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# The `isphysicalmath` package\*

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September 18, 2023

## 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

L<sup>A</sup>T<sub>E</sub>X is a powerful language, but to take advantage of it, to respect its quality and to observe the discipline of matters that L<sup>A</sup>T<sub>E</sub>X interacts with—it requires some devices.

If you are interested in math and physics, here comes *isphysicalmath* inside L<sup>A</sup>T<sub>E</sub>X 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 not dependencies.

Internally, it uses standard L<sup>A</sup>T<sub>E</sub>X built-in commands like: `\textnormal`, `\hspace{}`; however, it performs its activity in complex math environment too.

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\*This document corresponds to `isphysicalmath` v1.0.0, dated 2023/09/18.

## 4 Usage

`\ispm`

*hp.* It is a jolly command. The default setting substitutes the famous L<sup>A</sup>T<sub>E</sub>X built-in command `\textnormal`, in other words `\textnormal` is the value 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⟩}`

`dc` option *dc*

`\usepackage[⟨dc⟩]{isphysicalmath}`

$\forall x, y, \dots \in \mathbb{N}$ :

`\ispmdc ⟨x.y⟩`

```
comma option comma
\usepackage[\langlecomma\rangle]{isphysicalmath}
```

```


$$\forall a, b, c, d, e, f, g, h, i \in \mathbb{N}:$$

\ispmnovem \langleabcdefghi\rangle
\ispmocto \langleabcdefgh\rangle
\ispmseptem \langleabcdefg\rangle
\ispmsex \langleabcdef\rangle
\ispmquinque \langleabcde\rangle
\ispmquattuor \langleabcd\rangle
```

## 5 In-depth usage

### 5.1 In-depth formatting

*isphysicalmath* automatical settings:

- 0.5 mm 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:

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

**By *isphysicalmath***

- With one measurement unit.

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

The code:

```
\[
F = 1 \ispnone{N}
\]
```

- 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.

$$L = 1 \text{ Nmm}(10^{-3})$$

The code:

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

- With three measurement units.

$$V = 8 \text{ mmm}$$

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).

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

The code:

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

- With inner mathematical environment (b).

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

The code:

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

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

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

The code:

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

- 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  $\text{\LaTeX}$  power and *isphysicalmath*.

$$u = 7 \alpha m \beta m^2 \delta s$$

The code:

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

- About physical quantities dimensions.

e.g.

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

The code:

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

## 5.2 In-depth notation

Option *dc* and option *comma* are compatible, you can use both in the same document; e.g.:

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

1,234  
1,234,567

The code:

```
\ispm dc 1.234 \\  
\ispm septem 1234567
```

### 5.2.1 option <dc>

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

The code of this option is not mine, it already exists in L<sup>A</sup>T<sub>E</sub>X literature, I discovered it in <https://en.wikibooks.org/wiki/LaTeX>.

This option 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 separate the unit from negative numbers.

e.g.

1.234 becomes 1,234

The code:

```
\ispm dc 1.234
```

### 5.2.2 option <comma>

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

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

For this task there are six ispm commands, in the next *isphysicalmath* version I'll automate this goal introducing one single ispm command.

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



The code:

```
\ispmnovem 1000000000 \\  
\ispmocto 100000000 \\  
\ispmseptem 1000000 \\  
\ispmsex 100000 \\  
\ispmquinque 10000 \\  
\ispmquattuor 1000
```

## 6 isphysicalmath url

Package home URL: <https://github.com/MartDiVenus/LaTeX/tree/isphysicalmath>

## 7 Copyright

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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.

## Change History

v1.0.0

General: Initial version . . . . . 1