General index

The isphysicalmath package*

Mario Fantini
marfant7@gmail.com

January 7, 2024

Abstract

This package helps user to write mathematical and physical formulas – their numerical values, their measurement units, their factors, their dimensions – in a scientific way (international mainly), by an elegant formatting.

1 Introduction

LaTeX is a powerful language, but to take advantage of it, to respect its quality and to observe the discipline of matters that LaTeX interacts with—it requires some devices.

If you are interested in math and physics, here comes *isphysicalmath* inside LaTeX as far as international scientific notation and formatting of formulas, quantities, numerical values, factors, dimensions, measurement units.

The name *isphysicalmath* means either:

- Physics is Math's daughter;
- International System of units (SI) is observed.

2 Conventions

To have a clear doc text, I'll not refer to physical quantities dimensions every times; for them, the measurement units *isphysicalmath* acting is valid too.

3 Dependencies

isphysicalmath has *xstring* package dependency.

Internally, it uses standard LaTeX built-in commands like: `\textnormal`, `\hspace{}`, `\,`; however, it performs its activity in complex math environment too.

*This document corresponds to isphysicalmath v1.1.0, dated 2024/01/03.

4 Usage

`\ispm`

hp. It is a jolly command. The default setting consists in — a 0.15 mm of space and normal text rendering for a generic 'entity'. In other words <`\textnormal`> and <0.15mm> are the values of `\ispm` variable. So, if you are a developer you can modify this variable how and when you want. I use it for generic "entities".
th. Default setting: normal text rendering for a generic "entity".
`\ispm{`⟨*generic "entity" in place of argument*⟩`}`

`\ispmone`

hp. You have only a measurement unit.
th. Horizontal space between measurement unit and numerical value, and normal text rendering for the measurement unit.
`\ispmone{`⟨*measurement unit in place of argument*⟩`}`

`\ispmtwo`

hp. You have two measurement units.
th. Horizontal space between the first measurement unit and numerical value, horizontal space between the first measurement unit and second measurement unit; normal text rendering for both measurement units.
`\ispmtwo{`⟨*the first measurement unit in place of the I argument*⟩`}{`⟨*second measurement unit in place of II argument*⟩`}`

`\ispmthird`

hp. You have three measurement units.
th. Horizontal space between the first measurement unit and numerical value, horizontal space between the first measurement unit and the second measurement unit, horizontal space between the second measurement unit and third measurement unit; normal text rendering for all the measurement units.
`\ispmtwo{`⟨*the first measurement unit in place of the I argument*⟩`}{`⟨*the second measurement unit in place of the II argument*⟩`}` `\ispmthird{`⟨*third measurement unit in place of III argument*⟩`}`
Or, e.g. if you have a fraction [see In-depth formatting' (subsection 5.1)]:
`\ispmone{`⟨*the first measurement unit in place of the I argument (numerator)*⟩`}`
`\ispmone{`⟨*the second measurement unit in place of the II argument (denominator)*⟩`}`
`\ispmthird{`⟨*third measurement unit in place of III argument*⟩`}`

And so on until ninth measurement unit, having:

`\ispmfourth`
`\ispmfifth`
`\ispmsixth`
`\ispmseventh`
`\ispmeighth`

`\ispmninth`

`\ispmn`

If you don't want to follow a numerical order, you can use this command.
hp. You have three measurement units.
th. Horizontal space between the first measurement unit and numerical value, horizontal space between the first measurement unit and the second measurement unit, horizontal space between the second measurement unit and third measurement unit; normal text rendering for all the measurement units.
`\ispmtwo{`⟨*the first measurement unit in place of the I argument*⟩`}{`⟨*the second measurement unit in place of the II argument*⟩`}` `\ispmn{`⟨*third measurement unit in place of III argument*⟩`}`
Or, e.g. if you have a fraction [see In-depth formatting' (subsection 5.1)]:
`\ispmone{`⟨*the first measurement unit in place of the I argument (numerator)*⟩`}`
`\ispmn{`⟨*the second measurement unit in place of the II argument (denominator)*⟩`}`
`\ispmn{`⟨*third measurement unit in place of III argument*⟩`}`

`dc` option *dc*
\usepackage`[`⟨*dc*⟩`]`{isphysicalmath}

$\forall x, y, \ldots, +\infty \in \mathbb{N}$:
`\ispmc` ⟨*x.y*⟩
`\ispmrc` ⟨*x,y*⟩

`comma` option *comma*
\usepackage`[`⟨*comma*⟩`]`{isphysicalmath}

$\forall a, b, c, d, e, f, g, h, i \in \mathbb{N}$ [0,9]:
`\ispmc`{abcdefghi}
`\ispmc`{abcdefghi}.aa

5 In-depth usage

5.1 In-depth formatting

isphysicalmath command, in mathematical environments, can be joined or detached to previous term; while, in not mathematical environments, *isphysicalmath* command must be joined to previous term.

isphysicalmath automatical settings:

- a small space between numerical value and first measurement unit, «first» if there are others.
- 0.15 mm between two or three measurement units, or between measurement units and their factors.
- Normal text for measurement unit.

Without *isphysicalmath*

- Without mathematical environment:

  $$\mathrm{F} = 1\ \mathrm{N}$$

  I don't like this style, and it has not a logical meaning.
- By mathematical environment:

  $$F = 1N$$

  I don't like this style, and it has not a logical meaning.
  The code:

  ```
  \[ F = 1 N \]
  ```

By *isphysicalmath*

- With one measurement unit.

  $$F = 1\,\mathrm{N}$$

  $$P = 1\,\mathrm{bar}$$

  The code:

  ```
  \[
  F = 1 \ispmone{N}
  \]
  \[P = 1 \ispmone{bar}\]
  ```

- With two measurement units (a).

$$L = 1\,\mathrm{N m}$$

The code:

```
\[
L = 1 \ispmtwo{N}{m}
\]
```

- With two measurement units and a factor for the last unit.

$$L = 1\,\mathrm{N mm}\,(10^{-3})$$

The code:

```
\[
L = 1 \ispmtwo{N}{mm}\ispmthird{(10$^{-3}$)}
\]
```

- With three measurement units.

$$V = 8\,\mathrm{m m m}$$

The code:

```
\[
V = 8 \ispmtwo{m}{m}\ispmthird{m}
\]
```

- With a declared additional inner `\textnormal`, with inner `\tiny` environment, and with inner mathematical environment (a).

$$m = \gamma V = 1\,\frac{\mathrm{kg}}{\mathrm{m}^3}\,\mathrm{m}^3$$

The code:

```
\[
m = \gamma V = 1 \frac{\ispmone{kg}}
{\ispmone{m$^{\textnormal{\tiny 3}}$}}\ispmthird{m$^3$}
\]
```

- With inner mathematical environment (b).

$$m = \gamma V = 1\,\frac{\mathrm{kg}}{\mathrm{m}^3}\,\mathrm{m}^3$$

The code:

```
\[
m = \gamma V = 1 \frac{\ispmone{kg}}
{\ispmone{m$^3$}}\ispmthird{m$^3$}
\]
```

- With inner mathematical environment (c) and `\large`, `\normalsize` environments.

$$m = \gamma V = 1 \large\frac{\ispmone{kg}}{\ispmone{m^3}}\normalsize\ispmthird{m^3}$$

The code:

```
\[
m = \gamma V = 1 \large\frac{\ispmone{kg}}
{\ispmone{m$^3$}}\normalsize\ispmthird{m$^3$}
\]
```

- With inner mathematical environments (d).
The following is a trascendental physical example, but it could be useful like material for some mathematical need; however, this case demonstrates LaTeX power and *isphysicalmath*.

$$u = 7\,\alpha\mathrm{m}\beta\mathrm{m}^2\,\delta\mathrm{s}$$

The code:

```
\[
u = 7  \ispmtwo{$\alpha$m}{$\beta$m$^2$}
\ispmthird{$\delta$s}
\]
```

- With inner mathematical environments (e).

$$P_p = (V_{cls})(\gamma_{cls}) = (29.6\,\mathrm{m}^3)\left(25\frac{\mathrm{kN}}{\mathrm{m}^3}\right) = 740\,\mathrm{kN}$$

The code:

```
\[
P_p = (V_{cls})(\gamma_{cls}) = (29.6\ispmone{m$^3$})
\Big(25\frac{\ispmone{kN}}
{\ispmone{m$^3$}}\Big) = 740 \ispmone{kN}
\]
```

- About physical quantities dimensions.
e.g.

$$F = ma \equiv [\mathrm{M}][\mathrm{L}][\mathrm{T}]^{-2}$$

The code:

```
F = m a \equiv \ispmtwo{[M]}{[L]}\ispmthird{[T]$^{-2}$}
```

- Final example.
e.g.

$$1\,\mathrm{abcdefghi}$$

$$1\,\mathrm{abcdefghi}$$

The code:

```
\[1\ispmtwo{a}{b}\ispmthird{c}\ispmfourth{d}\ispmfifth{e}
\ispmsixth{f}\ispmseventh{g}\ispmeighth{h}\ispmninth{i}\]

\[1\ispmone{a}\ispmn{b}\ispmn{c}\ispmn{d}\ispmn{e}
\ispmn{f}\ispmn{g}\ispmn{h}\ispmn{i}\]
```

5.2 In-depth notation

Option *dc* and option *comma* are not compatible, but you can use option *dc* and `\ispmcomma` command, both in the same document.

```
\usepackage[dc]{isphysicalmath}
\usepackage[comma]{isphysicalmath}
```

In a document by *dc* option:
1,234

In an other document by *comma* option:
1,234,567

Both in the same document, by *dc* option and `\ispmcomma` command:
1,234 1,234,567

The code:

```
\ispmc 1.234 \\
\ispmc{1234567} \\
\ispmc 1.234 \ispmcomma{1234567}
```

5.2.1 option <dc>

Usage: `\usepackage[dc]{isphysicalmath}`

The code of this option is not mine, it already exists in LaTeX literature, I discovered it in https://en.wikibooks.org/wiki/LaTeX.

This option by `\ispmc` changes dots in commas. It is useful for some users who don't use scientific international notation. It is convenient for users who respect scientific international notation, so they change dots in commas to select thousands and not to express numbers under the unit.

e.g.

1.234 becomes 1,234

The code:

```
\ispmc 1.234
```

This option by `\ispmrc` changes commas in dots. It is useful for some users who want to use scientific international notation. It is convenient for users who respect scientific international notation, so they change commas in dots to express numbers under the unit.

e.g.

1,234 becomes 1.234

The code:

```
\ispmrc 1,234
```

5.2.2 option <comma>

Usage: `\{usepackage}[comma]{isphysicalmath}`

It adds comma after every three digits, according to international scientific notation.

100,000,000
100,000,000.00
10,000,000.00
1,000,000.00
100,000.00
10,000.00
1,000.00

The code:

```
\ispmc{100000000} \\
\ispmc{100000000}.00 \\
\ispmc{10000000}.00 \\
\ispmc{1000000}.00 \\
\ispmc{100000}.00 \\
\ispmc{10000}.00 \\
\ispmc{1000}.00
```

5.2.3 command <comma>

Usage: `\{usepackage}[dc]{isphysicalmath}`
or
`\{usepackage}{isphysicalmath}`
It adds comma after every three digits, according to international scientific notation.

100,000,000
100,000,000.00
10,000,000.00
1,000,000.00
100,000.00
10,000.00
1,000.00

The code:

```
\ispmcomma{100000000} \\
\ispmcomma{100000000}.00 \\
\ispmcomma{10000000}.00 \\
\ispmcomma{1000000}.00 \\
\ispmcomma{100000}.00 \\
\ispmcomma{10000}.00 \\
\ispmcomma{1000}.00
```

6 isphysicalmath url

Package home URL: https://ctan.org/pkg/isphysicalmath

https://github.com/MartDiVenus/LaTeX/tree/isphysicalmath

7 Copyright

8 Change history

8.1 v1.0.0

2023.09.18 First version.

8.2 v1.1.0

2024.01.03 Following improvements have been brought:

1. section 3 changed.
2. URL https://ctan.org/pkg/isphysicalmath specified.
3. Original *comma* option changed in command, and new *comma* option `\ispmc` added.
4. Example added in subsection 5.1.
5. Doc *dc* option improved in section 4.
6. *dc* option changed in `\ispmc`.
7. *dc* option improved adding `\ispmrc` to change commas in dots.
8. Doc *comma* option improved in section 4.
9. Doc *comma* option changed in subsection 5.2.
10. Option *comma* improved, now the goal is reached by a single command.

11. subsubsection 5.2.2 changed.
12. subsubsection 5.2.3 added.
13. Following commands added:
    - `\ispmfourth`;
    - `\ispmfifth`;
    - `\ispmsixth`;
    - `\ispmseventh`;
    - `\ispmeighth`;
    - `\ispmninth`;
    - `\ispmn`.
14. Example 'With inner mathematical environments (e)' added in subsection 5.1.
15. Example 'Final example' added in subsection 5.1.
16. subsubsection 5.2.1 changed.
17. `\ispm` command changed, so section 4 changed.
18. 'About physical quantities dimensions' (subsection 5.1) improved.
19. Clarified in subsection 5.1 when to join or to detach formatting commands to previous term.
20. Year of the copyright modified.
21. README.md:
    - Year of the copyright modified.
    - 'Change History' added.
    - 'URL' modified.
    - 'Documentation' modified.
    - 'Dependencies' modified.
    - 'Build the documentation' removed.
    - 'Build isphysicalmath.sty' removed.