

The **gyoudori** package

Gyou-dori (line-based placement) for Japanese typesetting

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Abstract

The **gyoudori** package places headings, display math and floats by *gyou-dori*, so that the lines of the main text before and after them stay on the line positions of the kihon-hanmen (the line grid). It works with pLaTeX, upLaTeX and LuaLaTeX (LuaTeX-jā). The package is designed for horizontal writing. A Japanese manual ([gyoudori-ja.pdf](#)) is also available.

1 What is gyou-dori?

Gyou-dori (行取り, also written 行ドリ) is one of the arbitrary layouts: the space in the block direction occupied by an element whose size differs from the main text, such as a heading, is determined as a number of lines of the kihon-hanmen (the basic page format), so that the lines of the main text after it are not shifted off the line positions defined by the kihon-hanmen (the line grid).

Gyou-dori is used in typesetting Japanese books and the like when it is specified that the lines of the main text on each page be placed on the line grid. This package is a tool for cases where one has to typeset under such a specification.

This package is for horizontal writing; vertical writing is not considered (results of trials in vertical writing are given in Section 8).

1.1 The gyou-dori area

As defined in JLREQ (W3C *Requirements for Japanese Text Layout*) §4.1.6, the block-direction size of the area of an n -line gyou-dori is

$$\text{character frame} \times n + \text{line gap} \times (n - 1) = \text{line pitch} \times (n - 1) + \text{character frame},$$

that is, the range from the top of the character frame of the first line to the bottom of the character frame of the n -th line (Figure 1). Visually, a line gap is added before and after the area in the middle

of a page (or column), and only after it at the top of a page (or column). The line pitch in the figure is shown as the distance between baselines (dashed lines). In this manual, the reference point for measuring the line pitch is tentatively taken to be the baseline (Section 1.3).

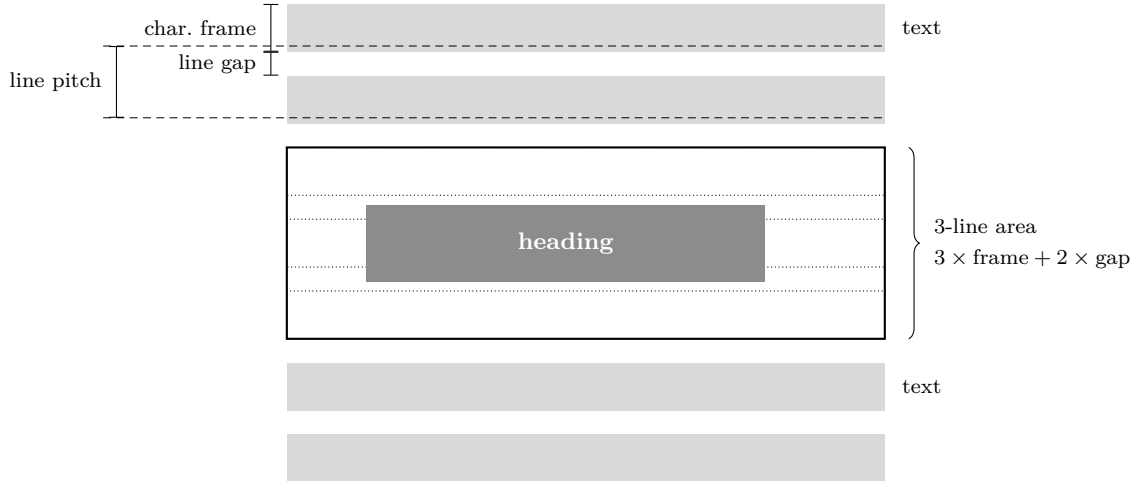


Figure 1 A 3-line gyou-dori area with a heading at its center

By default this package places the content at the center of the area. The position argument (`t`, `c`, `b`) changes it to top or bottom alignment (Figure 2). Where in the area the content should be placed depends on the specification of each typesetting job; JLREQ, too, lists methods other than centering (Section 3.3).

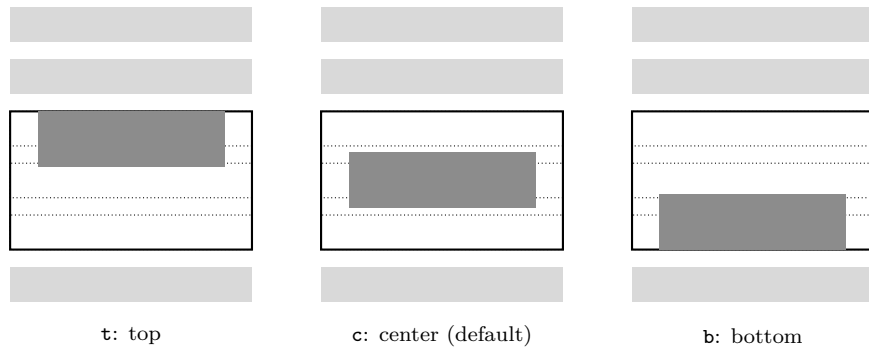


Figure 2 Positions in the area

1.2 Dimensions used by this package

The line pitch is `\normalbaselineskip`, and the height of the character frame is the height plus depth of the hiragana “あ” (the JFM metrics), both taken at `\normalsize`. Even inside `\small` etc., the grid of the main text is used (except for display math, and for the `gyoudori` environment and `\gyoudoriarea` with `local`; Sections 3.1 and 4.3).

The height of the character frame depends on the JFM. With the standard JFM of upLaTeX and LuaTeX-jā (including `jlreq`) it equals the full-width size (a square frame), which agrees with JLREQ. With the standard JFM of pLaTeX (`jis`) it is 0.952 times the full-width size. Since this package follows the frame of the JFM, an area in pLaTeX is shorter than the JLREQ definition by 0.048 times the full-width size.

1.3 Reference point of line pitch and `\baselineskip`

JLREQ (note in §2.4.2) defines the line feed (line pitch) as “the distance between two adjacent lines measured from their reference points”, but does not fix the reference point itself. It says that the reference point differs from implementation to implementation and that the vertical center of the character frame is commonly used in horizontal writing, without giving any evidence for this. Moreover, L^AT_EX (T_EX) stacks lines by their baselines, which is far from the idea of using the vertical center as the reference point.

This manual therefore tentatively takes the baseline as the reference point of the line pitch, because both the default behavior of L^AT_EX and the implementation of this package are based on baselines. That is, the line pitch is the distance between baselines.

`\baselineskip` of L^AT_EX is the distance between the baselines of adjacent lines. T_EX inserts glue between lines, computed from the depth of the previous line and the height of the next, so that the baselines are `\baselineskip` apart; however, if the space between the lines would be less than `\lineskiplimit`, `\lineskip` is inserted instead and the distance becomes larger than `\baselineskip`.

This package uses `\normalbaselineskip` at `\normalsize` as the line pitch b of the main text (a change by `\linespread` is reflected in it), and regards the positions where baselines are b apart as the line positions of the main text (the line grid). The character frame of each line extends from the baseline upward by the height h of “あ” and downward by its depth d . Hence the area of an n -line gyou-dori extends from h above the baseline of the first line to d below the baseline of the n -th line, and its size is $(n - 1)b + h + d$. The area is placed so that the baseline of its first line is at distance b from the baseline of the preceding line, and the baseline of the line after the area is at distance b from the baseline of the n -th line (Section 7.2). Display math, too, is placed so that the midpoint between the baselines of its first and last rows coincides with the midpoint between the baselines of the first and last lines of the area (Section 7.3).

Between lines consisting of characters of the same size, the value of the line pitch does not depend on the choice of the reference point; neither does the JLREQ relation (line feed = character size + line gap) nor the formula for the size of the area. The reference point matters only for lines with characters of different sizes, such as a large heading: then the distance between baselines differs from that between vertical centers. This package puts such headings into gyou-dori areas and keeps the surrounding lines of the main text on the line grid by their baselines.

The line gap of this package (line pitch – height of the character frame) equals the line gap of

JLREQ (line feed — character size) for JFMs with a square frame. With the standard JFM of pLaTeX, whose frame height is 0.952 times the full-width size, it is larger than the JLREQ line gap by 0.048 times the full-width size.

2 Requirements and installation

- pLaTeX, upLaTeX, or LuaLaTeX with LuaTeX-jā (l^jtsarticle, jlreq, etc.). Horizontal writing only.
- L^AT_EX 2022-06-01 or later (the package uses the key-value options of the kernel, `\DeclareKeys` and `\ProcessKeyOptions`, and the environment hooks `\AddToHook`). No other package is required.

Put `gyoudori.sty` into your TEXMF tree (e.g. `tex/latex/gyoudori/`).

3 Usage

3.1 The gyoudori environment

```
\begin{gyoudori}[<options>]{<lines>}
<content>
\end{gyoudori}
```

places *<content>* in a *<lines>*-line gyou-dori area. *<lines>* must be an integer of 1 or more; otherwise an error is raised. *<options>* is a comma-separated list of the following.

Position `t` (top), `c` (center, default) or `b` (bottom).

local Base the gyou-dori on the current font size (see below).

indent, noindent Indent the paragraphs of *<content>* or not. The default is given by the package option `indent` (Section 4.2; no indentation by default).

The content is set in vertical mode, so it may contain several lines or size changes. The content is positioned by its character frames: the range from the height of “あ” above the baseline of its first line to the depth of “あ” below the baseline of its last line, both in the last font size of the content, is placed in the area according to the position. A heading of Latin letters only is thus placed at the same position as a Japanese one. If the ink of the content extends into the line gaps outside the area by more than half of them, a warning is issued (an error with the package option `overflow`; Section 4.1).

With `local`, the gyou-dori is based not on the line pitch of `\normalsize` but on the height and depth of “あ” in the current font size and on `\baselineskip`. Use it to keep the surrounding lines on their grid inside `\small` etc. (e.g. `\begin{gyoudori}[b,local]{2}`). Without `local`, the line pitch of `\normalsize` is used regardless of the font size.

A line of text. This is the last line of the preceding paragraph.

A heading centered in 3 lines

The paragraph after the heading stays on the line grid.

A heading at the bottom of 2 lines

Text that follows without a blank line is not indented.

The next example uses `local` inside a part set in `\small`. The gray bands show the line grid of `\small`.

A line of text set in `\small`.

A heading centered in 3 lines

The following line also stays on the grid of `\small`.

- If no blank line follows `\end{gyoudori}`, the following text is neither indented nor preceded by `\parskip`, as after a display math. A blank line starts a new paragraph, indented and preceded by `\parskip`.
- The area is never split. If it does not fit at the bottom of a page (column), the whole heading moves to the top of the next page (column) (JLREQ §4.1.7 a, c).
- No page (column) break is allowed right after the heading. If not even one line of text fits after the heading, the whole heading moves to the next page (column) (JLREQ §4.1.7 b). In both cases the bottom of the previous page (column) is left blank.

3.2 The `\gyoudoriarea` command

`\gyoudoriarea[<options>]{<lines>}{<content>}`

works like the `gyoudori` environment, with the same *<options>*. Being a command, it does not control the indentation of the following text.

3.3 Placement methods of JLREQ

JLREQ §4.1.6 lists four methods (a–d) of placing a heading by `gyou-dori`. They are written with this package as follows.

- Center of a multi-line area** `\begin{gyoudori}{3}`.
- Centered, with blank lines before or after** Combine with a space of whole lines. For a one-line space before the heading, put `\vspace{\baselineskip}` before the environment.
- A specified position in the area** Top (`t`) and bottom (`b`) are provided. For other positions, put

space into the content.

- d. A one-line heading on a line position with a blank line before** For a heading in the text size, a 2-line area with bottom alignment (position `b`, 2 lines) gives the same result.

When a heading area comes to the top of a page The area of a heading, too, is placed at the top of the *kihon-hanmen* at the top of a page (or column), and the position in the area follows the position option (Section 3.4). For example, when the “low-level heading with a one-line space before it” of method `d` (a 2-line area with bottom alignment) comes to the top of a page, the first line is left blank and the heading is on the second line. This corresponds to the policy “always keep the one-line space” of JLREQ §4.1.8.

3.4 Gyou-dori areas at the top and bottom of a page

Not only headings: an area of the `gyoudori` environment, of `\gyoudoriarea`, or of display math may happen to come to the top or bottom of a page (or column) as the text flows. It then behaves as follows. Floats are not covered here, since $\text{\LaTeX}$ decides where they go (Section 4.5).

When a gyou-dori area comes to the top of a page The area itself is placed at the top of the *kihon-hanmen* (*tentsuki*), with no line gap before it. The position in the area follows the position option (`t`, `c`, `b`) as in the middle of a page (Figure 3), and the line after an n -line area starts on line $n + 1$. The same holds for display math: the formula is placed in the area at the same position as in the middle of a page.

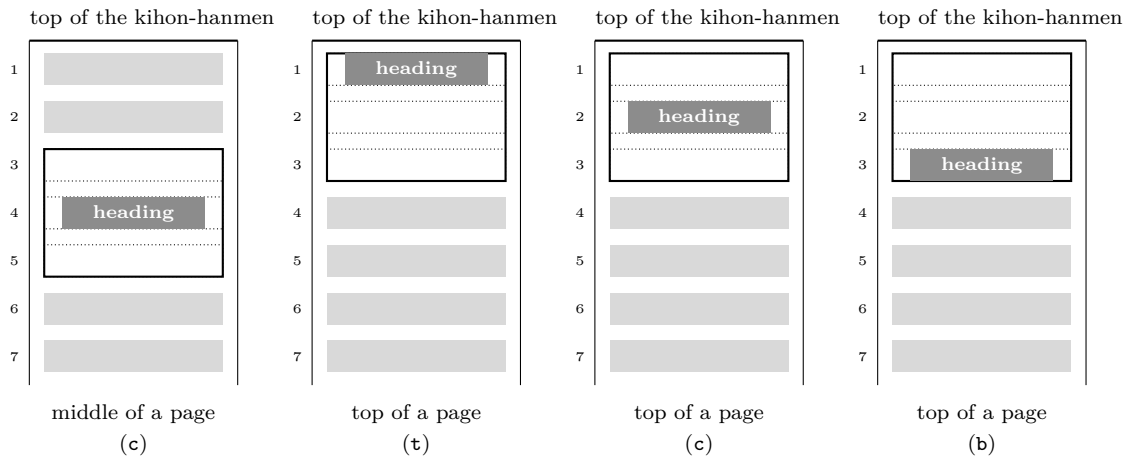


Figure 3 A 3-line area in the middle and at the top of a page (numbers on the left are line numbers)

When a gyou-dori area comes to the bottom of a page The area is never split. If it fits by the last line of the *kihon-hanmen*, it stays on the page; otherwise the whole area moves to the top of the next page (column), and the bottom of the previous page (column) is left blank for the lines that did not fit.

- The `gyoudori` environment and `\gyoudoriarea` are meant for headings and allow no page (column) break right after them. If the area ends on the last line and not even one line of text fits after it, the whole area moves to the next page (column) (Section 3.1).
- A page break is allowed after display math. If the area ends on the last line, it stays on the page and the following text starts on the first line of the next page (column). A multi-line display is a single area, so it is not broken across pages even with `\allowdisplaybreaks`.

4 Package options

Options are given as key-value pairs. For a Boolean option, the key alone means `true`.

`\usepackage[displaymath,float,textfloatsep=2\baselineskip]{gyoudori}`

4.1 `overflow=warning|error`

Whether to issue a warning (`warning`, default) or an error (`error`) when the content of the `gyoudori` environment or `\gyoudoriarea` does not fit in the area (its ink extends into the line gaps outside the area by more than half of them). The number of lines is not increased automatically.

4.2 `indent=true|false`

Whether to indent the paragraphs of the content of the `gyoudori` environment and `\gyoudoriarea`. The default is `false` (no indentation). It can be changed for each area with `indent` and `noindent` (Section 3.1).

4.3 `displaymath=true|false`

Display math is placed by `gyou-dori` automatically. The default is `false`.

Targets `equation`, `eqnarray`, `math` enclosed by `\[` and `\]` (the `displaymath` environment), and `equation*`, `align`, `gather`, `multline`, `flalign` and `alignat` of `amsmath`, with their starred forms. Math enclosed by `$$` is not handled. Equation numbers, `\label` and `\eqref` work as they do without this option.

Number of lines A display takes the number of lines it needs plus one, and at least two. The number added can be changed with `displaymathextra` (Section 4.4). The number of lines a display needs is the smallest number of lines in whose area it fits when it may extend into the outer line gaps by up to half of them, as the ink of a text line may extend beyond its character frame. For example, a display that fits in one line takes two lines, and one that needs two lines takes three. One line of space in total is thus added above and below the display. `\abovedisplayskip` and the like are not used.

Position Each display is placed so that the midpoint between the baselines of its first and last rows coincides with the midpoint between the baselines of the first and last lines of the area. A one-row display thus sits on the baseline of the middle line in an area of an odd number of lines, and midway between two baselines in an area of an even number of lines. A display that is asymmetric and does not fit at this position, such as one with the equation number on a lower row, is shifted into the range where it fits.

Measurement The struts (`\strut`) that `amsmath` puts in each row are measured at the size of the character frame of “あ”, so invisible struts do not increase the number of lines. Material before the display, such as a link target of `hyperref`, is not counted as a line.

Basis of `gyou-dori` The height and depth of “あ” in the current font size and `\baselineskip`. In the main text at `\normalsize` this is the same as the line pitch of `\normalsize`; inside footnotes, or answers set in `\small` and the like, the display follows the surrounding line pitch.

A line of text. The following display is placed by `gyou-dori`.

$$a = b + c \tag{1}$$

$$d = e \tag{2}$$

The text after the display is on the grid.

$$x = y$$

A line of text.

The gray bands show the line grid (the character frame of each line). In this example, the two-row `align` is centered in a 3-line area and the one-row `gather*` in a 2-line area, and the text before and after them stays on the grid.

Larger displays with fractions, integrals and sums are also placed in an area of the number of lines they need plus one.

A line of text. An integral and a sum:

$$\int_0^1 f(x) dx = \sum_{k=1}^n \frac{a_k}{k!} \quad (3)$$

Text after the display. Two rows:

$$S_n = \sum_{k=1}^n k = \frac{n(n+1)}{2} \quad (4)$$

$$I = \int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi} \quad (5)$$

More text. A case analysis:

$$f(x) = \begin{cases} \frac{x^2}{2} & (x \geq 0) \\ -x & (x < 0) \end{cases} \quad (6)$$

The last line of text.

In this example, the displays take three, five and three lines, and the text after each of them is on the grid.

The next example is inside a part set in `\small`. The gray bands show the line grid of `\small`.

A line of an answer set in `\small`.

$$\int_0^1 x^2 dx = \frac{1}{3}$$

The following line is also on the grid of `\small`.

$$x = y$$

The last line.

4.4 `displaymathextra=<integer>`

With `displaymath`, this option sets the number of lines added to the number of lines a display needs (an integer of 0 or more). The default is 1. The display takes “needed lines + this value” lines, and at least two. With 0, it takes the smallest number of lines in which it fits (at least two), and the space between the display and the character frames of the adjacent lines may shrink to half the line gap. With 2 or more, the space above and below the display widens accordingly.

```
\usepackage[displaymath,displaymathextra=0]{gyoukori}
```

4.5 `float=true|false`

Floats are placed by `gyou-dori`. The default is `false`. Below, a float placed at the top of a page (column) is called a *top float*, one at the bottom a *bottom float*, and one placed in the middle of the text (the `h` placement) an *in-text float*.

- A float is put into the smallest gyou-dori area (at least one line) that holds it.
- When its place is decided, the float is aligned in the area: a top float to the top, with the top of the area on the top of the character frame of the first line; a bottom float to the bottom, with the bottom of the area on the bottom of the character frame of a line; and an in-text float to the center, aligned with the lines before and after it.
- The five float separations (`\floatsep` etc.; see below) are rounded up to the smallest value of the form “line gap + a multiple of the line pitch” that is not less than the given value, without stretch or shrink. `\intextsep`, which is used both above and below, takes half of the line gap.
- On a float-only page (column), the floats are aligned to the top, with the top of the area of the first float on the top of the character frame of the first line of text; the separation between floats (`\@fpsep`) is rounded in the same way.
- A float taller than the text height is shrunk with a warning, as in L^AT_EX. To align its top with the lines, it is shrunk a little more than in L^AT_EX (by `\@fptop`; Section 7.4).

Thus the text lines around floats stay on the grid. L^AT_EX changes a lone `[h]` into `[ht]`; a float that goes to the top instead is realigned to the top. No column break is allowed right before an in-text float.

4.6 `floatsep`, `textfloatsep`, `intextsep`, `dblfloatsep`, `dbltextfloatsep`

Set the length of the same name. If not given, the value of the document class is used. With `float=true`, the value is rounded as described above.

5 Use with other packages

The following applies with `float=true`.

nidanfloat A double-column float (`figure*`) is aligned to the top of the page, or to the bottom of the character frame of the last line that fits in the page. A single-column bottom float in two-column mode is aligned to the last line of the column. The loading order does not matter.

stfloats Double-column floats at the top and bottom are aligned likewise.

flushend The glue in the balanced columns of the last page is not stretched or shrunk, so the lines stay on the grid (the `spread` and `shrink` options have no effect). The gap where the two columns are joined is rounded up to a multiple of the line pitch.

evenend (LuaLaTeX) Floats on the balanced last page are aligned to the top or bottom of the column. Deferred column floats that `evenend` puts at the top of a column at a change of the number of columns or on the last page are aligned to the top as well.

6 Relation to JLREQ

The behavior of this package was checked against the description of gyou-dori in JLREQ.

Reference point of the line pitch (note in §2.4.2) JLREQ does not fix it. This package takes the baseline as the reference point (Section 1.3).

Size of the area (§2.5.2, §4.1.6) Agrees. As the frame of the JFM is used, an area in pLaTeX with the standard JFM is shorter than the definition with a square frame by 0.048 times the full-width size (Section 1.2).

Placement in the area (§4.1.6 a–d) a is the default center and c is covered by top and bottom alignment; b and d are realized by combination (Section 3.3).

Heading at the bottom of a page or column (§4.1.7) Agrees. If the area does not fit, or if no text line fits after the heading, the whole heading moves to the next page (column). The exception for even pages in vertical writing does not apply, since only horizontal writing is supported.

Heading at the top of a page (§4.1.6, §4.1.8) Agrees. The area is placed at the top of the kihon-hanmen and only the line gap after it is added (§4.1.6). For a low-level heading with a one-line space before it, this corresponds to the policy “always keep the one-line space” among the three in §4.1.8 (Section 3.3).

Blank space at the end of a column (§4.1.7 c) JLREQ prefers some processing to avoid it but allows it if unavoidable. This package leaves it blank.

Display math (note in §4.1.6) For a display formula larger than the text size, JLREQ mentions two methods: specifying the area by gyou-dori, or keeping a minimum line gap before and after and adjusting the remainder within the page or column. `displaymath` follows the former. Adding one line to the number of lines a display needs (changeable with `displaymathextra`) and the minimum of two lines are design choices of this package.

Illustrations (§2.5.2, §4.3) JLREQ says that the block-direction space of illustrations should also be aligned to the line positions of the kihon-hanmen; `float` follows this. Avoiding a single text line before or after an illustration (§4.3) is left to the float placement of L^AT_EX.

7 How it works

7.1 Notation

b : the line pitch (`\normalbaselineskip` at `\normalsize`); h , d : the height and depth of “あ” at `\normalsize` (the character frame); $g = b - h - d$: the line gap; $A(n) = (n - 1)b + h + d$: the height of an n -line area; t_1 : the distance from the top of the type area (column) to the baseline of the first

line of text (the larger of `\topskip` and h ; $\text{\TeX}$ puts the baseline at the height of the first line if it is larger than `\topskip`).

No settings of a particular class are assumed. The only assumptions about the class are:

- `\normalsize` sets `\normalbaselineskip` to the line pitch of the main text (as usual definitions with `\fontsize` or `\@setfontsize` do);
- lines of the main text have the height and depth of “ $\mathcal{A}$ ” (the character frame of the JFM);
- `\parskip` between paragraphs of the main text is zero (otherwise lines are shifted at every paragraph regardless of this package).

The text height (`\textheight`) need not be a multiple of the line pitch. `\topskip`, `\maxdepth` and the float separations of the class are used as they are (the separations are rounded).

7.2 Placing a gyou-dori area

The content is set in a `\vbox` of height $A(n)$, whose height is then changed to h and depth to 0 (the content is drawn hanging below). After the paragraph is ended, this box, a kern of $n - 1$ times the line pitch, and an empty box of height 0 and depth d are put. $\text{\TeX}$ inserts `\baselineskip` glue so that the baseline of the box (the baseline of the first line of the area) is at distance b from the previous baseline. The empty box stands for the last line of the area, so the next line is at distance b from its baseline, i.e. on line $n + 1$. At the top of a page (column), `\topskip` puts the top of the area on the top of the character frame of the first line. No page break is possible among the three items, and the page builder treats them like n lines of text. This method is an improvement on the algorithm of Noriyuki Abe (<https://abenori.blogspot.com/2017/12/gyodori.html>), which it refers to. Abe’s algorithm represents the area by a single box of large depth; it was split into three items because a box whose depth exceeds `\maxdepth` may extend below the last line at a page break.

For the `gyoudori` environment and `\gyoudoriarea`, a `\penalty-10000` is put at the beginning of the box of the content, and the distance Δ between the baselines of its first and last lines is obtained as for display math (Section 7.3). With h_c and d_c , the height and depth of “ $\mathcal{A}$ ” in the last font size of the content, the frame range (of height $\Delta + h_c + d_c$) is aligned to the top, center or bottom of the area. With `local`, the height and depth of “ $\mathcal{A}$ ” in the current font size and `\baselineskip` are used for h , d and b .

The `gyoudori` environment and `\gyoudoriarea` add `\nobreak` after the area to forbid a page break right after a heading. After the `gyoudori` environment and the display math environments, the same mechanism as `\@doendpe` of $\text{\LaTeX}$ suppresses the indentation and sets `\parskip` to zero for the next paragraph unless a blank line follows.

7.3 Display math

The height and depth of “ $\mathcal{A}$ ” in the current font size and `\baselineskip` are used for h , d and b .

1. With the environment hooks (`env/<name>/before` and `after`), a `\vbox` is opened outside the environment, and the display is set in it with `\abovedisplayskip` etc. set to zero. In the box, `\strutbox` is set to the size of the character frame of “あ” (the struts of the rows of `amsmath`), and `\predisplaypenalty` to -10000 .
2. Since $\text{\TeX}$ puts `\predisplaypenalty` right before the display, the box is split there by `\vsplit` into the material before the display (such as a line formed before it) and the display. Only the display is measured below. The material before it is finally kept as a box of height zero overlaid at the top of the display.
3. When a copy of the display with a `\penalty -10000` at its top is split by `\vsplit` with `\splittopskip` set to a large value S , the rest begins with glue of “ S – the height of the first row”. Thus “the height of the rest $-S$ ” is the distance Δ between the baselines of the first and last rows.
4. Let H and D be the height and depth of the box. The baseline of the last row is at H from the top of the box, and that of the first row at $H - \Delta$. With the distance from the top of the area to the top of the box

$$y = h + \frac{(n-1)b}{2} - H + \frac{\Delta}{2},$$

the midpoint of the baselines of the display coincides with that of the area.

5. Starting from $k = 1$, the smallest k with $H + D \leq A(k) + g$ is found (the number of lines the display needs; the box may extend into the outer line gaps by up to half of them), and $n = k + e$ is used, where e is the value of `displaymathextra` (1 by default); if $n < 2$, $n = 2$. If y is less than $-g/2$, it is set to $-g/2$; if it is greater than $A(n) + g/2 - H - D$, it is set to that value, so that the box is shifted into the range where it fits.
6. The box is lowered by y in the area, which is placed in the same way as in Section 7.2.

7.4 Floats

Size After `\@endfloatbox`, the float box is rebuilt as a `\vbox` of height $A(n)$ for the smallest $n \geq 1$ with height + depth $\leq A(n)$ (the content at the top).

Realignment When the placement is decided, the content is placed at position p (`t`, `c`, `b`) and lowered by δ , keeping the outer dimensions (height and depth) of the box. Thus the float placement of $\text{\LaTeX}$ is not affected, and the mark of double-column floats (depth 1 sp) is kept. A box stacked without `\@endfloatbox` (such as the double-column title of `\twocolumn`) is not realigned, since its content cannot be taken out.

Top floats (`\@cflt`) $p = \text{t}$, $\delta = t_1 - h$; the top of the area is on the top of the character frame of the first line.

Bottom floats (`\@cflb`) $p = b$, $\delta = d - d_{\text{last}}$, where d_{last} is the depth of the last box in the column (measured by taking out the last box, since the depth of the column box may be cut at `\maxdepth`). After the floats, an empty line of height 0 and depth d and glue of “ $r - d$ ” are added, where r is “the column height $-t_1$ ” modulo b . Then, even when the floats are pushed down by the `\vfil` of `\clearpage`, their bottom is on the bottom of the character frame of the last line in the column, and no overfull box occurs in classes where that bottom goes below the type area. When pushed down (the column ends with glue), $\delta = 0$ and the stretch of `\@textbottom` is cancelled.

In-text floats (`\@addtocurcol`) $p = c$, $\delta = g/2 + d - d_{\text{prev}}$, where d_{prev} is the depth of the previous line (`\@pagedp`). A `\nobreak` is inserted before the float so that it does not start a column.

Rounding of separations Each separation is set to the smallest value of the form $g + kb$ ($k \geq 0$ an integer) that is not less than the given value, without stretch or shrink; `\intextsep`, used above and below, is $g/2 + kb$. Then “float area + separation” is a multiple of b , and the text lines are not shifted.

Float-only pages `\@fptop` is set to $t_1 - h$ without stretch, `\@fpsep` is rounded like the other separations, and `\@fpbot` keeps its stretch. The floats are realigned to the top in `\@wtryfc`, which stacks them (they keep the alignment of a trial as an in-text float). Since the fitting test (`\@xtryfc`) does not count `\@fptop`, the column height is reduced by it during the test. L^AT_EX shrinks a float taller than the text height to the text height (`\@largefloatcheck`); to match the test, it is shrunk by `\@fptop` more, with a warning. Float-only pages of double-column floats are handled in the same way.

Order of footnotes The `\@makecol` of pL^AT_EX puts footnotes after the floats, so their height is subtracted from the column height when computing r . The `\@makecol` of L^AT_EX 2025-06-01 or later (e.g. LuaL^AT_EX) puts the floats after the footnotes, so in a column with bottom floats a `\vfil` is put before the footnotes to place the footnotes and the floats at the bottom.

7.5 Interfaces to other packages

Double-column floats They are handled in `\@comdblflflt`. A float in `\@dbltoplist` is at the top: $p = t$, $\delta = t_1 - h$. Otherwise it is at the bottom (`nidanfloat`, `stfloats`): $p = b$, $\delta = d - r$ with r being “`\textheight - t_1`” modulo b , and a `\vfil` is put before the floats.

nidanfloat Top floats of each column are handled as by `\@cflt`. `\L@cflb` and `\R@cflb` are replaced so that the bottom floats are aligned to the last line in the column, with the stretch between the text and the floats.

flushend After the columns of the last page are built, they are rebuilt without stretching or shrinking the glue in them (with fill glue at the end). Where the two columns are joined (`\atColsBreak`), the distance from the baseline of the last element of the left column to that of the first element of

the right column is rounded up to a multiple of b , taking the shift δ of float boxes into account.

evenend Before the copies of column floats on the last page are taken, top floats are realigned to $\mathbf{t}$ and bottom floats to $\mathbf{b}$. Deferred column floats are realigned like top floats in the hook `evenend/deferredfloat`, which `evenend` calls before putting them into a column.

8 Limitations

- Gyou-dori of floats is based on the line pitch of `\normalsize`. So is that of the `gyoudori` environment and `\gyoudoriarea` without `local` (Section 3.1).
- `\topsep`, `\itemsep` and `\parsep` of lists are not multiples of the line pitch, so lines in and around lists are off the grid.
- Vertical writing is not considered. In the trials, however (`tarticle` and `jlreq` with `tate` in pLaTeX, `ltjarticle` in LuaLaTeX), gyou-dori of the `gyoudori` environment, display math and floats works as in horizontal writing, and the lines of text before and after stay on the line grid. Since lines advance from right to left, the position $\mathbf{t}$ aligns to the right and $\mathbf{b}$ to the left, and an area at the top of a page is put at the right edge of the *kihon-hanmen*. The exception for even pages in vertical writing (JLREQ §4.1.7) is not handled. Two-column vertical layouts and the use with other packages have not been tested.
- `\flushbottom` and the `[H]` placement of the `float` package have not been tested.
- When `flushend`, footnotes, and a bottom or in-text float on the last page come together, text may be shifted by about 1 pt.
- `\fnbelowfloat` of `stfloats` has no effect in pLaTeX, which uses its own `\@makecol`.
- Display math enclosed by `$$` is not placed by gyou-dori.
- Known, not yet fixed: when `nidanfloat` moves text overflowing the left column into the right column, it inserts the space between lines without regard to the depth of the last line of the left column, so the lines of the right column may be shifted by the depth of “あ”. Whether it occurs depends on the page layout.
- Known, not yet fixed: with `float`, `nidanfloat` and footnotes together in pLaTeX, an overfull box may occur when a two-column page is output.

9 References

- W3C, *Requirements for Japanese Text Layout*, <https://www.w3.org/TR/jlreq/>
- Noriyuki Abe, *Gyodori* (in Japanese), <https://abenori.blogspot.com/2017/12/gyodori.html>

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