TOP, BOTTOM specifiable 2 column floats
Version v2.9

Ken Nakano*

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The package nidanfloat enables bottom (b) placement option for double float in two column mode (*nidan-kumi*). This package was originally part of Japanese pLaTeX, and now is distributed as a separate package because it supports all LaTeX formats.

日本語版ドキュメントは "nidanfloat.pdf"です。

[TODO] This package needs adjustment for LaTeX 2_ε 2015/01/01 changes of the float order in two column mode!

1 Code

1.1 Package Options

In the nidanfloat package, the height of the left and right columns of the last page set is designed to be equalised. However, due to the effect of this function, the \newpage and \clearpage commands on last page do not work properly. We introduced an option to specify whether or not to use this function. If you specify the option " balance" when specifying a package, automatic adjustment of last page will be done. It is not done by default.

```
1 ⟨∗core⟩
2 \DeclareOption{balance}{\AtEndDocument{\let\clearpage\balanceclearpage}}
3 \DeclareOption{nobalance}{\relax}
4 \ExecuteOptions{nobalance}
5 \ProcessOptions
```

1.2 Float parameters

Here, we explain the parameters created to place a floating float at the bottom of the page.

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*Publishing Engineering Department, ASCII Corporation (email: ken-na at ascii.co.jp)

\dblbotfraction — Percentage of a page that may be occupied by a two-column float. The default is 0.5, which means that it can occupy half of the page.

```
6 \newcommand\dblbotfraction{0.5}
```

\c@dblbotnumber — Number of two-column floats that can be placed at the bottom of the page. By default this is set to 2. `\c@dblbotnumber` is the internal format of the counter `dblnumber`.

```
7 \newcount\c@dblbotnumber
8 \setcounter{dblbotnumber}{2}
```

\@dblbotroom
\@dblbotnum — `\@dblbotroom`: Length variable indicating the percentage of the page a two-column float can occupy at the bottom of the page. `\@dblbotnum`: Counter that holds the number of two-column floats that can be placed at the bottom of the page.

```
9 \newdimen\@dblbotroom
10 \newcount\@dblbotnum
```

\@dblfloatplacement — Redefine this macro to set the newly added parameters.

```
11 \def\@dblfloatplacement{%
12     \global\@dbltopnum\c@dbltopnumber
13     \global\@dblbotnum\c@dblbotnumber % added
14     \global\@dbltoproom\dbltopfraction\@colht
15     \global\@dblbotroom\dblbotfraction\@colht % added
16     \@textmin\@colht
17       \advance\@textmin-\@dbltoproom
18       \advance\@textmin-\@dblbotroom % added
19     \@fpmin\dblfloatpagefraction\textheight
20     \@fptop\@dblfptop
21     \@fpsep\@dblfpsep
22     \@fpbot\@dblfpbot
23 }
```

1.3   Define float lists

The definition of a double column float should be done in a class file, as follows.

```
\newenvironment{figure*}
              {\@dblfloat{figure}}
              {\end@dblfloat}
```

The content of `figure*` environment is registered in the two-column float holding list. In this section, we expand it so that you can put a float at the bottom of the page.

\@dblbotlist Add the `\@dblbotlist` to hold the float to be placed at the bottom of the two-
\L@toplist column page. In addition, for floats to be placed above and below the column,
\R@toplist distinguish between the left side and the right side,
\L@botlist
\R@botlist

```
24 \gdef\@dblbotlist{}
25 \gdef\L@toplist{}
26 \gdef\R@toplist{}
27 \gdef\L@botlist{}
28 \gdef\R@botlist{}
```

\@dblfloat `\@dblfloat`, `\@dbflt` is redefined so that the default position argument is set to
\@dbflt "tb". Also, set `\end@dblfloat` to `\end@float` to allow floats to be placed at the
\end@dblfloat bottom of the page.

```
29 \def\@dblfloat{%
30   \if@twocolumn\let\reserved@a\@dbflt\else\let\reserved@a\@float\fi
31   \reserved@a}
32 \def\@dbflt#1{\@ifnextchar[{\@xdblfloat{#1}}{\@xdblfloat{#1}[tb]}}
33 \def\@xdblfloat#1[#2]{%
34   \@xfloat{#1}[#2]\hsize\textwidth\linewidth\textwidth}
35 \let\end@dblfloat\end@float
```

\@addtocurcol Called from `\@xdblfloat`, `\@xfloat` evaluates the position specification op-
tion, and start building the float object. Assembling a float object ends with
`\end@float`. `\end@float` starts the `\output` routine with a penalty value
of -10004. The `\output` routine with this value invokes `\@specialoutput`.
`\@specialoutput` calls `\@addtocurcol` to move the contents of the float to the
current page. If it can be output, then do so; otherwise we explore another possi-
bility.

```
36 \def\@addtocurcol{%
```

In the case of this package, there is a possibility that a double column float may
be passed, so check it. If the width of the float is larger than the column width,
forcibly treat as starred, double column float.

```
37   \ifdim\wd\@currbox>\columnwidth
38     \@addtodblcol
39   \else
```

Otherwise, it is almost the same as the original version.

```
40     \@insertfalse
41     \@setfloattypecounts
42     \ifnum\@fpstype=8 % is only '!p'
43     \else
44       \ifnum\@fpstype=24 % is only 'p'
45       \else
46         \@flsettextmin
47         \advance\@textmin\@textfloatsheight
```

3

```
48        \@reqcolroom\@pageht
49        \ifdim\@textmin>\@reqcolroom \@reqcolroom\@textmin\fi
50        \advance\@reqcolroom\ht\@currbox
51        \ifdim\@colroom>\@reqcolroom
52          \@flsetnum\@colnum
53          \ifnum\@colnum>\z@
54            \@bitor\@currtype\@deferlist
55            \if@test
56            \else
```

The only difference from LaTeX is the name of float list,

```
57              \@bitor\@currtype{\L@botlist\R@botlist}%
58              \if@test
59                \@addtobot
60              \else
61                \ifodd\count\@currbox
62                  \advance\@reqcolroom\intextsep
63                  \ifdim\@colroom>\@reqcolroom
64                    \global\advance\@colnum\m@ne
65                    \global\advance\@textfloatsheight\ht\@currbox
66                    \global\advance\@textfloatsheight 2\intextsep
67                    \@cons\@midlist\@currbox
68                    \if@nobreak
69                      \nobreak
70                      \@nobreakfalse
71                      \everypar{}%
72                    \else
73                      \addpenalty \interlinepenalty
74                    \fi
75                    \vskip\intextsep
76                    \box\@currbox
77                    \penalty\interlinepenalty
78                    \vskip\intextsep
79                    \ifnum\outputpenalty<-\@Mii \vskip-\parskip \fi
80                    \outputpenalty\z@
81                    \@inserttrue
82                  \fi
83                \fi
84                \if@insert\else\@addtotoporbot\fi
85              \fi
86            \fi
87          \fi
88        \fi
89      \fi
90    \fi
91    \if@insert\else\@resethfps\@cons\@deferlist\@currbox\fi
92  \fi
93 }
```

`\@addtotoporbot` Update variables holding float lists.

```
94 \def\@addtotoporbot{%
95   \@getfpsbit \tw@
96   \ifodd\@tempcnta
97     \@flsetnum\@topnum
98     \ifnum\@topnum>\z@
99       \@tempswafalse
100      \@flcheckspace\@toproom\@toplist\L@toplist\R@toplist
101      \if@tempswa
102        \@bitor\@currtype{\@midlist\L@botlist\R@botlist}%
103        \if@test\else
104          \if@firstcolumn
105            \@flupdates \@topnum \@toproom \L@toplist
106          \else
107            \@flupdates \@topnum \@toproom \R@toplist
108          \fi
109          \@inserttrue
110        \fi
111      \fi
112    \fi
113  \fi
114  \if@insert\else\@addtobot\fi
115 }
```

`\@addtobot` Update variables holding float lists.

```
116 \def\@addtobot{%
117   \@getfpsbit 4\relax
118   \ifodd\@tempcnta
119     \@flsetnum\@botnum
120     \ifnum\@botnum>\z@
121       \@tempswafalse
122       \@flcheckspace\@botroom\@botlist\L@botlist\R@botlist
123       \if@tempswa
124         \global\maxdepth\z@
125         \if@firstcolumn
126           \@flupdates \@botnum \@botroom \L@botlist
127         \else
128           \@flupdates \@botnum \@botroom \R@botlist
129         \fi
130         \@inserttrue
131       \fi
132     \fi
133   \fi
134 }
```

`\org@addtonextcol` These macros are used inside `\@startcolumn`, to output a float that failed to be
`\@addtonextcol` inserted or a float specified by 'p'. In this package, a width larger than the column
width signals the float should be added to the double column float list.

```
135 \let\org@addtonextcol\@addtonextcol
136 \def\@addtonextcol{%
137    \ifdim\wd\@currbox>\columnwidth
138       \@addtodblcol
139    \else
140       \org@addtonextcol
141    \fi
142 }
```

\@addtodblcol The `\@addtodblcol` macro determines whether the float object fits in the current page and calls `\@addtodbltoporbot` if it would fit. Otherwise, adds to `\@dbldeferlist`.

First set `@insert` flag to false, obtain the float type as `\@fpstype`. If the float type is 8 or 24, the position option is only '!p 'or 'p', so unconditionally add to `\@dbldeferlist`.

```
143 \def\@addtodblcol{%
144    \begingroup
145    \@insertfalse
146    \@setfloattypecounts
147    \ifnum\@fpstype=8 % is only '!p'
148    \else
149       \ifnum\@fpstype=24 % is only 'p'
150       \else
```

Otherwise, check whether there are unplaced ones of the same float type. If there is a float of the same type that has not been output yet, do not output. However, even with the same type, consider the float column width. If you can output it, call `\@addtodblbotortop`.

```
151          \@bitor\@currtype{\@dbldeferlist}
152          %\@bitor\@currtype{\@deferlist\@dbldeferlist}
153          \if@test
154          \else
155             \@tempswafalse
156             \@checkdblspace
157             \if@tempswa
158                \@addtodbltoporbot
159             \fi
160          \fi
161       \fi
162    \fi
163    \if@insert\else\@cons\@dbldeferlist\@currbox\fi
164    \endgroup
165 }
```

\@addtodbltoporbot First, check whether there is a specification of 't', and whether it exceeds the number allowed at the top of the page.

6

```
166 \def\@addtodbltoporbot{%
167   \@getfpsbit \tw@
168   \ifodd\@tempcnta
169     \@flsetnum\@dbltopnum
170     \ifnum\@dbltopnum>\z@
```

Then, check whether the same type of float may be output at the top or bottom of the page. Note that two-column floats are placed on the top of a one-column floats.

```
171       \@bitor\@currtype{%
172         \L@toplist\R@toplist\L@botlist\R@botlist\@dblbotlist}
173       \if@test
174       \else
```

If possible, check if there is enough space to output the float.

```
175         \@tempswafalse
176         \@dblflcheckspace \@dbltoproom \@dbltoplist
```

If there is a space, subtract the height of the float from the space available for top floats. Also, reduce the number of starred floats to put in the top, and update the float list for double column top floats.

```
177         \if@tempswa
178           \@tempdima-\ht\@currbox
179           \advance\@tempdima
180            -\ifx\@dbltoplist\@empty \dbltextfloatsep\else\dblfloatsep\fi
181           \global\advance\@dbltoproom\@tempdima
182           \global\advance\@dbltopnum\m@ne
183           \@cons\@dbltoplist\@currbox
```

For the left column, subtract the float from the column height `\@colroom`.

```
184           \if@firstcolumn
185             \advance\@colroom\@tempdima
186             \global\advance\@colroom\maxdepth
```

In the case of the right column, insert not only the new float, also the height of the text moved from the left column is decreased.

```
187           \else
188             \@tempdima\textheight
189             \@chkdblfloatht\advance\@tempdima-\@floatht
190             \L@chkfloatht\advance\@tempdima-\@floatht
191             \vbadness=\@M \splittopskip=\topskip \splitmaxdepth=\maxdepth
192             \setbox\z@=\vbox{\unvcopy\@leftcolumn}%
193             \setbox\@ne=\vsplit\z@ to\@tempdima
194             \advance\@colroom-\ht\z@
195             \global\advance\@colroom-\dp\z@
196           \fi
```

Finally, set the @insert flag to true.

```
197             \@inserttrue
```

```
198            \fi
199          \fi
200        \fi
201      \fi
202    \if@insert\else\@addtodblbot\fi
203 }
```

\@addtodblbot Placing a two-column float at the bottom of the page is similar to the preceding
section. However, because a two-column float is placed at the very bottom, we
don't have to examine other output lists.

```
204 \def\@addtodblbot{%
205   \@getfpsbit 4\relax
206   \ifodd\@tempcnta
207     \@flsetnum\@botnum
208     \ifnum\@botnum>\z@
209       \@tempswafalse
210       \@dblflcheckspace \@dbltoproom \@dbltoplist
211       \if@tempswa
212         \@tempdima-\ht\@currbox \advance\@tempdima
213           -\ifx\@dblbotlist\@empty \dbltextfloatsep\else\dblfloatsep\fi
214         \global\advance\@dblbotroom\@tempdima
215         \global\advance\@dblbotnum\m@ne
216         \@cons\@dblbotlist\@currbox
217         \if@firstcolumn
218           \advance\@colroom\@tempdima
219           \global\advance\@colroom\maxdepth
220         \else
221           \@tempdima\textheight
222           \@chkdblfloatht\advance\@tempdima-\@floatht
223           \L@chkfloatht\advance\@tempdima-\@floatht
224           \vbadness=\@M \splittopskip=\topskip \splitmaxdepth=\maxdepth
225           \setbox\z@=\vbox{\unvcopy\@leftcolumn}%
226           \setbox\@ne=\vsplit\z@ to\@tempdima
227           \advance\@colroom-\ht\z@
228           \global\advance\@colroom-\dp\z@
229         \fi
230         \@inserttrue
231       \fi
232     \fi
233   \fi
234 }
```

1.4   Macro to calculate float height

\@floatht \@floatht is used to store the float height stored in the output list.

```
235 \global\newdimen\@floatht \@floatht\z@
```

\@flcheckspace

```
236 \def \@flcheckspace #1#2#3#4{%
237   \advance \@reqcolroom
238   \if@twocolumn
239     \if@firstcolumn
240       \ifx #3\@empty \textfloatsep \else \floatsep \fi
241     \else
242       \ifx #4\@empty \textfloatsep \else \floatsep \fi
243     \fi
244   \else
245     \ifx #2\@empty \textfloatsep \else \floatsep \fi
246   \fi
247   \ifdim \@colroom>\@reqcolroom
248     \ifdim #1>\ht\@currbox
249       \@tempswatrue
250     \else
251       \ifnum \@fpstype<\sixt@@n
252         \@tempswatrue
253       \fi
254     \fi
255   \fi
256 }
```

\@dblflcheckspace Check if the percentage that can be occupied by floats on the top or bottom of the page has been exceeded. If not, \@tempswa will be made true.

```
257 \def\@dblflcheckspace#1#2{%
258   \@tempdima=#1\relax
259   \advance\@tempdima
260     -\ifx #2\@empty \dbltextfloatsep\else\dblfloatsep\fi
261   \ifdim\@tempdima>\ht\@currbox
262     \@tempswatrue
263   \else
264     \ifnum\@fpstype<\sixt@@n
265       \advance\@tempdima\@textmin
266       \if \@tempdima>\ht\@currbox
267         \@tempswatrue
268       \fi
269     \fi
270   \fi
271 }
```

\@checkdblspace Check whether the float would fit in the space allocated to text page floats.

First, compare the height of text currently assembled with the amount of text that must be minimized, and store the larger one in \@tempdima. If you are in the right column, also add the height of the text in the left column.

```
272 \def\@checkdblspace{%
273   \@tempdima\@pageht\advance\@tempdima\@pagedp
274   \@tempdimb\textfraction\@colht
275   \ifdim\@tempdima<\@tempdimb \@tempdima\@tempdimb\fi
```

```
276    \if@firstcolumn\else
277      \advance\@tempdima\ht\@leftcolumn
278      \advance\@tempdima\dp\@leftcolumn
279    \fi
```

Then add the height of the column width float and two-column float that are to be output. At this time, double the height of the two-column float.

```
280    \L@chkfloatht\advance\@tempdima\@floatht
281    \R@chkfloatht\advance\@tempdima\@floatht
282    \@chkdblfloatht\advance\@tempdima\tw@\@floatht
```

Then add the current float height and required space. Again, double their heights.

```
283    \@tempdimb\ht\@currbox\advance\@tempdimb\dp\@currbox
284    \advance\@tempdimb
285      \ifdim\@floatht>\z@ \dbltextfloatsep\else\dblfloatsep\fi
286    \multiply\@tempdimb\tw@ \advance\@tempdima\@tempdimb
```

If the height of all these elements is less than twice the `\textheight`, we can place the current float.

```
287    \ifdim\@tempdima>\tw@\textheight
288      \@tempswafalse
289    \else
290      \@tempswatrue
291    \fi
292 }
```

`\tmp@comflelt` Used to measure the height of the float stored in the output list. Almost the same
`\tmp@comdblflelt` as `\@comfelt`, `\@comdblflelt` respectively, but use `\copy` so that the original box is not lost.

```
293 \def\tmp@comflelt#1{%
294    \setbox\@tempboxa
295    \vbox{\unvbox\@tempboxa\copy #1\vskip\floatsep}%
296 }
297 \def\tmp@comdblflelt#1{%
298    \setbox\@tempboxa
299    \vbox{\unvbox\@tempboxa\copy #1\vskip\dblfloatsep}%
300 }
```

`\L@chkfloatht` Used to calculate the height of the float to be output to the left and right column,
`\R@chkfloatht` respectively. The calculation result is stored in `\@floatht`.

```
301 \def\L@chkfloatht{\@floatht\z@
302    \ifx\L@toplist\@empty\else
303      \let\@elt\tmp@comflelt\setbox\@tempboxa\vbox{}\L@toplist
304      \setbox\@ne\vbox{\boxmaxdepth\maxdepth
305          \unvbox\@tempboxa\vskip-\floatsep\topfigrule\vskip\textfloatsep
306          }%
307      \let\@elt\relax \advance\@floatht\ht\@ne \advance\@floatht\dp\@ne
308    \fi
```

```
309  \ifx\L@botlist\@empty\else
310    \let\@elt\tmp@comflelt\setbox\@tempboxa\vbox{}\L@botlist
311    \setbox\@ne\vbox{\boxmaxdepth\maxdepth
312        \vskip\textfloatsep\botfigrule\unvbox\@tempboxa\vskip-\floatsep
313        }%
314    \let\@elt\relax \advance\@floatht\ht\@ne \advance\@floatht\dp\@ne
315  \fi
316  \global\@floatht\@floatht
317 }
318 \def\R@chkfloatht{\@floatht\z@
319  \ifx\R@toplist\@empty\else
320    \let\@elt\tmp@comflelt\setbox\@tempboxa\vbox{}\R@toplist
321    \setbox\@ne\vbox{\boxmaxdepth\maxdepth
322        \unvbox\@tempboxa\vskip-\floatsep\topfigrule\vskip\textfloatsep
323        }%
324    \let\@elt\relax \advance\@floatht\ht\@ne \advance\@floatht\dp\@ne
325  \fi
326  \ifx\R@botlist\@empty\else
327    \let\@elt\tmp@comflelt\setbox\@tempboxa\vbox{}\R@botlist
328    \setbox\@ne\vbox{\boxmaxdepth\maxdepth
329        \vskip\textfloatsep\botfigrule\unvbox\@tempboxa\vskip-\floatsep
330        }%
331    \let\@elt\relax \advance\@floatht\ht\@ne \advance\@floatht\dp\@ne
332  \fi
333  \global\@floatht\@floatht
334 }
```

\@chkdblfloatht Calculate the height of the double float output on the top and bottom of the page, store the result in \@floatht.

```
335 \def\@chkdblfloatht{\@floatht\z@
336  \ifx\@dbltoplist\@empty\else
337    \let\@elt\tmp@comdblflelt\setbox\@tempboxa\vbox{}\@dbltoplist
338    \setbox\@ne\vbox{\boxmaxdepth\maxdepth
339        \unvbox\@tempboxa
340        \vskip-\dblfloatsep
341        \dblfigrule
342        \vskip\dbltextfloatsep
343        }%
344    \let\@elt\relax \advance\@floatht\ht\@ne \advance\@floatht\dp\@ne
345  \fi
346  \ifx\@dblbotlist\@empty\else
347    \let\@elt\tmp@comdblflelt\setbox\@tempboxa\vbox{}\@dblbotlist
348    \setbox\@ne\vbox{\boxmaxdepth\maxdepth
349        \vskip\dbltextfloatsep
350        \dblfigrule
351        \unvbox\@tempboxa
352        \vskip-\dblfloatsep
353        }%
354    \let\@elt\relax \advance\@floatht\ht\@ne \advance\@floatht\dp\@ne
```

```
355   \fi
356   \global\@floatht\@floatht
357 }
```

1.5   Merging float and text

`\@fixht`   `\@fixht` is used to store the height of the left column.

```
358 %
359 \global\newdimen\@fixht
```

`\@rightfixht`   *Added by the Japanese TeX development community*: `\@rightfixht` is used to store the height of the right column.

```
360 \global\newdimen\@rightfixht
```

`\@combinefloats`   This macro is executed in the right column.

```
361 \def\@combinefloats{%
362   %%\boxmaxdepth\maxdepth
363   \if@twocolumn
364     \if@firstcolumn
365     \else
```

Store the total height of left column text, upper and lower column width float, upper and lower double column float height in `\@fixht`.

```
366       \@fixht\ht\@leftcolumn \advance\@fixht\dp\@leftcolumn
367       \@chkdblfloatht \@tempdima\@floatht
368       \L@chkfloatht \advance\@tempdima\@floatht
369       \advance\@fixht\@tempdima
```

If `\@fixht` is greater than `\textheight`, split the text and transfer the remaining to the right column.

```
370       \ifdim\@fixht>\textheight
```

Stores the height of the part left in the left column in `\@fixht`.

```
371         \@fixht\textheight
372         \advance\@fixht-\@tempdima
373         \advance\@fixht\maxdepth
```

Store the text of height `\@fixht` in box 0.

```
374         \vbadness=\@M \splittopskip=\topskip \splitmaxdepth=\maxdepth
375         \setbox\z@=\vsplit\@leftcolumn to\@fixht
```

Since the part to be moved remains in `\@leftcolumn`, place it in the right column (`\@outputput`). Also, return the contents of box 0 to the left column.

```
376         \advance\@fixht-\maxdepth
377         \@tempdima\baselineskip \advance\@tempdima-\topskip
378         \setbox\@outputbox=\vbox{%
379           \ifvoid\@leftcolumn
```

```
380            \else
381              \unvbox\@leftcolumn\vskip\@tempdima
382            \fi\relax
383            \unvbox\@outputbox}% \vss moved from here
```

0 *Modified by the Japanese TEX development community*: the `\vss` that was immediately after `\unvbox\@outputbox` of the code immediately above this location was moved here.

```
384            \setbox\@leftcolumn=\vbox to\@fixht{\unvbox\z@\vss}% to here (2017/05/01)
385          \fi
```

Stores the height of the left column in `\@fixht`, by adding the height of the float that enters the left column to the text height of the left column.

```
386          \@fixht\ht\@leftcolumn
387            \advance\@fixht\dp\@leftcolumn \advance\@fixht\@floatht
```

Added by the Japanese TEX development community: Process the right column as well. Fixed a longstanding bug where the right column overlapped with the float.

```
388          \@rightfixht\ht\@outputbox \advance\@rightfixht\dp\@outputbox
389          \@chkdblfloatht \@tempdima\@floatht
390          \R@chkfloatht \advance\@tempdima\@floatht
391          \advance\@rightfixht\@tempdima
392          \ifdim\@rightfixht>\textheight
393            \@rightfixht\textheight
394            \advance\@rightfixht-\@tempdima
395            \advance\@rightfixht\maxdepth
396            \vbadness=\@M \splittopskip=\topskip \splitmaxdepth=\maxdepth
397            \setbox\z@=\vsplit\@outputbox to\@rightfixht
398            \advance\@rightfixht-\maxdepth
399            \unvbox\@outputbox
400            \setbox\@outputbox=\vbox to\@rightfixht{\unvbox\z@\vss}%
401          \fi
402          \@rightfixht\ht\@outputbox
403            \advance\@rightfixht\dp\@outputbox \advance\@rightfixht\@floatht
```

Assemble text and column width floats, for left and right respectively.

```
404        \ifx\L@toplist\@empty\else\L@cflt\fi
405        \ifx\L@botlist\@empty\else\L@cflb\fi
406        \ifx\R@toplist\@empty\else\R@cflt\fi
407        \ifx\R@botlist\@empty\else\R@cflb\fi
408      \fi
```

When it is not a two-column float, it operates as usual.

```
409    \else
410      \ifx\@toplist\@empty\else\@cflt\fi
411      \ifx\@botlist\@empty\else\@cflb\fi
412    \fi
413 }
```

`\L@cflt`	Used to assemble left and right columns.
`\L@cflb`	*Added by the Japanese TeX development community*: Update the height of
`\R@cflt`	`\@fixht` in the left column, `\@rightfixht` in the right column. Also update
`\R@cflb`	`\@colht` to these heights.

```
414 \def\L@cflt{%
415     \let\@elt\@comflelt\setbox\@tempboxa\vbox{}\L@toplist
416     \setbox\@leftcolumn\vbox to\@fixht{\boxmaxdepth\maxdepth
417         \unvbox\@tempboxa
418         \vskip-\floatsep\topfigrule\vskip\textfloatsep\unvbox\@leftcolumn
419         \vss}%
420     \let\@elt\relax
421     \xdef\@freelist{\@freelist\L@toplist}\global\let\L@toplist\@empty
422     \@colht\@fixht
423 }
424 \def\L@cflb{%
425     \let\@elt\@comflelt\setbox\@tempboxa\vbox{}\L@botlist
426     \setbox\@leftcolumn\vbox to\@fixht{\boxmaxdepth\maxdepth
427         \unvbox\@leftcolumn
428         \vskip\textfloatsep\botfigrule\unvbox\@tempboxa\vskip-\floatsep
429         \vss}%
430     \let\@elt\relax
431     \xdef\@freelist{\@freelist\L@botlist}\global\let\L@botlist\@empty
432     \@colht\@fixht
433 }
434 \def\R@cflt{%
435     \let\@elt\@comflelt\setbox\@tempboxa\vbox{}\R@toplist
436     \setbox\@outputbox\vbox to\@rightfixht{\boxmaxdepth\maxdepth
437         \unvbox\@tempboxa
438         \vskip-\floatsep\topfigrule\vskip\textfloatsep\unvbox\@outputbox
439         \vss}%
440     \let\@elt\relax
441     \xdef\@freelist{\@freelist\R@toplist}\global\let\R@toplist\@empty
442     \@colht\@rightfixht
443 }
444 \def\R@cflb{%
445     \let\@elt\@comflelt\setbox\@tempboxa\vbox{}\R@botlist
446     \setbox\@outputbox\vbox to\@rightfixht{\boxmaxdepth\maxdepth
447         \unvbox\@outputbox
448         \vskip\textfloatsep\botfigrule\unvbox\@tempboxa\vskip-\floatsep
449         \vss}%
450     \let\@elt\relax
451     \xdef\@freelist{\@freelist\R@botlist}\global\let\R@botlist\@empty
452     \@colht\@rightfixht
453 }
```

`\@combinedblfloats`	Merge text and float. In this package, double column float at the bottom of the page are also merged.

```
454 %\def\@comdblflelt#1{\setbox\@tempboxa
```

```
455 %        \vbox{\unvbox\@tempboxa\box#1\vskip\dblfloatsep}}
456 %
457 \def\@combinedblfloats{%
458   \ifx\@dbltoplist\@empty
459   \else
460     \let\@elt\@comdblflelt\setbox\@tempboxa\vbox{}\@dbltoplist
461     \setbox\@outputbox\vbox{\boxmaxdepth\maxdepth
462       \unvbox\@tempboxa
463       \vskip-\dblfloatsep
464       \dblfigrule
465       \vskip\dbltextfloatsep
466       \box\@outputbox}%
467     \let\@elt\relax\xdef\@freelist{\@freelist\@dbltoplist}%
468     \global\let\@dbltoplist\@empty
469   \fi
470   \ifx\@dblbotlist\@empty
471   \else
472     \let\@elt\@comdblflelt\setbox\@tempboxa\vbox{}\@dblbotlist
473     \setbox\@outputbox\vbox{\boxmaxdepth\maxdepth
474       \box\@outputbox
475       \vskip\dbltextfloatsep
476       \dblfigrule
477       \unvbox\@tempboxa
478       \vskip-\dblfloatsep
479       }%
480     \let\@elt\relax\xdef\@freelist{\@freelist\@dblbotlist}%
481     \global\let\@dblbotlist\@empty
482   \fi
483   \global\setbox\@outputbox\vbox to\textheight{\unvbox\@outputbox}%
484 }
```

1.6   Output of two columns

\if@balance   Flag indicating whether the left and right columns are to be balanced.

```
485 \newif\if@balance  \@balancefalse
```

\@outputdblcol   Concatenate left and right columns and output them by \@outputdblcol. In this package, a routine for equally dividing the left and right columns has been added.

```
486 \newbox\@combinebox
```

Just store the assembled left column in \@leftcolumn, do not output it yet.

```
487 \def\@outputdblcol{%
488   \if@firstcolumn
489     \global\@firstcolumnfalse
490     \global\setbox\@leftcolumn\box\@outputbox
491     \@colht\textheight
492     \@chkdblfloatht\global\advance\@colht-\@floatht
493   \else
494     \global\@firstcolumntrue
```

Here starts the code that balances the left and right columns.

```
495    \if@balance
496      \@tempdima\baselineskip
497      \advance\@tempdima-\topskip
498      \setbox\@combinebox=\vbox{%
499          \unvbox\@leftcolumn\vskip\@tempdima\unvbox\@outputbox}%
500      \@tempdima\ht\@combinebox
501      \advance\@tempdima\dp\@combinebox
502      \divide\@tempdima\tw@
503      \vbadness=\@M \splittopskip=\topskip \splitmaxdepth=\maxdepth
504      \setbox\@leftcolumn=\vsplit\@combinebox to\@tempdima
505      \setbox\@outputbox=\vtop{\unvbox\@combinebox}
506      \setbox\@leftcolumn=\vtop{\unvbox\@leftcolumn}
507    \fi
```

Format it.

```
508      \@tempdima\ht\@leftcolumn
509      \setbox\@outputbox\vbox to\@tempdima{%
510        \hb@xt@\textwidth{%
511          \hb@xt@\columnwidth{%
512            \vbox to\@tempdima{\box\@leftcolumn\vss}\hss}%
513          \hfil
514          \vrule width\columnseprule
515          \hfil
516          \hb@xt@\columnwidth{%
517            \vbox to\@tempdima{\box\@outputbox\vss}\hss}%
518        }%
519        \vss
520      }%
521      \@combinedblfloats
522      \@outputpage
523      \begingroup
524        \@dblfloatplacement
525        \@startdblcolumn
526        \@whilesw\if@fcolmade \fi{\@outputpage\@startdblcolumn}%
527      \endgroup
528    \fi
529    \global\@balancefalse
530 }
```

\@startdblcolumn   When starting a two-column page, output a float that has not yet been output. They are output by \@addtonextcol via \@sdblcolelt. In this package, update the height of the column by subtracting the height of the float from \textheight.

```
531 \def\@startdblcolumn{%
532    \global\@colht\textheight
533    \@tryfcolumn\@dbldeferlist
534    \if@fcolmade
535    \else
536      \begingroup
```

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```
537        \let\reserved@b\@dbldeferlist
538        \global\let\@dbldeferlist\@empty
539        \let\@elt\@sdblcolelt
540        \reserved@b
541      \endgroup
542    \fi
543    \@chkdblfloatht
544    \global\advance\@colht-\@floatht
545 }
```

\@doclearpage   Redefine \@doclearpage to initialize output float list.

```
546 \def\@doclearpage{%
547   \ifvoid\footins
548     \setbox\@tempboxa\vsplit\@cclv to\z@ \unvbox\@tempboxa
549     \setbox\@tempboxa\box\@cclv
550     \xdef\@deferlist{%
551       \L@toplist\R@toplist\L@botlist\R@botlist\@deferlist}%
552     \global\let\L@toplist\@empty % changed from \@toplist
553     \global\let\R@toplist\@empty % added
554     \global\let\L@botlist\@empty % changed from \@botlist
555     \global\let\R@botlist\@empty % added
556     \global\@colroom\@colht
557     \ifx\@currlist\@empty
558     \else
559       \@latexerr{Float(s) lost}\@ehb
560         \global\let\@currlist\@empty
561     \fi
562     \@makefcolumn\@deferlist
563     \@whilesw\if@fcolmade \fi{\@opcol\@makefcolumn\@deferlist}%
564     \if@twocolumn
565       \if@firstcolumn
566         % added \@dblbotlist
567         \xdef\@dbldeferlist{\@dbltoplist\@dblbotlist\@dbldeferlist}%
568         \global\let\@dbltoplist\@empty
569         \global\let\@dblbotlist\@empty % added
570         \global\@colht\textheight
571         \begingroup
572           \@dblfloatplacement
573           \@makefcolumn\@dbldeferlist
574           \@whilesw\if@fcolmade \fi{\@outputpage
575                                     \@makefcolumn\@dbldeferlist}%
576         \endgroup
577       \else
578         \vbox{}\clearpage
579       \fi
580     \fi
581   \else
582     \setbox\@cclv\vbox{\box\@cclv\vfil}%
583     \@makecol\@opcol
584     \clearpage
```

```
585    \fi
586 }
```

\@topnewpage   Redefine \@topnewpage to initialize \@dblbotroom and dblbotnumber.

```
587 \long\def\@topnewpage[#1]{%
588   %\@nodocument
589   \@next\@currbox\@freelist{}{}%
590   \global\setbox\@currbox
591     \color@vbox
592       \normalcolor
593       \vbox{\hsize\textwidth
594           \@parboxrestore
595           \col@number\@ne
596           #1%
597           \vskip-\dbltextfloatsep}%
598     \color@endbox
599   \ifdim\ht\@currbox>\textheight
600     \ht\@currbox\textheight
601   \fi
602   \global\count\@currbox\tw@
603   \@tempdima-\ht\@currbox
604   \advance\@tempdima-\dbltextfloatsep
605   \global\advance\@colht\@tempdima
606   \ifx\@dbltoplist\@empty
607   \else
608     \@latexerr{Float(s) lost}\@ehb
609     \let\@dbltoplist\@empty
610   \fi
611   \@cons\@dbltoplist\@currbox
612   \global\@dbltopnum\m@ne
613   \global\@dblbotnum\m@ne % added
614   \ifdim\@colht<2.5\baselineskip
615     \@latex@warning@no@line {Optional argument of \noexpand\twocolumn
616         too tall on page \thepage}%
617     \@emptycol
618     \if@firstcolumn
619     \else
620       \@emptycol
621     \fi
622   \else
623     \global\vsize\@colht
624     \global\@colroom\@colht
625     \@floatplacement
626   \fi
627   %\global\@dbltoproom\maxdimen
628   %\global\@dblbotroom\maxdimen
629   %\@addtodblcol
630 }
```

\balancenewpage   Macro for evenly dividing text and outputting it. However, when using this macro,
\balanceclearpage

`\newpage` or `\clearpage` are not allowed on the current page.

```
631 \def\balancenewpage{\par\vfil\global\@balancetrue\penalty-\@M}
632 \def\balanceclearpage{\balancenewpage
633     \write\m@ne{}\vbox{}\global\@balancetrue\penalty-\@Mi}
634 \endinput
635 ⟨/core⟩
```