mathwrap

Automatic Line-Breaking in Inline Math Mode

Lee Yiu Sing
yslee.pika@connect.hku.hk

November 2026 — Version 1.3

Abstract

By default, LaTeX strongly resists breaking lines inside inline mathematical expressions (`$...$`), frequently producing `Overfull \hbox` warnings when typesetting long variable lists, tensor indices, or multi-term equations. The mathwrap package enables clean, automatic line breaks after commas in inline math (`\textstyle`) and lowers binary and relational operator penalties, while leaving display math and sub-/superscripts unaffected, and integrates seamlessly with icomma for decimal commas.

1 Introduction

In standard LaTeX, inline mathematical formulas are treated largely as unbreakable units unless they contain explicit binary or relational operators, and even then high default penalties (`\binoppenalty=700`, `\relpenalty=500`) discourage line breaks. Comma-separated sequences such as $x_1, x_2, \ldots, x_n$ permit no line breaks at all without manual `\allowbreak` commands.

mathwrap addresses this globally through three complementary mechanisms:

1. **Active Inline Commas:** Assigns mathcode `"8000` to the comma so that, exclusively in `\textstyle` (via `\mathchoice`), a zero-penalty breakpoint and slight stretchable glue (`\penalty0\mskip0mu plus 2mu`) are inserted after each comma. Display equations (`\displaystyle`) and sub-/superscripts (`\scriptstyle`) never break. When icomma is loaded, only commas followed by a space are treated as breakable punctuation.

2. **Relaxed Operator Penalties:** Lowers `\binoppenalty` and `\relpenalty` to `100`, allowing TeX to wrap long inline equations at operators such as $+$, $-$, $=$, or $\leq$ when needed.

3. **Non-Destructive Stretch:** Increases `\emergencystretch` to `1em` (only if currently smaller than `1em`) so surrounding prose can absorb line breaks smoothly without underfull lines.

2 Installation

Place `mathwrap.sty` in your working directory or install it into your local `texmf` tree under:

`TEXMFHOME/tex/latex/mathwrap/mathwrap.sty`

Run `mktexlsr` (or `texhash`) if required by your TeX distribution.

3 Usage and Package Options

Load the package in your document preamble:

```
\usepackage{mathwrap}
```

Each of the three wrapping mechanisms can be individually enabled or disabled via package options, summarized in Table 1.

Table 1: Summary of mathwrap package options.

Option	Default	Behavior
`comma`	Yes	Enables line breaks after commas in `\textstyle`.
`nocomma`	No	Preserves standard non-breaking math commas.
`penalties`	Yes	Sets `\binoppenalty=100` and `\relpenalty=100`.
`nopenalties`	No	Leaves `\binoppenalty` and `\relpenalty` untouched.
`stretch`	Yes	Ensures `\emergencystretch` is at least `1em`.
`nostretch`	No	Leaves `\emergencystretch` untouched.

4 Local Control and Semantic Macros

The package captures your document's original comma mathcode, any pre-existing active comma definition, and penalty settings at the start of the document (`begindocument/end`). You can dynamically restore or re-enable them using two mid-document switches:

- `\mathwrapOff`: Restores the original comma mathcode, active comma definition (such as icomma's handler), `\binoppenalty`, `\relpenalty`, and `\emergencystretch`.
- `\mathwrapOn`: Re-activates the mathwrap settings (respecting your package options).

4.1 Comma Protection vs. Paragraph Penalties

Because TEX applies penalties and stretch at the *end of a paragraph*, calling `\mathwrapOff` inside a paragraph purely protects the commas within that group. To restore standard line-breaking penalties for an entire block of text, ensure the group includes a blank line or `\par`:

```
{%
  \mathwrapOff
  Standard paragraph behavior applied here, keeping short relational
  statements together and turning off comma breaks.\par
}
```

4.2 Semantic Wrapper Macros

For elements that should never break (such as short tuples or closed intervals), define lightweight semantic commands using `\ensuremath` and local scoping:

```
\newcommand{\tuple}[1]{\ensuremath{\mathwrapOff(#1)}}
\newcommand{\cint}[2]{\ensuremath{\mathwrapOff[#1, #2]}}
```

Usage: `The trajectory passes through \tuple{x_1, x_2, x_3}.` If you also use European decimal commas (such as 3,14159), load icomma alongside mathwrap as described in Section 6 rather than wrapping every number manually.

5 Live Demonstration

The side-by-side comparison below is typeset directly using mathwrap to illustrate narrow-column behavior before and after activation. Notice how `\mathwrapOff` seamlessly restores baseline TEX behavior:

Without mathwrap

Consider $e_{11}, e_{12}, e_{13}, e_{14}, e_{21}, e_{22}, e_{23}, e_{24}, e_{31}, e_{32}, e_{33}, e_{34}$ satisfying $a_1 + a_2 + a_3 + a_4 + a_5 = b_1 + b_2 + b_3 + b_4 + b_5$ inside $[0, 1]$.

With mathwrap

Consider $e_{11}, e_{12}, e_{13}, e_{14}, e_{21}, e_{22}, e_{23}, e_{24}, e_{31}, e_{32}, e_{33}, e_{34}$ satisfying $a_1 + a_2 + a_3 + a_4 + a_5 = b_1 + b_2 + b_3 + b_4 + b_5$ inside $[0, 1]$.

Multi-index subscripts such as R_{i_1,i_2,i_3,i_4} and display equations are unaffected:

$$f(x_1, x_2, x_3, x_4, x_5, x_6) = \sum_{k=1}^{6} x_k$$

6 Compatibility and icomma Integration

6.1 Intelligent Decimal Commas with icomma

mathwrap automatically detects icomma regardless of package load order (using LATEX's `begindocument/end` hook, with an `\AtBeginDocument` fallback on older kernels):

```
\usepackage{mathwrap}
\usepackage{icomma} % load order does not matter
```

When icomma is active, mathwrap preserves icomma's single-token lookahead:

- **List commas (followed by a space):** Expressions such as `$a, b, c$` retain normal punctuation spacing and allow line breaks in `\textstyle`.
- **Decimal commas (not followed by a space):** Expressions such as `$3,14159$` or `$f(x,y)$` are typeset as `\mathord` with no extra space and *never* break across lines.
- **With `\mathwrapOff` or `nocomma`:** Disabling comma wrapping restores icomma's original active-comma handler rather than reverting to a plain comma.

6.2 Demonstration: mathwrap with icomma

The side-by-side comparison below illustrates how icomma prevents unwanted thin spaces and line breaks inside decimal numbers while preserving mathwrap's automatic wrapping after list commas:

Without icomma (mathwrap only)

The constant is approximately 3, 14159265358979 and the measured value equals 123, 456789012345, while the sequence x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8 wraps at list commas.

With icomma + mathwrap

The constant is approximately 3,14159265358979 and the measured value equals 123,456789012345, while the sequence x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8 wraps at list commas.

When `\mathwrapOff` is active, icomma remains intact: decimal numbers such as 3,14159 keep tight spacing, while (a, b, c) retains standard punctuation spacing.

6.3 Other Packages and Environments

- **Parser-Sensitive Environments (TikZ, pgfplots):** Standard coordinate parsing in TikZ operates outside math mode and works normally. If an inline math expression inside a diagram reacts unexpectedly, wrap the environment in `\mathwrapOff` ... `\mathwrapOn`.

7 License

This work may be distributed and/or modified under the conditions of the LaTeX Project Public License (LPPL), version 1.3c or later.