud Style and Macros*

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Contents

*This file describes version v0.2, last revised 2021/08/04.

1 Purpose of this package

This package is made for the HSR Studenten organization to provide an easy to use interface to give a more consistent look and feel for the works produced by its the members. A secondary objective of this package is to eliminate the *many* dispersed duplicate .tex files that fill the repositories of the HSR-Stud org.

2 Package Options

dontrenew Do not renew existing LaTeX commands and environments. This is useful when the package is loaded on a document that is already partially written.

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 $\boldsymbol{\nabla}, \boldsymbol{\nabla}\cdot, \boldsymbol{\nabla}\times, \nabla^2, \boldsymbol{\nabla}^2$ are be replaced with grad, div, curl and div grad.

3 Summary notation

4 Default Theming

4.1 Links with `hyperref`

Colors from [1] see
https://intranet.hsr.ch

```
Colors from
\cite{bib:hsrcolors} see \\
\url{https://intranet.hsr.ch}
```

4.2 Source Code with `listings`

```
int main(int argc, char *argv[], char *envp[]) {
   std::cout << "hello world" << std::endl;
}
```

```
\begin{lstlisting}[language=C++]
int main(int argc, char *argv[], char *envp[]) {
   std::cout << "hello world" << std::endl;
}
\end{lstlisting}
```

5 Mathematics

5.1 Vectors

\vec Vectors notation. Aliases: \v, \vc. If the option `arrowvec` described in §2 is enabled, the notation with a small arrow over the varible will be used $\vec{x}$, otherwise the vector is bold $\mathbf{x}$. Takes one option {⟨*letter*⟩}. \v is renamed to \vaccent and \vec to \oldvec.

$$\mathbf{F} = m\mathbf{a}$$

```
\[ \vec{F} = m\vec{a} \]
```

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

$$\hat{\mathbf{x}} = \mathbf{x}/x$$

```
\[ \uvec{x} = \vec{x}/x \]
```

5.1.1 Products

`\dotp` Dot product between vectors.

$$\mathbf{u} \cdot \mathbf{v}$$

```
\[ \vec{u}\dotp\vec{v} \]
```

`\crossp` Cross product between vectors.

$$\mathbf{u} \times \mathbf{v}$$

```
\[ \vec{u}\crossp\vec{v} \]
```

5.2 Matrices

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

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

```
\[
    \mx{J} = \begin{pmatrix}
                0 & 1 \\
                1 & 0
             \end{pmatrix}
\]
```

5.3 Equalities

`\heq` L'Hôpital limit equality symbol.

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

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

5.4 Derivatives

5.4.1 Differentials

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

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

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

`\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.

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

```
\begin{align*}
    I &= \int \vec{J}\dotp\dd{\vec{s}} \\
      &= \iint \vec{J}\dotp\uvec{n}\di{x}\di{y}
\end{align*}
```

5.4.2 Scalar functions

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

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

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

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

$$\frac{\partial y}{\partial x} \qquad \frac{\partial^3 y}{\partial x^3}$$

```
\[
    \pderiv{y}{x} \qquad
    \pderiv[3]{y}{x}
\]
```

5.4.3 Vector functions

`\grad` The gradient vector operator.

$$\boldsymbol{\nabla} f$$

```
\[ \grad f \]
```

`\div` The divergence operator, `\div` is renamed to `\divsymb`. If the option `donotrenew` is used `\divg` is also available.

$$\boldsymbol{\nabla} \cdot \mathbf{f}$$

```
\[ \div \vec{f} \]
```

`\curl` The curl operator.

$$\boldsymbol{\nabla} \times \mathbf{f}$$

```
\[ \curl \vec{f} \]
```

`\laplacian` The laplacian operator.

$$\nabla^2 f$$

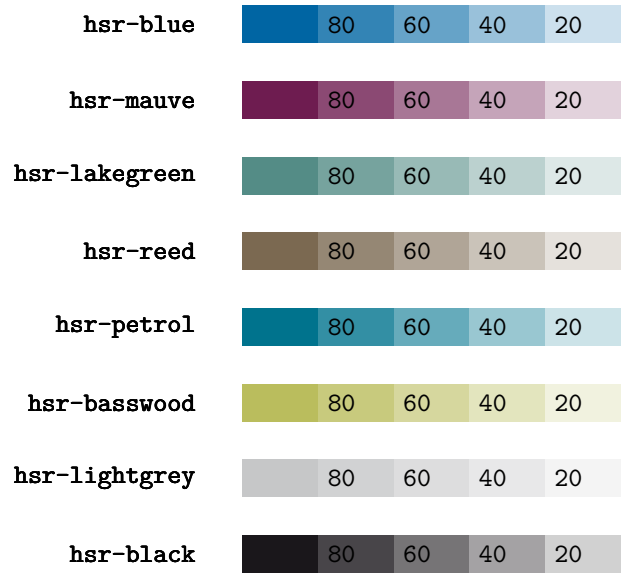
```
\[
    \laplacian f
\]
```

`\vlaplacian` The vector laplacian operator operator.

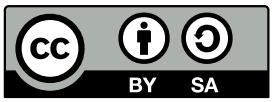
$$\nabla^2 \mathbf{F}$$

```
\[
    \vlaplacian \vec{F}
\]
```

6 Colors



7 License



References

[1] HSR Intern: Corporate Design / Farben, *Hochschule für Technik Rapperswil*, https://intranet.hsr.ch/Farben.7715.0.html

Change History

v0.1

General: Initial draft 1

v0.2

General: Remove legacy code and update notation 1

Index

Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; numbers in roman refer to the code lines where the entry is used.

A Implementation

hsrstud package implementation with inline documentation

A.1 Dependencies

```
1 %% Dependencies ((
2 \RequirePackage{amsmath}
3 \RequirePackage{amssymb}
4 \RequirePackage{bm}
```

```
5
6 \RequirePackage{esint}
7 \PassOptionsToPackage{b}{esvect}
8 \RequirePackage{esvect}
9
10 \RequirePackage{xcolor}
11 \RequirePackage{hyperref}
12 \RequirePackage{listings}
13
14 \RequirePackage{iftex}
15 \RequirePackage{kvoptions}
16 %% ))
```

A.2 Package options

```
17 \SetupKeyvalOptions{
18     family=hsr,
19     prefix=hsr@
20 }
21
22 %% Do not renew LaTeX Macros
23 \DeclareBoolOption[false]{dontrenew}
24
25 %% Vector style
26 \DeclareBoolOption[false]{arrowvec}
27 \DeclareComplementaryOption{boldvec}{arrowvec}
28
29 %% Vector derivative style
30 \DeclareBoolOption[false]{textvecdiff}
31 \DeclareComplementaryOption{delvecdiff}{textvecdiff}
32
33
34 %% Process options
35 \ProcessLocalKeyvalOptions*
```

A.3 Summary notation

```
36 %% TODO: change letters in german
37 \newcommand{\bookref}[1]{\texttt{\textcolor{hsr-mauve}{P.#1}}}
38 \newcommand{\notesref}[1]{\texttt{\textcolor{hsr-blue}{S.#1}}}
39 \newcommand{\lectureref}[1]{\texttt{\textcolor{hsr-lakegreen}{L.#1}}}
```

A.4 Default theming

```
40 %% Theming for hyperref and listings ((
41 \hypersetup{
42     colorlinks=true,
43     linkcolor=hsr-black,
44     citecolor=hsr-mauve,
45     filecolor=hsr-black,
46     urlcolor=hsr-blue,
47 }
48
49 %% Common listings settings
50 \lstdefinestyle{hsr-base}{
51     belowcaptionskip=\baselineskip,
52     breaklines=true,
53     frame=none,
54     inputencoding=utf8,
55     % margin
56     xleftmargin=\parindent,
57     % numbers
58     numbers=left,
```

```
    numbersep=5pt,
    numberstyle=\ttfamily\footnotesize\color{hsr-black40},
    % background
    backgroundcolor=\color{white},
    showstringspaces=false,
    % default language
    language=[LaTeX]TeX,
    % break long lines, and show an arrow where the line was broken
    breaklines=true,
    postbreak=\mbox{\textcolor{hsr-blue}{$\hookrightarrow$}\space},
    % font
    basicstyle=\ttfamily\small,
    identifierstyle=\color{hsr-black},
    keywordstyle=\color{hsr-blue},
    commentstyle=\color{hsr-black40},
    stringstyle=\color{hsr-mauve80},
}

%% Define missing languages / aliases
\lstdefinelanguage{LaTeX}{
    language=[LaTeX]Tex
}

%% Set style
\lstset{style=hsr-base, escapechar=`}
%%))
```

A.5 Mathematics

A.5.1 Vectors

```
%% Vector ((
\newcommand{\hsrvecbold}[1]{\mathbf{\bm{#1}}}
\newcommand{\hsrvecarrow}[1]{\vv{\mathrm{#1}}} % from esvect

\newcommand{\@hsrvecf}[1]{\hsrvecbold{#1}}
\ifhsr@arrowvec
    \renewcommand{\@hsrvecf}[1]{\hsrvecarrow{#1}}
\fi

\newcommand{\vc}{\@hsrvecf}
\ifhsr@dontrenew\else
    % save previous command
    \newcommand{\vaccent}{\v}
    \newcommand{\oldvec}{\vec}
    % redefine
    \renewcommand{\v}[1]{\@hsrvecf{#1}}
    \renewcommand{\vec}[1]{\@hsrvecf{#1}}
\fi
%%))

%% Unit vector ((
\newcommand{\hsruvecbold}[1]{\vec{\hat{#1}}}
\newcommand{\hsruvecarrow}[1]{\hat{\mathrm{#1}}}
\newcommand{\@hsruvecf}[1]{\hsruvecbold{#1}}
\ifhsr@arrowvec
    \renewcommand{\@hsruvecf}[1]{\hsruvecarrow{#1}}
\fi

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

```
%% Products ((
\newcommand{\dotp}{\boldsymbol\cdot}
\newcommand{\crossp}{\boldsymbol\times}
%%))
```

A.5.2 Matrices and Tensors

```
\newcommand{\mx}[1]{\bm{\mathrm{#1}}}
```

A.5.3 Equalities

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

A.6 Derivatives

A.6.1 Differentials

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

A.6.2 Derivatives

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

A.6.3 Vector derivatives

```
%% Gradient ((
\ifhsr@textvecdiff
    \DeclareMathOperator{\grad}{grad}
\else
    \newcommand{\grad}{\vec{\nabla}}
\fi
%% ))

%% Divergence ((
\ifhsr@textvecdiff
    \newcommand{\@hsrdivf}{div}
\else
    \newcommand{\@hsrdivf}{\vec{\nabla}\dotp}
\fi

\DeclareMathOperator{\divg}{\@hsrdivf}
\ifhsr@dontrenew\else
    \let\divsymb=\div
    \renewcommand{\div}{\operatorname{\@hsrdivf}}
\fi
%% ))

%% Curl ((
\ifhsr@textvecdiff
    \DeclareMathOperator{\curl}{curl}
\else
    \DeclareMathOperator{\curl}{\vec{\nabla}\crossp}
\fi
%% ))

%% laplacian ((
\ifhsr@textvecdiff
    \DeclareMathOperator{\laplacian}{div grad}
\else
    \DeclareMathOperator{\laplacian}{\nabla^2}
\fi

\ifhsr@textvecdiff
```

```
    \DeclareMathOperator{\vlaplacian}{div grad}
\else
    \DeclareMathOperator{\vlaplacian}{\vec{\nabla}^2}
\fi
%% ))
```

A.7 Colors

```
\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}
```