The magref package*

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1 Introduction

This document describes the magref package, a collection of macros to facilitate the writing of papers and reports on magnetic refrigeration. It just defines common macros and loads packages that are normally used:

- engsymbols
- sinuitx
- mhchem
- ifthen

Please notice that the user should refer to other references such as papers and textbooks to get the meaning of the symbols I describe here.

2 Implementation

The use of the conditional commands to define these custom macro is because some packages and classes that I use in conjuntion with magref provide some obscure commands that clash with them. A normal user should not have any problems with that.

2.1 Common refrigeration and thermodynamic parameters

```
\newcommand{\qe}{\rate{Q}\ped{e}}
\newcommand{\dtspan}{\Delta{}T\ped{span}}
\newcommand{\dtsys}{\Delta{}T\ped{sys}}
\newcommand{\dtreg}{\Delta{}T\ped{reg}}
\newcommand{\w}{\rate{W}}
\newcommand{\wpump}{\w\ped{pump}}
```

*This document corresponds to magref v0.4?, dated 2019/04/22.

```
\newcommand{\wmag}{\w\ped{mag}}
\newcommand{\wshaft}{\w\ped{shaft}}
\newcommand{\wvalve}{\w\ped{valve}}
\newcommand{\wvisc}{\w\ped{visc}}
\newcommand{\cop}{\mathrm{COP}}
\newcommand{\dtad}{\Delta{}T\ped{ad}}
\newcommand{\dsm}{\Delta{}s\ped{M}}
\newcommand{\tc}{T\ped{C}}
\ifthenelse{\isundefined{\th}}{\newcommand{\th}{T\ped{H}}}{\renewcommand{\th}{T\ped{H}}}
\newcommand{\tcend}{T\ped{CE}}
\newcommand{\thend}{T\ped{HE}}
\newcommand{\dthhex}{\Delta{}T\ped{HHEX}}
\newcommand{\dtchex}{\Delta{}T\ped{CHEX}}
\newcommand{\qc}{\rate{Q}\ped{C}}
\newcommand{\qh}{\rate{Q}\ped{H}}
\newcommand{\ths}{T\ped{H,s}}
\newcommand{\tcs}{T\ped{C,s}}
\newcommand{\lcool}{\Lambda\ped{cool}}
\newcommand{\tcurie}{T\ped{Curie}}
\newcommand{\ntu}{\mathrm{NTU}}
\newcommand{\mf}{\rate{m}\ped{f}}
\newcommand{\vvf}{\rate{\vv}\ped{f}}
\newcommand{\etasec}{\eta\ped{2nd}}
```

2.2 Common vector fields

```
\newcommand{\rvec}{\nvector{r}}
\newcommand{\nvh}{\nvector{H}}
\newcommand{\nvb}{\nvector{B}}
\newcommand{\nva}{\nvector{A}}
\newcommand{\nvf}{\nvector{F}^B}
\newcommand{\nvrem}{\nvector{B}\ped{rem}}
\newcommand{\nvbrem}{\nvrem}
\newcommand{\nvm}{\nvector{M}}
\newcommand{\nvdip}{\nvector{m}}
\newcommand{\nvnetdip}{\nvector{\mathcal{M}}}
\newcommand{\nvbremhat}{\hat{\nvector{B}}\ped{rem}}
\newcommand{\nvbi}{\nvector{B}_k}
\newcommand{\nvhi}{\nvector{H}_k}
\newcommand{\nvremi}{\nvector{B}_{\mathrm{rem},k}}
\newcommand{\nvbremi}{\nvremi}
\newcommand{\nvai}{\nvector{A}_k}
\newcommand{\nvha}{\nvh\ped{a}}
\newcommand{\nvhd}{\nvh\ped{d}}
\newcommand{\indexremmk}[2]{\mathrm{rem},{#1},{#2}}
\newcommand{\nvbremmk}[2]{\nvb_{\indexremmk{#1}{#2}}}
\newcommand{\bremmk}[2]{B_{\indexremmk{#1}{#2}}}
\newcommand{\alpharemmk}[2]{\alpha_{\indexremmk{#1}{#2}}}
\newcommand{\nvfremmk}[2]{\nvector{F}^B_{\indexremmk{#1}{#2}}}
\newcommand{\nvbiii}{\nvb\ped{III}}
```

2.3 Scalar fields defined from vector fields

```
\newcommand{\nha}{H\ped{a}}
```

2.4 Common other scalar parameters

```
\newcommand{\mur}{\mu\ped{r}}
\newcommand{\bl}{B\ped{l}}
\newcommand{\bh}{B\ped{h}}
\newcommand{\hal}{H\ped{a,l}}
\newcommand{\hah}{H\ped{a,h}}
\newcommand{\brem}{B\ped{rem}}
\newcommand{\muri}{\mu_{\mathrm{r},k}}
\newcommand{\bremi}{B_{\mathrm{rem},k}}
\newcommand{\avgb}[1]{\left\langle B^{2/3} \right\rangle\ped{#1}}
\newcommand{\qmce}{q'\ped{MCE}}
```

2.5 Aliases from common terms

```
\newcommand{\ndfeb}{\ce{Nd{-}Fe{-}B} }
```

2.6 Thermodynamic potentials

```
\newcommand{\sigmaxdh}{\sigma \diffd{H\ped{a}}}
\newcommand{\hxdsigma}{H\ped{a}\diffd{\sigma}}
```

2.7 Geometric parameters

```
\newcommand{\ri}{R\ped{i}}
\ifthenelse{\isundefined{\ro}}{\newcommand{\ro}{R\ped{o}}}{\renewcommand{\ro}{R\ped{o}}}
\newcommand{\rg}{R\ped{g}}
\newcommand{\rs}{R\ped{s}}
\newcommand{\rc}{R\ped{c}}
\newcommand{\re}{R\ped{e}}
\newcommand{\hgap}{h\ped{gap}}
```

2.8 Coefficients for the analytical solution

```
\newcommand{\acoef}[2]{a_{{#1},\mathrm{#2}}}
\newcommand{\bcoef}[2]{b_{{#1},\mathrm{#2}}}
\newcommand{\Azexpr}[1]{A_{\mathrm{#1},z}}
\newcommand{\bremii}{B_{\mathrm{rem,II}}}
\newcommand{\bremiv}{B_{\mathrm{rem,IV}}}
\newcommand{\murn}[1]{\mu\ped{r,#1}}
\newcommand{\aIII}{\acoef{1}{III}}
\newcommand{\bIII}{\bcoef{1}{III}}
\newcommand{\nvbIII}{\nvector{B}\ped{III}}
\newcommand{\BIII}{B\ped{III}}
```