

# The `resizegather` package

Heiko Oberdiek  
<heiko.oberdiek at googlemail.com>

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## Abstract

Equations that are too large are resized to fit the available space. The environment `gather` of package `amsmath` is supported. Also the environments `equation` and `displaymath` are redefined using `gather` and its starred version.

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## 1 Documentation

Sometimes an equation is just a little too large to fit in the line. And breaking the equation across lines might be worse than downscaling the equation. This package implements this for the environments `gather` and `gather*` of package `amsmath`. That package already measures the equations and simplifies the implementation of `resizegather` that only needs to hook into `amsmath`'s code to add the resizing feature.

Resized equations are recorded in the `..log` file for small exceeds (default setting is smaller than five percent). Otherwise a warning is given.

Also environments `equation` and `displaymath` are supported by redefining them using `gather` and `gather*`.

`\[` and `\]` are not supported, because these macros are not in environment form that is required for `amsmath`. The environment body is collected first to be able to process the body twice for measuring first.

Also the environments using alignments are not supported. If a single equation line would be resized, the alignment would get lost. And resizing all equations of the alignment does not seem appropriate either.

## 1.1 Options

**warningthreshold:** Print a warning if the original equation line exceeds its available width by the given fraction. Default is 0.05: A warning is given if the equation is too large by five percent. Otherwise the exceed is recorded in the `..log` file only.

The next options are boolean options. They are enabled by value `true` or if no value is given. They are switched off by value `false`.

**enable:** The resize feature is active (default).

**disable:** The complementary option for `enable`, added for convenience: `disable` (or `disable=true`) is the same as `enable=false`.

**equations:** L<sup>A</sup>T<sub>E</sub>X environments `equation` and `displaymath` environments are redefined. These equations are now using environment `gather` and `gather*`. This is the default.

The following table shows additional options if you want to have finer control for the redefined environments:

| Option                   | Environments          |                          |
|--------------------------|-----------------------|--------------------------|
|                          | <code>equation</code> | <code>displaymath</code> |
| <code>equations</code>   | <code>gather</code>   | <code>gather*</code>     |
| <code>equation</code>    | <code>gather</code>   | <i>unchanged</i>         |
| <code>displaymath</code> | <i>unchanged</i>      | <code>gather*</code>     |

If such an option is switched off, the original meaning of the affected environments is restored.

Options are evaluated in the following order:

1. Configuration file `resizegather.cfg` using `\resizegathersetup` if the file exists.
2. Package options given for `\usepackage`.
3. Later calls of `\resizegathersetup`.

`\resizegathersetup{<option list>}`

The options are key value options. Boolean options are enabled by default (without value) or by using the explicit value `true`. Value `false` disable the option.

## 1.2 Options for packages `amsmath` or `graphics`

The package loads the package `amsmath` because it internally measures the equations first. Thus this package hooks into this code in order to resize the equations if they are too large. The resizing itself is done by `\resizebox` of package `graphics`. If you need special options for these packages, just load them first or use global options when appropriate. Example:

```
\usepackage[dvipdfm]{graphicx}% or graphics
\usepackage[fleqn]{amsmath}
\usepackage{resizegather}
```

## 2 Implementation

```

1 (*package)
Reload check, especially if the package is not used with LATEX.
2 \begingroup\catcode61\catcode48\catcode32=10\relax%
3 \catcode13=5 % ^~M
4 \endlinechar=13 %
5 \catcode35=6 % #
6 \catcode39=12 % '
7 \catcode44=12 % ,
8 \catcode45=12 % -
9 \catcode46=12 % .
10 \catcode58=12 % :
11 \catcode64=11 % @
12 \catcode123=1 % {
13 \catcode125=2 % }
14 \expandafter\let\expandafter\x\csname ver@resizgather.sty\endcsname
15 \ifx\x\relax % plain-TeX, first loading
16 \else
17 \def\empty{}%
18 \ifx\x\empty % LaTeX, first loading,
19 % variable is initialized, but \ProvidesPackage not yet seen
20 \else
21 \expandafter\ifx\csname PackageInfo\endcsname\relax
22 \def\x#1#2{%
23 \immediate\write-1{Package #1 Info: #2.}%
24 }%
25 \else
26 \def\x#1#2{\PackageInfo{#1}{#2, stopped}}%
27 \fi
28 \x{resizgather}{The package is already loaded}%
29 \aftergroup\endinput
30 \fi
31 \fi
32 \endgroup%
Package identification:
33 \begingroup\catcode61\catcode48\catcode32=10\relax%
34 \catcode13=5 % ^~M
35 \endlinechar=13 %
36 \catcode35=6 % #
37 \catcode39=12 % '
38 \catcode40=12 % (
39 \catcode41=12 % )
40 \catcode44=12 % ,
41 \catcode45=12 % -
42 \catcode46=12 % .
43 \catcode47=12 % /
44 \catcode58=12 % :
45 \catcode64=11 % @
46 \catcode91=12 % [
47 \catcode93=12 % ]
48 \catcode123=1 % {
49 \catcode125=2 % }
50 \expandafter\ifx\csname ProvidesPackage\endcsname\relax
51 \def\x#1#2#3[#4]{\endgroup
52 \immediate\write-1{Package: #3 #4}%
53 \xdef#1{#4}%
54 }%
55 \else
56 \def\x#1#2[#3]{\endgroup
57 #2[#{#3}]%
58 \ifx#1\@undefined

```

```

59      \xdef#1{#3}%
60      \fi
61      \ifx#1\relax
62      \xdef#1{#3}%
63      \fi
64  }%
65  \fi
66  \expandafter\x\csname ver@resizegather.sty\endcsname
67  \ProvidesPackage{resizegather}%
68  [2010/03/01 v1.2 Automatically resizing of too large equations (HO)]%
69  \begingroup\catcode61\catcode48\catcode32=10\relax%
70  \catcode13=5 % ^~M
71  \endlinechar=13 %
72  \catcode123=1 % {
73  \catcode125=2 % }
74  \catcode64=11 % @
75  \def\x{\endgroup
76    \expandafter\edef\csname ResizeGather@AtEnd\endcsname{%
77      \endlinechar=\the\endlinechar\relax
78      \catcode13=\the\catcode13\relax
79      \catcode32=\the\catcode32\relax
80      \catcode35=\the\catcode35\relax
81      \catcode61=\the\catcode61\relax
82      \catcode64=\the\catcode64\relax
83      \catcode123=\the\catcode123\relax
84      \catcode125=\the\catcode125\relax
85    }%
86  }%
87  \x\catcode61\catcode48\catcode32=10\relax%
88  \catcode13=5 % ^~M
89  \endlinechar=13 %
90  \catcode35=6 % #
91  \catcode64=11 % @
92  \catcode123=1 % {
93  \catcode125=2 % }
94  \def\TMP@EnsureCode#1#2{%
95    \edef\ResizeGather@AtEnd{%
96      \ResizeGather@AtEnd
97      \catcode#1=\the\catcode#1\relax
98    }%
99    \catcode#1=#2\relax
100 }
101 \TMP@EnsureCode{10}{12}% ^~J
102 \TMP@EnsureCode{33}{12}% !
103 \TMP@EnsureCode{36}{3}% $
104 \TMP@EnsureCode{38}{4}% &
105 \TMP@EnsureCode{39}{12}% '
106 \TMP@EnsureCode{40}{12}% (
107 \TMP@EnsureCode{41}{12}% )
108 \TMP@EnsureCode{42}{12}% *
109 \TMP@EnsureCode{43}{12}% +
110 \TMP@EnsureCode{44}{12}% ,
111 \TMP@EnsureCode{45}{12}% -
112 \TMP@EnsureCode{46}{12}% .
113 \TMP@EnsureCode{47}{12}% /
114 \TMP@EnsureCode{58}{12}% :
115 \TMP@EnsureCode{59}{12}% ;
116 \TMP@EnsureCode{60}{12}% <
117 \TMP@EnsureCode{62}{12}% >
118 \TMP@EnsureCode{63}{12}% ?
119 \TMP@EnsureCode{91}{12}% [
120 \TMP@EnsureCode{93}{12}% ]

```

```

121 \TMP@EnsureCode{94}{7}% ^ (superscript)
122 \TMP@EnsureCode{96}{12}% '
123 \edef\ResizeGather@AtEnd{\ResizeGather@AtEnd\noexpand\endinput}
124 \RequirePackage{kvoptions}[2009/12/04]
125 \SetupKeyvalOptions{%
126   family=resizgather,%
127   prefix=ResizeGather@,%
128 }
129 \@for\ResizeGather@option:=%
130   centertags,%
131   tbtags,%
132   sumlimits,%
133   nosumlimits,%
134   intlimits,%
135   nointlimits,%
136   nonamelimits,%
137   leqno,%
138   reqno,%
139   fleqn%
140 \do{%
141   \edef\ResizeGather@temp{%
142     \noexpand\DeclareVoidOption{\ResizeGather@option}{%
143       \noexpand\PassOptionsToPackage{amsmath}{\ResizeGather@option}%
144     }%
145     \noexpand\AtEndOfPackage{%
146       \noexpand\DisableKeyvalOption[%
147         action=error,%
148         package=resizgather,%
149       ]{resizgather}{\ResizeGather@option}%
150     }%
151   }%
152   \ResizeGather@temp
153 }
154 \@for\ResizeGather@option:=%
155   draft,%
156   final,%
157   hiderotate,%
158   hidescale,%
159   hiresbb,%
160   demo,%
161   dvips,xdvi,dvipdf,dvipdfm,dvipdfmx,pdftex,dvipsone,%
162   dviwindo,emtex,dviwin,pctexp,pctexwin,pctexhp,pctex32,%
163   truetex,tcidvi,vtex,oztex,textures,xetex%
164 \do{%
165   \edef\ResizeGather@temp{%
166     \noexpand\DeclareVoidOption{\ResizeGather@option}{%
167       \noexpand\PassOptionsToPackage{graphics}{\ResizeGather@option}%
168     }%
169     \noexpand\AtEndOfPackage{%
170       \noexpand\DisableKeyvalOption[%
171         action=error,%
172         package=resizgather,%
173       ]{resizgather}{\ResizeGather@option}%
174     }%
175   }%
176   \ResizeGather@temp
177 }
178 \DeclareBoolOption[true]{enable}
179 \DeclareComplementaryOption{disable}{enable}
180 \DeclareStringOption[.05]{warningthreshold}
181 \newif\ifResizeGather@NeedInit
182 \DeclareBoolOption[true]{equations}

```

```

183 \DeclareBoolOption[true]{equation}
184 \DeclareBoolOption[true]{displaymath}
185 \AddToKeyvalOption*{equations}{%
186   \ResizeGather@NeedInittrue
187   \ifResizeGather@equations
188     \ResizeGather@equationtrue
189     \ResizeGather@displaymathtrue
190   \else
191     \ResizeGather@equationfalse
192     \ResizeGather@displaymathfalse
193   \fi
194 }
195 \AddToKeyvalOption*{equation}{%
196   \ResizeGather@NeedInittrue
197 }
198 \AddToKeyvalOption*{displaymath}{%
199   \ResizeGather@NeedInittrue
200 }

```

`\resizegathersetup`

```

201 \newcommand*{\resizegathersetup}[1]{%
202   \ResizeGather@NeedInitfalse
203   \setkeys{resizegather}{#1}%
204   \ifResizeGather@NeedInit
205     \ResizeGather@init
206   \fi
207 }
208 \let\ResizeGather@init\relax

209 \InputIfFileExists{resizegather.cfg}{-}{-}%
210 \ProcessKeyvalOptions*\relax

211 \RequirePackage{amsmath}
212 \RequirePackage{graphics}

```

`\ResizeGather@redefine`

```

213 \def\ResizeGather@redefine#1#2#3#4#5{%
214   \csname ifResizeGather@#1\endcsname
215   \@ifundefined{ResizeGather@org@#2}{%
216     \expandafter\let\csname ResizeGather@org@#2\expandafter\endcsname
217       \csname #2\endcsname
218   }{%
219     \@ifundefined{ResizeGather@org@#3}{%
220       \expandafter\let\csname ResizeGather@org@#3\expandafter\endcsname
221         \csname #3\endcsname
222     }{%
223       \expandafter\edef\csname #2\endcsname{%
224         \expandafter\noexpand\csname#4\endcsname
225       }%
226       \expandafter\edef\csname #3\endcsname{%
227         \expandafter\noexpand\csname#5\endcsname
228       }%
229     \else
230       \@ifundefined{ResizeGather@org@#2}{%
231         \expandafter\let\csname #2\expandafter\endcsname
232           \csname ResizeGather@org@#2\endcsname
233         \expandafter\let\csname #3\expandafter\endcsname
234           \csname ResizeGather@org@#3\endcsname
235       }%
236     \fi
237 }

```

`\ResizeGather@init`

```

238 \def\ResizeGather@init{%
239   \ResizeGather@redefine{equation}{equation}{endequation}%
240   {gather}{endgather}%
241   \ResizeGather@redefine{displaymath}{displaymath}{enddisplaymath}%
242   {gather*}{endgather*}%
243 }
244 \ResizeGather@init

```

\ResizeGather@ResizeGather

```

245 \def\ResizeGather@ResizeGather{%
246   \ifResizeGather@enable
247     \dimen@ \displaywidth
248     \if@fleqn
249       \advance\dimen@ -\@mathmargin
250     \fi
251     \ifdim\wdz@ > \dimen@
252       \begingroup
253         \advance\dimen@ -\wdz@
254         \dimen@ -\dimen@
255         \ifdim\ResizeGather@warningthreshold\wdz@ > \dimen@
256           \expandafter\PackageInfo
257         \else
258           \expandafter\PackageWarning
259         \fi
260         {resizegather}{%
261           Equation line \the\row@\space is too large %
262           by \the\dimen@\MessageBreak
263           in environment '@currentenv'%
264         }%
265       \endgroup
266       \setboxz@h to\dimen@{%
267         \resizebox{\dimen@}{!}{\boxz@}%
268         \hss
269       }%
270     \fi
271   \fi
272 }

```

\calc@shift@gather

```

273 \expandafter\def\expandafter\calc@shift@gather\expandafter{%
274   \expandafter\ResizeGather@ResizeGather
275   \calc@shift@gather
276 }

```

\ResizeGather@org@gmeasure@

```

277 \let\ResizeGather@org@gmeasure@\gmeasure@

```

\gmeasure@

```

278 \def\gmeasure@#1{%
279   \ResizeGather@org@gmeasure@{#1}%
280   \ifResizeGather@enable
281     \ifdim\totwidth@ > \displaywidth
282       \totwidth@ = \displaywidth
283     \fi
284   \fi
285 }

286 \ResizeGather@AtEnd%
287 </package>

```

## 3 Test

### 3.1 Catcode checks for loading

```
288 <*test1>
289 \catcode'\{=1 %
290 \catcode'\}=2 %
291 \catcode'\#=6 %
292 \catcode'\@=11 %
293 \expandafter\ifx\csname count@\endcsname\relax
294   \countdef\count@=255 %
295 \fi
296 \expandafter\ifx\csname @gobble\endcsname\relax
297   \long\def\@gobble#1{}%
298 \fi
299 \expandafter\ifx\csname @firstofone\endcsname\relax
300   \long\def\@firstofone#1{#1}%
301 \fi
302 \expandafter\ifx\csname loop\endcsname\relax
303   \expandafter\@firstofone
304 \else
305   \expandafter\@gobble
306 \fi
307 {%
308   \def\loop#1\repeat{%
309     \def\body{#1}%
310     \iterate
311   }%
312   \def\iterate{%
313     \body
314     \let\next\iterate
315   \else
316     \let\next\relax
317   \fi
318   \next
319 }%
320 \let\repeat=\fi
321 }%
322 \def\RestoreCatcodes{}
323 \count@=0 %
324 \loop
325   \edef\RestoreCatcodes{%
326     \RestoreCatcodes
327     \catcode\the\count@=\the\catcode\count@\relax
328   }%
329 \ifnum\count@<255 %
330   \advance\count@ 1 %
331 \repeat
332
333 \def\RangeCatcodeInvalid#1#2{%
334   \count@=#1\relax
335   \loop
336     \catcode\count@=15 %
337   \ifnum\count@<#2\relax
338     \advance\count@ 1 %
339   \repeat
340 }
341 \def\RangeCatcodeCheck#1#2#3{%
342   \count@=#1\relax
343   \loop
344     \ifnum#3=\catcode\count@
345     \else
```



```

346     \errmessage{%
347         Character \the\count@\space
348         with wrong catcode \the\catcode\count@\space
349         instead of \number#3%
350     }%
351     \fi
352     \ifnum\count@<#2\relax
353         \advance\count@ 1 %
354     \repeat
355 }
356 \def\space{ }
357 \expandafter\ifx\csname LoadCommand\endcsname\relax
358     \def\LoadCommand{\input resizgather.sty\relax}%
359 \fi
360 \def\Test{%
361     \RangeCatcodeInvalid{0}{47}%
362     \RangeCatcodeInvalid{58}{64}%
363     \RangeCatcodeInvalid{91}{96}%
364     \RangeCatcodeInvalid{123}{255}%
365     \catcode'\@=12 %
366     \catcode'\=0 %
367     \catcode'\%=14 %
368     \LoadCommand
369     \RangeCatcodeCheck{0}{36}{15}%
370     \RangeCatcodeCheck{37}{37}{14}%
371     \RangeCatcodeCheck{38}{47}{15}%
372     \RangeCatcodeCheck{48}{57}{12}%
373     \RangeCatcodeCheck{58}{63}{15}%
374     \RangeCatcodeCheck{64}{64}{12}%
375     \RangeCatcodeCheck{65}{90}{11}%
376     \RangeCatcodeCheck{91}{91}{15}%
377     \RangeCatcodeCheck{92}{92}{0}%
378     \RangeCatcodeCheck{93}{96}{15}%
379     \RangeCatcodeCheck{97}{122}{11}%
380     \RangeCatcodeCheck{123}{255}{15}%
381     \RestoreCatcodes
382 }
383 \Test
384 \csname @@end\endcsname
385 \end
386 </test1>

```

## 4 Installation

### 4.1 Download

**Package.** This package is available on CTAN<sup>1</sup>:

[CTAN:macros/latex/contrib/oberdiek/resizgather.dtx](#) The source file.

[CTAN:macros/latex/contrib/oberdiek/resizgather.pdf](#) Documentation.

**Bundle.** All the packages of the bundle ‘oberdiek’ are also available in a TDS compliant ZIP archive. There the packages are already unpacked and the documentation files are generated. The files and directories obey the TDS standard.

[CTAN:install/macros/latex/contrib/oberdiek.tds.zip](#)

TDS refers to the standard “A Directory Structure for T<sub>E</sub>X Files” ([CTAN:tds/tds.pdf](#)). Directories with `texmf` in their name are usually organized this way.

---

<sup>1</sup>[ftp://ftp.ctan.org/tex-archive/](http://ftp.ctan.org/tex-archive/)

## 4.2 Bundle installation

**Unpacking.** Unpack the `oberdiek.tds.zip` in the TDS tree (also known as `texmf` tree) of your choice. Example (linux):

```
unzip oberdiek.tds.zip -d ~/texmf
```

**Script installation.** Check the directory `TDS:scripts/oberdiek/` for scripts that need further installation steps. Package `attachfile2` comes with the Perl script `pdfatfi.pl` that should be installed in such a way that it can be called as `pdfatfi`. Example (linux):

```
chmod +x scripts/oberdiek/pdfatfi.pl
cp scripts/oberdiek/pdfatfi.pl /usr/local/bin/
```

## 4.3 Package installation

**Unpacking.** The `.dtx` file is a self-extracting `docstrip` archive. The files are extracted by running the `.dtx` through plain  $\mathrm{T}_{\mathrm{E}}\mathrm{X}$ :

```
tex resizegather.dtx
```

**TDS.** Now the different files must be moved into the different directories in your installation TDS tree (also known as `texmf` tree):

|  |   |
|--|---|
| <code>resizegather.sty</code>            | $\rightarrow$ <code>tex/latex/oberdiek/resizegather.sty</code>            |
| <code>resizegather.pdf</code>            | $\rightarrow$ <code>doc/latex/oberdiek/resizegather.pdf</code>            |
| <code>test/resizegather-test1.tex</code> | $\rightarrow$ <code>doc/latex/oberdiek/test/resizegather-test1.tex</code> |
| <code>resizegather.dtx</code>            | $\rightarrow$ <code>source/latex/oberdiek/resizegather.dtx</code>         |

If you have a `docstrip.cfg` that configures and enables `docstrip`'s TDS installing feature, then some files can already be in the right place, see the documentation of `docstrip`.

## 4.4 Refresh file name databases

If your  $\mathrm{T}_{\mathrm{E}}\mathrm{X}$  distribution (`te $\mathrm{T}_{\mathrm{E}}\mathrm{X}$` , `mik $\mathrm{T}_{\mathrm{E}}\mathrm{X}$` , ...) relies on file name databases, you must refresh these. For example, `te $\mathrm{T}_{\mathrm{E}}\mathrm{X}$`  users run `texhash` or `mktextlsr`.

## 4.5 Some details for the interested

**Attached source.** The PDF documentation on CTAN also includes the `.dtx` source file. It can be extracted by AcrobatReader 6 or higher. Another option is `pdftk`, e.g. unpack the file into the current directory:

```
pdftk resizegather.pdf unpack_files output .
```

**Unpacking with  $\mathrm{L}^{\mathrm{A}}\mathrm{T}_{\mathrm{E}}\mathrm{X}$ .** The `.dtx` chooses its action depending on the format:

**plain  $\mathrm{T}_{\mathrm{E}}\mathrm{X}$ :** Run `docstrip` and extract the files.

**$\mathrm{L}^{\mathrm{A}}\mathrm{T}_{\mathrm{E}}\mathrm{X}$ :** Generate the documentation.

If you insist on using  $\mathrm{L}^{\mathrm{A}}\mathrm{T}_{\mathrm{E}}\mathrm{X}$  for `docstrip` (really, `docstrip` does not need  $\mathrm{L}^{\mathrm{A}}\mathrm{T}_{\mathrm{E}}\mathrm{X}$ ), then inform the autodetect routine about your intention:

```
latex \let\install=y\input{resizegather.dtx}
```

Do not forget to quote the argument according to the demands of your shell.

**Generating the documentation.** You can use both the `.dtx` or the `.drv` to generate the documentation. The process can be configured by the configuration file `ltxdoc.cfg`. For instance, put this line into this file, if you want to have A4 as paper format:

```
\PassOptionsToClass{a4paper}{article}
```

An example follows how to generate the documentation with pdfL<sup>A</sup>T<sub>E</sub>X:

```
pdflatex resizegather.dtx
makeindex -s gind.ist resizegather.idx
pdflatex resizegather.dtx
makeindex -s gind.ist resizegather.idx
pdflatex resizegather.dtx
```

## 5 Acknowledgement

**Dieter Jurzitza:** He wanted the resizing feature at the T<sub>E</sub>X table in Karlsruhe of December 2009. Thus this package is a kind of Christmas present.

## 6 History

[2009/12/04 v1.0]

- The first version.

[2009/12/05 v1.1]

- Options enable and disable added.

[2010/03/01 v1.2]

- TDS location moved from ‘generic’ to ‘latex’.

## 7 Index

Numbers written in *italic* refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; plain numbers refer to the code lines where the entry is used.

| Symbols            |                         |                    |  |
|--------------------|-------------------------|--------------------|--|
| \#                 | 291                     | \AtEndOfPackage    | 145, 169   |
| \%                 | 367                     | <b>B</b>           |  |
| \@                 | 292, 365                | \body              | 309, 313   |
| \@currentvir       | 263                     | \boxz@             | 267  |
| \@firstofone       | 300, 303                | <b>C</b>           |  |
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