

# oststud — OST-Stud Style and Macros\*

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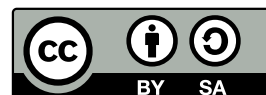
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## 1 Purpose of this Package

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 `hsrstud` package.

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\*This document corresponds to `oststud` v0.2, last revised 2022/11/22.

## 2 Package Options

- dontrenew** Do not renew existing L<sup>A</sup>T<sub>E</sub>X 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 replaced with grad, div, curl and div grad.

## 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**) 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  $\nabla$  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  $\phi$  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:  $\nabla^2$ . If the option **dontrenew** is set both symbols are replaced by div grad.

### 3.2 References

*Work in progress.*

### 3.3 OST Colors

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



And then there are the other “design colors”.



### 3.4 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 \ProcessLocalKeyvalOptions*
```

## 4.2 Vectors and Vector Calculus

`\vec` Set up bold notation for vectors.

```
14 \newcommand{\ost@vec}[1]{\mathbf{\bm{#1}}}
15 \ifost@dontrenew
16   \newcommand{\bvec}[1]{\ost@vec{#1}}
17 \else
18   \let\oldvec\vec
19   \renewcommand{\vec}[1]{\ost@vec{#1}}
20 \fi
```

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

```
21 \newcommand{\uvec}[1]{\vec{\hat{#1}}}
```

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

```
\crossp 22 \DeclareMathOperator{\dotp}{\boldsymbol{\cdot}}
23 \DeclareMathOperator{\crossp}{\boldsymbol{\times}}
```

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

```
24 \ifost@textvecdiff
25   \DeclareMathOperator{\grad}{grad}
26 \else
27   \DeclareMathOperator{\grad}{\vec{\nabla}}
28 \fi
```

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

```
29 \ifost@textvecdiff
30   \DeclareMathOperator{\ost@div}{div}
31 \else
32   \DeclareMathOperator{\ost@div}{\vec{\nabla}\dotp}
33 \fi
34 \ifost@dontrenew
35   \DeclareMathOperator{\divg}{\ost@div}
36 \else
37   \let\divsymb\div
38   \renewcommand{\div}{\ost@div}
39 \fi
```

`\curl` Curl of a vector field.

```
40 \ifost@textvecdiff
41   \DeclareMathOperator{\curl}{curl}
42 \else
43   \DeclareMathOperator{\curl}{\vec{\nabla}\crossp}
44 \fi
```

`\laplacian` Laplacian of a scalar and vector field.

```
\vlaplacian 45 \ifost@textvecdiff
46   \DeclareMathOperator{\laplacian}{\div\grad}
47   \DeclareMathOperator{\vlaplacian}{\div\grad}
48 \else
49   \DeclareMathOperator{\laplacian}{\nabla^2}
50   \DeclareMathOperator{\vlaplacian}{\vec{\nabla}^2}
51 \fi
```

### 4.3 References

`\skriptum` Reference material in the skriptum (lecture notes) of the course.

```
\sref 52 \newcommand{\ost@skriptum}{\PackageWarning{No \noexpand\skriptum given}}
53 \newcommand{\skriptum}[1]{\gdef\ost@skriptum{#1}}
54 \newcommand{\sref}[1]{%
55     \texttt{\textcolor{OSTBlackberry}{#1}}\nocite{\ost@skriptum}}
```

`\textbook` Reference material in the textbook of the course.

```
\bref 56 \newcommand{\ost@textbook}{\PackageWarning{No \noexpand\textbook given}}
57 \newcommand{\textbook}[1]{\gdef\ost@textbook{#1}}
58 \newcommand{\bref}[1]{%
59     \texttt{\textcolor{OSTRaspberry}{#1}}\nocite{\ost@textbook}}
```

### 4.4 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”.

```
60 \definecolor{OSTBlack}{RGB}{25,25,25}
61 \definecolor{OSTGray}{RGB}{198,198,198}
62 \definecolor{OSTBlackberry}{RGB}{140,25,95}
63 \definecolor{OSTRaspberry}{RGB}{215,40,100}
```

Then the “design colors”.

```
64 \definecolor{OSTPurple}{RGB}{149,96,164}
65 \definecolor{OSTDarkPurple}{RGB}{107,56,129}
66 \definecolor{OSTLightPurple}{RGB}{208,169,208}

67 \definecolor{OSTGreen}{RGB}{29,175,142}
68 \definecolor{OSTDarkGreen}{RGB}{0,126,107}
69 \definecolor{OSTLightGreen}{RGB}{167,213,194}

70 \definecolor{OSTRed}{RGB}{232,78,15}
71 \definecolor{OSTDarkRed}{RGB}{195,46,21}
72 \definecolor{OSTLightRed}{RGB}{243,154,139}

73 \definecolor{OSTBlue}{RGB}{0,115,176}
74 \definecolor{OSTDarkBlue}{RGB}{0,115,176}
75 \definecolor{OSTLightBlue}{RGB}{95,191,237}

76 \definecolor{OSTOrange}{RGB}{251,186,0}
77 \definecolor{OSTDarkOrange}{RGB}{209,143,0}
78 \definecolor{OSTLightOrange}{RGB}{253,214,175}
```

### 4.5 Sane Defaults

First, set up `hyperref` to not look hideous.

```
79 \hypersetup{
80     colorlinks=true,
81     linkcolor=OSTBlack,
82     citecolor=OSTBlackberry,
83     filecolor=OSTBlack,
84     urlcolor=OSTBlue,
85 }
```

```

86 \lstdefinestyle{ost-base}{
87     belowcaptionskip=\baselineskip,
88     breaklines=true,
89     frame=none,
90     inputencoding=utf8,
91     % margin
92     xleftmargin=\parindent,
93     % numbers
94     numbers=left,
95     numbersep=5pt,
96     numberstyle=\ttfamily\footnotesize\color{OSTGray},
97     % background
98     backgroundcolor=\color{white},
99     showstringspaces=false,
100    % default language
101    language=TeX,
102    % break long lines, and show an arrow where the line was broken
103    breaklines=true,
104    postbreak=\mbox{\textcolor{OSTDarkBlue}{\hookrightarrow}}\space,
105    % font
106    basicstyle=\ttfamily\small,
107    identifierstyle=\color{OSTBlack},
108    keywordstyle=\color{OSTBlue},
109    commentstyle=\color{OSTGray},
110    stringstyle=\color{OSTBlackberry},
111 }

```

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

v0.1	v0.2
General: Initial version . . . . . 1	General: Port features of <b>hsrstud</b> . 1

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.

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