

oststud — OST-Stud Style and Macros*

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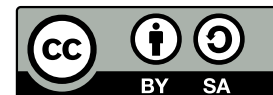
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1 Purpose of this Package

This package is made for the OST Studenten organization to provide an easy to use interface that gives a more consistent look and feel for the works produced by its the members. This package is the successor after the fusion of the old `hsrcstud` package.

2 Package Options

- dontrenew** Do not renew existing L^AT_EX commands and environments. This is useful when the package is loaded on a document that is already partially written.
- textvecdiff** Disables the “Nabla” or “Del” notation for vector derivatives. Instead the symbols $\nabla, \nabla \cdot, \nabla \times, \nabla^2, \nabla^2$ are be replaced with grad, div, curl and div grad.
- textvecdiff** *Work in progress.*
- bfemph** *Work in progress.*
- bbprobability** *Work in progress.*
- scrtransforms** *Work in progress.*

3 Usage

3.1 Vectors and Vector Calculus

\vec In the physics used by electrical engineers it is common to use bold letters for vectors. If the **dontrenew** option is set a new macro **\bvec** (bold **\vec**) that takes a $\{\langle symbol \rangle\}$ defines the bold vector notation. Otherwise the default vector notation with the tiny ugly arrow (\vec{u}) is replaced by bold and the arrow notation saved in **\oldvec**. In vector calculus it is common to denote unit vectors by putting a hat, so there is a macro **\uvec** that does just that:

$$\hat{\mathbf{u}} = \mathbf{u}/u.$$

\dotp To differentiate the dot and cross products (between vectors) from normal **\crossp** product between scalars ($a \cdot b$ and $a \times b$), the macros **\dotp** and **\crossp** provide a bold variant:

$$\mathbf{u} \cdot \mathbf{v}, \quad \mathbf{u} \times \mathbf{v}.$$

\grad The macros **\grad**, **\div** and **\curl** provide symbols for the gradient, divergence and curl operators used in vector calculus. If the option **textvecdiff** is set, they symbols are written as words, otherwise they will be written (ab)using the Nabla symbol, i.e. by pretending that the symbol ∇ is a “vector” (sometime referred to as “del”) of partial derivatives: $\nabla = (\partial_x, \partial_y, \partial_z)^T$. Unless the option **dontrenew** is set, the division symbol is replaced by the divergence and the symbol \div is saved in **\divsymb**. For a scalar field ϕ or a vector field \mathbf{F} the notation (in order) of the gradient, divergence and curl appear as follows:

$$\nabla \phi, \quad \nabla \cdot \mathbf{F}, \quad \nabla \times \mathbf{F}.$$

`\laplacian` Continuing with the (ab)use of the “Nabla” or “Del” notation, there is a `\vlaplacian` macro `\laplacian` for the Laplacian operator

$$\nabla^2 \equiv \nabla \cdot \nabla \equiv \sum_i \partial_i^2.$$

Notice that the Nabla symbol is not bold, that is because the Laplacian operator results in a scalar value. Though, sometimes in electrodynamics the vector Laplacian is used (which applies the Laplacian operator to each component). To differentiate the two there is a macro `\vlaplacian` which uses the bold nabla symbol: $\boldsymbol{\nabla}^2$. If the option `dontrenew` is set both symbols are replaced by `div` and `grad`.

3.2 Complex Numbers

Work in progress.

3.3 Probability Operators

Work in progress.

3.4 Transformation Operators

Work in progress.

$$\mathcal{L}\{f(t)\} = F(s) \circ\!\!\!\!\!\bullet f(t) \bullet\!\!\!\!\!\circ F(s)$$

3.5 References

Work in progress.

3.6 OST Colors

The official OST color palette provides the following “primary” or “accent” colors.



And then there are the other “design colors”.

OSTDarkOrange	OSTOrange	OSTLightOrange
OSTDarkRed	OSTRed	OSTLightRed
OSTDarkPurple	OSTPurple	OSTLightPurple
OSTDarkBlue	OSTBlue	OSTLightBlue
OSTDarkGreen	OSTGreen	OSTLightGreen

3.7 Sane Defaults

Work in progress.

4 Implementation

4.1 Dependencies and Parse Options

First, we have the dependencies necessary for typesetting.

```

1 \RequirePackage{xcolor}
2 \RequirePackage{amsmath}
3 \RequirePackage{amssymb}
4 \RequirePackage{bm}

```

This package also sets sane defaults to the following packages.

```

5 \RequirePackage{hyperref}
6 \RequirePackage{listings}

```

Then we create the options for the package.

```

7 \SetupKeyvalOptions{
8   family=ost,
9   prefix=ost@
10 }
11 \DeclareBoolOption[false]{dontrenew}
12 \DeclareBoolOption[false]{textvecdiff}
13 \DeclareBoolOption[false]{bfemph}
14 \DeclareBoolOption[false]{bbprobability}
15 % \DeclareBoolOption[false]{scrtransforms}
16 \ProcessLocalKeyvalOptions*

```

4.2 Bold emphasis

`\emph` Change the behaviour of `\emph`.

```

17 \ifost@bfemph
18   \ifost@dontrenew
19     \PackageError{The options \noexpand\dontrenew and \noexpand\bfemph cannot be used at
20     \fi

```

```

21 \long\expandafter\def\csname em \endcsname{%
22 \@nomath\em
23 \if b\expandafter\@car\@series\@nil
24 \itshape\else\bfseries\fi
25 }
26 \fi

```

4.3 Vectors and Vector Calculus

`\vec` Set up bold notation for vectors.

```

27 \newcommand{\ost@vec}[1]{\mathbf{\bm{#1}}}
28 \ifost@dontrenew
29 \newcommand{\bvec}[1]{\ost@vec{#1}}
30 \else
31 \let\oldvec\vec
32 \renewcommand{\vec}[1]{\ost@vec{#1}}
33 \fi

```

`\uvec` In vector calculus unit vectors are usually denoted by a hat.

```

34 \newcommand{\uvec}[1]{\vec{\hat{#1}}}

```

`\dotp` To differentiate them from `\cdot` and `\times` which are for scalars.

```

\crossp 35 \DeclareMathOperator{\dotp}{\boldsymbol{\cdot}}
36 \DeclareMathOperator{\crossp}{\boldsymbol{\times}}

```

`\grad` Gradient of a vector valued scalar function.

```

37 \ifost@textvecdiff
38 \DeclareMathOperator{\grad}{grad}
39 \else
40 \DeclareMathOperator{\grad}{\vec{\nabla}}
41 \fi

```

`\div` Divergence operator. If the option `dontrenew` is a new macro `\divg` is defined. Otherwise `\div` is renamed to `\divsymb`.

```

42 \ifost@textvecdiff
43 \DeclareMathOperator{\ost@div}{div}
44 \else
45 \DeclareMathOperator{\ost@div}{\vec{\nabla}\dotp}
46 \fi
47 \ifost@dontrenew
48 \DeclareMathOperator{\divg}{\ost@div}
49 \else
50 \let\divsymb\div
51 \renewcommand{\div}{\ost@div}
52 \fi

```

`\curl` Curl of a vector field.

```

53 \ifost@textvecdiff
54 \DeclareMathOperator{\curl}{curl}
55 \else
56 \DeclareMathOperator{\curl}{\vec{\nabla}\crossp}
57 \fi

```

```

\laplacian Laplacian of a scalar and vector field.
\vlaplacian 58 \ifost@textvecdiff
59   \DeclareMathOperator{\laplacian}{\div\grad}
60   \DeclareMathOperator{\vlaplacian}{\div\grad}
61 \else
62   \DeclareMathOperator{\laplacian}{\nabla^2}
63   \DeclareMathOperator{\vlaplacian}{\vec{\nabla}^2}
64 \fi

```

4.4 Complex Numbers

\Re Replace the real and imaginary operators to look “normal”, that is not using the
\Im Fraktur fonts.

```

65 \ifost@dontrenew\else
66   \renewcommand{\Re}[1]{\mathrm{Re} \left\{#1\right\}}
67   \renewcommand{\Im}[1]{\mathrm{Im} \left\{#1\right\}}
68 \fi

```

4.5 Probability Operators

\E Expectation of a random variable.

```

69 \ifost@bbprobability
70   \DeclareMathOperator{\ost@expectation}{\mathbb{E}}
71 \else
72   \DeclareMathOperator{\ost@expectation}{E}
73 \fi
74 \newcommand{\E}[1]{\ost@expectation\left\{#1\right\}}

```

\Var Variance of a random variable.

```

75 \ifost@bbprobability
76   \DeclareMathOperator{\ost@variance}{\mathbb{V}}
77 \else
78   \DeclareMathOperator{\ost@variance}{Var}
79 \fi
80 \newcommand{\Var}[1]{\ost@variance\left\{#1\right\}}

```

\Pr Probability operator.

```

81 \ifost@bbprobability
82   \DeclareMathOperator{\ost@probability}{\mathbb{P}}
83 \else
84   \DeclareMathOperator{\ost@probability}{Pr}
85 \fi
86 \ifost@dontrenew
87   \newcommand{\P}[1]{\ost@probability\left\{#1\right\}}
88 \else
89   \renewcommand{\Pr}[1]{\ost@probability\left\{#1\right\}}
90 \fi

```

4.6 Transformation Operators

\fourier Fourier transform and its inverse.

```

\ifourier 91 \DeclareMathOperator{\fourier}{\mathcal{F}}
92 \DeclareMathOperator{\ifourier}{\mathcal{F}^{-1}}

```

```

\laplace Laplace transform and its inverse.
\ilaplace 93 \DeclareMathOperator{\laplace}{\mathcal{L}}
          94 \DeclareMathOperator{\ilaplace}{\mathcal{L}^{-1}}

\ztransf Z-transform and its inverse.
\iztransf 95 \DeclareMathOperator{\ztransf}{\mathcal{Z}}
          96 \DeclareMathOperator{\iztransf}{\mathcal{Z}^{-1}}

\hilbert Hilbert transform.
          97 \DeclareMathOperator{\hilbert}{\mathcal{H}}

\corresponds Correspondence symbols.
\rcorresponds 98 \newcommand{\corresponds}{%
              99 \mbox{\setlength{\unitlength}{0.1em}%
              100 \begin{picture}(20,10)%
              101 \put(5,3){\circle{4}}%
              102 \put(7,3){\line(1,0){7}}%
              103 \put(16,3){\circle*{4}}%
              104 \end{picture}}}
              105 \newcommand{\rcorresponds}{%
              106 \mbox{\setlength{\unitlength}{0.1em}%
              107 \begin{picture}(20,10)%
              108 \put(5,3){\circle*{4}}%
              109 \put(7,3){\line(1,0){7}}%
              110 \put(16,3){\circle{4}}%
              111 \end{picture}}}

```

4.7 References

```

\skriptum Reference material in the skriptum (lecture notes) of the course.
\sref 112 \newcommand{\ost@skriptum}{\PackageWarning{No \noexpand\skriptum given}}
      113 \newcommand{\skriptum}[1]{\gdef\ost@skriptum{#1}}
      114 \newcommand{\sref}[1]{%
      115 \texttt{\textcolor{OSTBlackberry}{#1}}\nocite{\ost@skriptum}}

\textbook Reference material in the textbook of the course.
\bref 116 \newcommand{\ost@textbook}{\PackageWarning{No \noexpand\textbook given}}
      117 \newcommand{\textbook}[1]{\gdef\ost@textbook{#1}}
      118 \newcommand{\bref}[1]{%
      119 \texttt{\textcolor{OSTRaspberry}{#1}}\nocite{\ost@textbook}}

```

4.8 OST Colors

Define the colors according to the OST corporate design. The code was kindly stolen from H. Badertscher's `OSTColors.sty` [?]. First there are the “primary colors”.

```

120 \definecolor{OSTBlack}{RGB}{25,25,25}
121 \definecolor{OSTGray}{RGB}{198,198,198}
122 \definecolor{OSTBlackberry}{RGB}{140,25,95}
123 \definecolor{OSTRaspberry}{RGB}{215,40,100}

```

Then the “design colors”.

```
124 \definecolor{OSTPurple}{RGB}{149,96,164}
125 \definecolor{OSTDarkPurple}{RGB}{107,56,129}
126 \definecolor{OSTLightPurple}{RGB}{208,169,208}

127 \definecolor{OSTGreen}{RGB}{29,175,142}
128 \definecolor{OSTDarkGreen}{RGB}{0,126,107}
129 \definecolor{OSTLightGreen}{RGB}{167,213,194}

130 \definecolor{OSTRed}{RGB}{232,78,15}
131 \definecolor{OSTDarkRed}{RGB}{195,46,21}
132 \definecolor{OSTLightRed}{RGB}{243,154,139}

133 \definecolor{OSTBlue}{RGB}{0,134,205}
134 \definecolor{OSTDarkBlue}{RGB}{0,115,176}
135 \definecolor{OSTLightBlue}{RGB}{95,191,237}

136 \definecolor{OSTOrange}{RGB}{251,186,0}
137 \definecolor{OSTDarkOrange}{RGB}{209,143,0}
138 \definecolor{OSTLightOrange}{RGB}{253,214,175}
```

4.9 Sane Defaults

First, set up hyperref to not look hideous.

```
139 \hypersetup{
140     colorlinks=true,
141     linkcolor=OSTBlack,
142     citecolor=OSTBlackberry,
143     filecolor=OSTBlack,
144     urlcolor=OSTDarkBlue,
145 }
```

Then create a listings style.

```
146 \lstdefinestyle{ost-base}{
147     belowcaptionskip=\baselineskip,
148     breaklines=true,
149     frame=none,
150     inputencoding=utf8,
151     % margin
152     xleftmargin=\parindent,
153     % numbers
154     numbers=left,
155     numbersep=5pt,
156     numberstyle=\ttfamily\footnotesize\color{OSTGray},
157     % background
158     backgroundcolor=\color{white},
159     showstringspaces=false,
160     % default language
161     language=TeX,
162     % break long lines, and show an arrow where the line was broken
163     breaklines=true,
164     postbreak=\mbox{\textcolor{OSTDarkBlue}{\mathhookrightarrow}}\space,
165     % font
166     basicstyle=\ttfamily\small,
167     identifierstyle=\color{OSTBlack},
168     keywordstyle=\color{OSTBlue},
```



```

169     commentstyle=\color{OSTGray},
170     stringstyle=\color{OSTBlackberry},
171 }

```

Then we set this style to be default.

```

172 \lstset{style=ost-base, escapechar=`}

```

Change History

v0.1

General: Initial version 1

v0.2

General: Port features of `hsrstud` . . 1

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