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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 \texttt{isphysicalmath} inside \LaTeX{} as far as international scientific notation and formatting of formulas, quantities, numerical values, factors, dimensions, measurement units.

The name \texttt{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 \texttt{isphysicalmath} acting is valid too.

3 Dependencies

\texttt{isphysicalmath} has \texttt{xstring} package dependency.

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

\*This document corresponds to \texttt{isphysicalmath} v1.1.0, dated 2024/01/03.
4 Usage

\ispm

\textit{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 <\textbf{\textit{textnormal}}> and
<0.15\textbf{\textit{mm}}> are the values of \texttt{\texttt{\textbackslash ispm}} variable. So, if you are a developer you
can modify this variable how and when you want. I use it for generic “entities”.
\textbf{\texttt{th}}. Default setting: normal text rendering for a generic “entity”.

\texttt{\texttt{\textbackslash ispm}\{\textit{\textit{generic “entity” in place of argument}}\}}

\texttt{\texttt{\textbackslash ispmone}}

\textit{hp}. You have only a measurement unit.

\textbf{\texttt{th}}. Horizontal space between measurement unit and numerical value, and normal
text rendering for the measurement unit.

\texttt{\texttt{\textbackslash ispmone}\{\textit{\textit{measurement unit in place of argument}}\}}

\texttt{\texttt{\textbackslash ispmtwo}}

\textit{hp}. You have two measurement units.

\textbf{\texttt{th}}. Horizontal space between the first measurement unit and numerical value, hori-
zontal space between the first measurement unit and second measurement unit;
normal text rendering for both measurement units.

\texttt{\texttt{\textbackslash ispmtwo}\{\textit{\textit{the first measurement unit in place of the I argument}}\}\{\textit{\textit{second measurement unit in place of II argument}}\}}

\texttt{\texttt{\textbackslash ispmtree}}

\textit{hp}. You have three measurement units.

\textbf{\texttt{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 measure-
ment unit; normal text rendering for all the measurement units.

\texttt{\texttt{\textbackslash ispmtree}\{\textit{\textit{the first measurement unit in place of the I argument}}\}\{\textit{\textit{the second measurement unit in place of the II argument}}\}\{\textit{\textit{third measurement unit in place of III argument}}\}}

Or, e.g. if you have a fraction [see In-depth formatting' (subsection 5.1)]:

\texttt{\texttt{\textbackslash ispmone}\{\textit{\textit{the first measurement unit in place of the I argument (numerator)}}\}}

\texttt{\texttt{\textbackslash ispmone}\{\textit{\textit{the second measurement unit in place of the II argument (denominator)}}\}}

\texttt{\texttt{\textbackslash ispmtree}\{\textit{\textit{third measurement unit in place of III argument}}\}}

And so on until ninth measurement unit, having:

\texttt{\texttt{\textbackslash ispmeighth}}
If you don’t want to follow a numerical order, you can use this command.

\( h.p. \) 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 measure-
ment unit; normal text rendering for all the measurement units.

\( \text{\textbackslash ispmtwo}\{\text{\textbackslash the first measurement unit in place of the I argument}\}\{\text{\textbackslash the second measurement unit in place of the II argument}\}\text{\textbackslash ispmn}\{\text{\textbackslash the third measurement unit in place of III argument}\} \)

Or, e.g. if you have a fraction [see In-depth formatting' (subsection 5.1)]:

\( \text{\textbackslash ispmone}\{\text{\textbackslash the first measurement unit in place of the I argument (numerator)}\}\text{\textbackslash ispmn}\{\text{\textbackslash the second measurement unit in place of the II argument (denominator)}\}\text{\textbackslash ispmn}\{\text{\textbackslash the third measurement unit in place of III argument)}\} \)

\texttt{dc} option \texttt{dc}

\texttt{usepackage[\texttt{dc}]{isphysicalmath}}

\( \forall x, y, \ldots, +\infty \in \mathbb{N}; \)
\texttt{ispmc} \( (x,y) \)
\texttt{ispmrc} \( (x,y) \)

\texttt{comma} option \texttt{comma}

\texttt{usepackage[\texttt{comma}]{isphysicalmath}}

\( \forall a, b, c, d, e, f, g, h, i \in \mathbb{N} \ [0,9]; \)
\texttt{ispmc} \{abcdefghi\}
\texttt{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:
  \[ F = 1 \text{ N} \]
  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:
  \[
  \[ F = 1 \text{ N} \]
  \]

By `isphysicalmath`

- With one measurement unit.

  \[ F = 1 \text{ N} \]
  \[ P = 1 \text{ bar} \]

  The code:
  \[
  \{ F = 1 \text{ N} \}
  \]
  \[
  \{ P = 1 \text{ bar} \}
  \]
• With two measurement units (a).

\[ L = 1 \text{ Nm} \]

The code:
\[
L = 1 \ispmtwo{N}{m}
\]

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

\[ L = 1 \text{ Nmm} \times 10^{-3} \]

The code:
\[
L = 1 \ispmtwo{N}{mm} \ispmthird{(10^{-3})}
\]

• With three measurement units.

\[ V = 8 \text{ mmm} \]

The code:
\[
V = 8 \ispmtwo{m}{m} \ispmthird{m}
\]

• With a declared additional inner \texttt{textnormal}, with inner \texttt{tiny} environment, and with inner mathematical environment (a).

\[ m = \gamma V = 1 \frac{\text{kg}}{\text{m}^3} \text{m}^3 \]

The code:
\[
m = \gamma V = 1 \frac{\text{kg}}{\text{m}^3} \text{m}^3
\]

• With inner mathematical environment (b).

\[ m = \gamma V = 1 \frac{\text{kg}}{\text{m}^3} \text{m}^3 \]

The code:
\[
m = \gamma V = 1 \frac{\text{kg}}{\text{m}^3} \text{m}^3
\]
• With inner mathematical environment (c) and `\large, `\normalsize environments.

\[ m = \gamma V = 1 \frac{kg}{m^3} \]

The code:
\[ m = \gamma V = 1 \frac{kg}{m^3} \]

• With inner mathematical environments (d).

The following is a transcendental physical example, but it could be useful like material for some mathematical need; however, this case demonstrates \LaTeX power and \texttt{isphysicalmath}.

\[ u = 7 \alpha m^2 \delta s \]

The code:
\[ u = 7 \alpha m^2 \delta s \]

• With inner mathematical environments (e).

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

The code:
\[ P_p = (V_{cls})(\gamma_{cls}) = (29.6 m^3)\left(25 \frac{kN}{m^3}\right) = 740 kN \]

• About physical quantities dimensions.

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

The code:
\[ F = ma \equiv [M][L][T]^{-2} \]

• Final example.

\[ 1abcdefg hi \]

The code:
\[ 1abcdefg hi \]
\{1\ispmtwo{a}\ispmtwo{b}\ispmtwo{c}\ispmtwo{d}\ispmtwo{e}
\ispmsixth{f}\ispmsixth{g}\ispmsixth{h}\ispmsixth{i}\}
\{1\ispmonen{a}\ispmonen{b}\ispmonen{c}\ispmonen{d}\ispmonen{e}
\ispmonen{f}\ispmonen{g}\ispmonen{h}\ispmonen{i}\}
5.2 In-depth notation

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

\begin{verbatim}
\usepackage[dc]{isphysicalmath}
\usepackage[comma]{isphysicalmath}
\end{verbatim}

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 \texttt{\ispmcomma} command:

1,234 1,234,567

The code:

\begin{verbatim}
\ispmc 1.234 \ \\
\ispmc{1234567} \ \\
\ispmc 1.234 \ispmcomma{1234567}
\end{verbatim}

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 [WikiBook](https://en.wikibooks.org/wiki/LaTeX).

This option by \texttt{\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:

\begin{verbatim}
\ispmc 1.234
\end{verbatim}

This option by \texttt{\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

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:
6 isphysicalmath url

Package home URL: [https://ctan.org/pkg/isphysicalmath](https://ctan.org/pkg/isphysicalmath)
[https://github.com/MartDiVenus/LaTeX/tree/isphysicalmath](https://github.com/MartDiVenus/LaTeX/tree/isphysicalmath)

7 Copyright

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and version 1.3 or later is part of all distributions of L\TeX version 2005/12/01 or later.

This work has the LPPL maintenance status ‘maintained’.

The Current Maintainer of this work is Mario Fantini.

This work consists of the files isphysicalmath.dtx and isphysicalmath.ins and the derived file isphysicalmath.sty.

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](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.


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.