stmmath package description

Copyright © 2025 DLR SY STM
v20250624

Martin Rädel

2025-06-24

These are the math definitions for `stmlatex`. It is build upon the amsmath package.

Contents

1. Commands

1.1. Operators

`\dev`	Deviatoric	dev
`\dif`	Infinitesimal differential	d
`\divergenceoperator`	Quantity of a vector field	div
`\erf`	Error function	erf
`\sign`	Signum function	sign
`\sph`	Spherical	sph
`\spur`	Trace	Tr
`\Grad`	Gradient w.r.t. material coordinates	Grad
`\grad`	Gradient w.r.t. spatial coordinates	grad

1.2. Symbols

```
\minus                                          −
\curveplus                                      ↫+
\rightplus                                      ±→
\upplus                                         +↑

\numbersetNaturals                              ℕ
\numbersetIntegers                              ℤ
\numbersetRationals                             ℚ
\numbersetReals                                 ℝ
\numbersetComplex                               ℂ
\numbersetPrimes                                ℙ
\numbersetAlgebraics                            𝔸
\numbersetQuaternions                           ℍ
\numbersetOctonions                             𝕆
\numbersetGenerals                              𝕂
```

2. Commands

There are additional commands available which require parameters. They are defined dependent of the symbols used in `stmglossaries`.

3. Environments

A. The code

A.1. stmmath.sty

```
1   %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
2   % Header                           %
3   %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
4   %
5   % This is a interface to all stm math definitions
6   % Based upon the amsmath package:
7   %    https://ctan.org/pkg/amsmath
8   %
9   % Usage
10  %  - Preamble:
11  %    - \usepackage{stmmath}
12  %
13  % Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>
14  %                       Initial draft
15  %
16  % Contact:   Martin Raedel,  martin.raedel@dlr.de
17  %            DLR Lightweight Systems
18  %
19  %                                 __/|__
20  %                                /_/_/_/
21  %            www.dlr.de/sy/en       |/ DLR
22  %
23  % Copyright (C) 2019-... DLR Lightweight Systems
24  %
25  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
26  % Content                          %
27  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
28
29  % Declare that this style file requires at least LaTeX version 2e.
30  \NeedsTeXFormat{LaTeX2e}
31
32  % Provide the name of your page, the date it was last updated, and a
        comment about what it's used for
33  \ProvidesPackage{stmmath}[2023/02/12 STMs custom LaTeX math definitions]
34
35  % --------------------------
36  % Options
37  % --------------------------
38
39  % For options
```

```
40  \@ifpackageloaded{kvoptions}{}{\RequirePackage{kvoptions}}%
41
42  % Option group
43  \SetupKeyvalOptions{%
44    family=stmmath,%
45    prefix=stmmath@,%
46    setkeys=\kvsetkeys,%
47  }
48
49  % Items
50  \DeclareBoolOption[true]{items}
51
52  % Process options
53  \ProcessKeyvalOptions{stmmath}
54
55  % --------------------------
56  % Modules
57  % --------------------------
58
59  % Load the base package
60  \@ifpackageloaded{stmmathbase}{}{%
61    \RequirePackage{stmmathbase}%
62  }%
63
64  % Load the items
65  \ifstmmath@items
66    \@ifpackageloaded{stmmathitems}{}{%
67      \RequirePackage{stmmathitems}%
68    }%
69  \fi
70
71  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
72  % That's it                     %
73  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
74
75  % Finally, we'll use \endinput to indicate that LaTeX can stop reading
          this file. LaTeX will ignore anything after this line.
76  \endinput
```

A.2. stmmathbase.sty

```
1  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
2  % Header                        %
3  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

```
 4  %
 5  % This is a interface to all stm math definitions
 6  % Based upon the amsmath package:
 7  %    https://ctan.org/pkg/amsmath
 8  %
 9  % Usage
10  %   - Preamble:
11  %     - \usepackage{stmmathbase}
12  %
13  % Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>
14  %                      Initial draft
15  %
16  % Contact:   Martin Raedel,  martin.raedel@dlr.de
17  %            DLR Lightweight Systems
18  %
19  %                                __/|__
20  %                               /_/_/_/
21  %            www.dlr.de/sy/en        |/ DLR
22  %
23  % Copyright (C) 2019-... DLR Lightweight Systems
24  %
25  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
26  % Content                         %
27  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
28
29  % Declare that this style file requires at least LaTeX version 2e.
30  \NeedsTeXFormat{LaTeX2e}
31
32  % Provide the name of your page, the date it was last updated, and a
        comment about what it's used for
33  \ProvidesPackage{stmmathbase}[2023/02/12 STMs custom LaTeX math
        definitions]
34
35  % -------------------------
36  % Package
37  % -------------------------
38
39  % Load amsmath to defined math operators
40  \@ifpackageloaded{amsmath}{}{\RequirePackage{amsmath}}%
41  \@ifpackageloaded{amssymb}{}{\RequirePackage{amssymb}}%
42
43  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
44  % That's it                       %
45  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

```
46
47  % Finally, we'll use \endinput to indicate that LaTeX can stop reading
       this file. LaTeX will ignore anything after this line.
48  \endinput
```

A.3. `stmmathitems.sty`

```
 1  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
 2  % Header                          %
 3  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
 4  %
 5  % This is a interface to all stm math definitions
 6  % Based upon the amsmath package:
 7  %   https://ctan.org/pkg/amsmath
 8  %
 9  % Usage
10  %  - Preamble:
11  %    - \usepackage{stmmathitems}
12  %
13  % Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>
14  %                       Initial draft
15  %
16  % Contact:   Martin Raedel,  martin.raedel@dlr.de
17  %            DLR Lightweight Systems
18  %
19  %                                 __/|__
20  %                                /_/_/_/
21  %            www.dlr.de/sy/en       |/ DLR
22  %
23  % Copyright (C) 2019-... DLR Lightweight Systems
24  %
25  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
26  % Content                         %
27  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
28
29  % Declare that this style file requires at least LaTeX version 2e.
30  \NeedsTeXFormat{LaTeX2e}
31
32  % Provide the name of your page, the date it was last updated, and a
       comment about what it's used for
33  \ProvidesPackage{stmmathitems}[2023/02/12 STMs custom LaTeX math
       definitions]
34
35  % -------------------------
```

```latex
36  % Package
37  % -------------------------
38
39  % Load base package
40  \@ifpackageloaded{stmmathbase}{}{\RequirePackage{stmmathbase}}%
41
42  % -------------------------
43  % Modules
44  % -------------------------
45
46  % Oeprators
47  \@ifundefined{dev}{\DeclareMathOperator{\dev}{dev}}{}
48  \@ifundefined{divergenceoperator}{\DeclareMathOperator{\
        divergenceoperator}{div}}{}
49  \@ifundefined{erf}{\DeclareMathOperator{\erf}{erf}}{}
50  \@ifundefined{sign}{\DeclareMathOperator{\sign}{sign}}{}
51  \@ifundefined{sph}{\DeclareMathOperator{\sph}{sph}}{}
52  \@ifundefined{spur}{\DeclareMathOperator{\spur}{Tr}}{}
53  \@ifundefined{Grad}{\DeclareMathOperator{\Grad}{Grad}}{}% englisch
        gradient w.r.t material coordinates
54  \@ifundefined{grad}{\DeclareMathOperator{\grad}{grad}}{}% englisch
        gradient w.r.t spatial coordinates
55
56  % -------------------------
57  % Symbols
58  % -------------------------
59
60  % Upright dif-symbol
61  \@ifundefined{dif}{\newcommand*\dif{\mathop{}\!\mathrm{d}}}{}
62
63  % shorter minus sign
64  \@ifpackageloaded{graphicx}{}{\RequirePackage{graphicx}}%
65  \@ifundefined{minus}{\newcommand{\minus}{\scalebox{0.75}[1.0]{$-$}}}{}
66
67  % Symbols for static equilibrium conditions:
68  \newcommand*\curveplus{%
69    \mathbin{\rotatebox[origin=c]{90}{$\m@th\curvearrowleft$}+}%
70  }
71
72  \newcommand*\rightplus{%
73    \mathpalette\@rightplus\relax%
74  }
75
76  \newcommand*\@rightplus[1]{%
```

```latex
77    \mathbin{\vcenter{\hbox{$\m@th\overset{#1+}{\to}$}}}%
78  }
79
80  \newcommand*\upplus{%
81    \mathbin{+\mathord\uparrow}%
82  }
83
84  % Number sets
85  \newcommand{\numbersetNaturals}{\mathbb{N}} % Natural numbers
86  \newcommand{\numbersetIntegers}{\mathbb{Z}} % Integers
87  \newcommand{\numbersetRationals}{\mathbb{Q}} % Rationals
88  \newcommand{\numbersetReals}{\mathbb{R}} % Reals
89  \newcommand{\numbersetComplex}{\mathbb{C}} % Complex numbers
90  \newcommand{\numbersetPrimes}{\mathbb{P}} % Primes
91  \newcommand{\numbersetAlgebraics}{\mathbb{A}} % Algebraic numbers (rare)
92  \newcommand{\numbersetQuaternions}{\mathbb{H}} % Quaternions
93  \newcommand{\numbersetOctonions}{\mathbb{O}} % Octonions (rare)
94  \newcommand{\numbersetGenerals}{\mathbb{K}} % General number field
95
96  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
97  % That's it                     %
98  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
99
100 % Finally, we'll use \endinput to indicate that LaTeX can stop reading
        this file. LaTeX will ignore anything after this line.
101 \endinput
```