

The engsymbols package*

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1 Introduction

This document describes the `engsymbols` package, a collection of macros to facilitate the writing of common engineering symbols.

The following packages are prerequisites:

- `bm`
- `amsmath`
- `esdiff`

This package follows the conventions specified by ISO standards of typesetting mathematics [1].

`engsymbols` is actually just a collection of commands I, as a Ph.D. student in Mechanical Engineering, find useful, and I hope other can find it to. There isn't any special design principles.

2 Implementation

2.1 Basic operations

`\ped` These macros by [1] typesets the argument in math roman font, to indicate a
`\ap` object. Italic subscripts should be used only to refer to another variables, for example, c_P is the specific heat obtained by maintaining the pressure, a physical parameter, fixes. By contrast, h_L (produced by `\h\ped{L}`) is the liquid enthalpy; liquid is not a variable. The command `\ap{<index>}` does the same to superscripts, like T^I for the interface temperature.

```
1 \newcommand{\ped}[1]{\ensuremath{\mathrm{#1}}}  
2 \newcommand{\ap}[1]{\ensuremath{\mathrm{#1}}}
```

*This document corresponds to `engsymbols` v0.1, dated 2014/12/05.

`\nvector` We define vector and matrix commands according to ISO standards: bold italic for vectors (\mathbf{x}) and matrices (\mathbf{A}). The “n” in names stands for “notation”. This requires the `bm` package.

```
3 \newcommand{\nvector}[1]{\bm{#1}}
4 \newcommand{\nmatrix}[1]{\bm{#1}}
```

2.2 Special individual symbols

`\volume` This macro produces a calligraphic V to indicate volume, as \mathcal{V} . This is usually done to avoid confusion with velocity.

```
5 \newcommand{\volume}{\mathcal{V}}
```

`\diffd` This macro produces the differential d operator, as in dx . The definition is fairly complex because it tries to do an optimal spacing, and is described by [1].

```
6 \newcommand{\diffd}{\@ifnextchar{\DifF}{\DifF~}}
7 \def\DifF#1{%
8   \mathop{\mathrm{\mathstrut d}}%
9     \nolimits^{#1}\gobblespace}
10 \def\gobblespace{%
11   \futurelet\diffarg\ospace}
12 \def\ospace{%
13   \let\DiffSpace\!%
14   \ifx\diffarg%
15     \let\DiffSpace\relax
16   \else
17     \ifx\diffarg[
18       \let\DiffSpace\relax
19     \else
20       \ifx\diffarg\{
21         \let\DiffSpace\relax
22       \fi\fi\fi\DiffSpace}
```

`\hheat` These macros produces a “crossed” h as in \hbar . This is done in some texts to denote the convection heat transfer coefficient and differentiate it from enthalpy h . This is actually just an alias to the existing command `\hbar`, to give a more meaningful name. There is also `\hmass` to produce \hbar_m , used to indicate a mass transfer coefficient.

```
23 \newcommand{\hheat}{\hbar}
24 \newcommand{\hmass}{\hbar\ped{m}}
```

`\universalgasconstant` A simple command to produce R_u

```
25 \newcommand{\universalgasconstant}{R\ped{u}}
```

`\diffusivitybinary` This is a shorthand for the diffusivity of a binary mixture, \mathcal{D}_{12} .

```
26 \newcommand{\diffusivitybinary}{\mathcal{D}_{12}}
```

2.3 Common operations

<code>\average</code>	This command puts a line above the argument (like \overline{x}), a notation widely used to indicate some type of average. 27 <code>\newcommand{\average}[1]{\overline{#1}}</code>
<code>\rate</code>	This macro denotes the rate of something, like \dot{m} for a mass flow rate. 28 <code>\newcommand{\rate}[1]{\dot{#1}}</code>
<code>\flux</code>	Produces q'' . 29 <code>\newcommand{\flux}[1]{#1''}</code>
<code>\divergent</code> <code>\divergentpar</code> <code>divergentn</code>	These two macros produce the diverget of a vector $\nabla \cdot \mathbf{q}$. The <code>par</code> variant automatically adds parentheses, useful for multiple arguments like $\nabla \cdot (\rho \mathbf{V})$ (produced with <code>\divergentpar{\rho \nvector}</code>). The <code>\divergentv</code> command automatically converts the argument to a vector 30 <code>\newcommand{\divergent}[1]{\nabla \cdot #1}</code> 31 <code>\newcommand{\divergentv}[1]{\divergent{\nvector{#1}}}</code> 32 <code>\newcommand{\divergentpar}[1]{\divergent{\left(#1 \right)}}</code>
<code>\gradient</code> <code>\gradientpar</code>	Gradient of a scalar ∇T . The <code>par</code> variant introduces parentheses (e.g. $\nabla \left(\frac{\rho_1}{\rho} \right)$. 33 <code>\newcommand{\gradient}[1]{\nabla {#1}}</code> 34 <code>\newcommand{\gradientpar}[1]{\gradient{\left({#1} \right)}}</code>
<code>\laplacian</code> <code>\laplacianpar</code>	The laplacian of a scalar x is defined as $\nabla^2 x = \nabla \cdot \nabla x$. One could also use $\nabla^2 (\rho c_p T)$. 35 <code>\newcommand{\laplacian}[1]{\nabla^2 #1}</code> 36 <code>\newcommand{\laplacianpar}[1]{\laplacian{\left(#1 \right)}}</code>
<code>vectornorm</code>	Produces the norm of a vector, like $\ \mathbf{V}\ $. 37 <code>\newcommand{\vectornorm}[1]{\left\lVert #1 \right\rVert}</code>
<code>\diffpar</code> <code>\diffppar</code>	This produces something like $\frac{d}{dx}(\rho V)$, building on the <code>\diff</code> command from the <code>esdiff</code> package. I find it really useful for printing derivatives when the function to be derived is a product of variables. Compare with $\frac{d\rho V}{dx}$. Notice the parentheses are automatically added. There is also the <code>\diffppar</code> for partial derivatives. 38 <code>\newcommand{\diffpar}[2]{\diff{#2} \left(#1 \right)}</code> 39 <code>\newcommand{\diffppar}[2]{\diffp{#2} \left(#1 \right)}</code>

References

- [1] Claudio Beccari. Typesetting mathematics for science and technology according to iso 31/xi. *TUGboat*, 18(1):39–48, 1997.