

Numbering individual lines of equation array's

Johannes Braams
T_EXniek
The Netherlands
Internet: texniek at texniek.nl

2026/01/02

This package defines the `subeqnarray` and `subeqnarray*` environments, which behave like the equivalent `eqnarray` and `eqnarray*` environments, except that the individual lines are numbered like 1a, 1b, 1c, etc.

To refer to these numbers an extra label command `\slabel` has been defined. Many of this code was taken from `latex.tex` and modified for this purpose.

1 Initial Code

`\c@subequation` We need to allocate a new counter for the `subequation` environment. It is reset by the `equation` counter.

```
1 \*package
2 \newcounter{subequation}[equation]
```

`\thesubequation` The representation of the counter `subequation` includes the `equation` counter.

```
3 \def\thesubequation{\theequation\alph{subequation}}
```

2 Option Handling

The standard L^AT_EX options `leqno` and `fleqn` are recognised by this package.

```
4 %
5 %   When \Lopt{leqno} is used the equation numbers should appear on
6 %   the left side of the equation. The numbers are generated by
7 %   |\@subeqnnum| which needs a different definition to achieve this
8 %   effect.
9 %   \begin{macrocode}
10 \DeclareOption{leqno}{%
11   \def\@subeqnnum{\hbox to .01\p@{\rlap{\reset@font\rmfamily
12     \hskip -\displaywidth(\thesubequation)}}}
```

The default definition of `\@subeqnnum`.

```
13 \DeclareOption{reqno}{%
14   \def\@subeqnnum{\reset@font\rmfamily (\thesubequation)}}}
```

When the option `fleqn` is used, the equations have to be printed flush left, with an indent of `\mathindent`; the equations are separated from the surrounding

text by `\topsep` (plus `\partopsep` if necessary) and the width of the display is `\linewidth`.

```

15 \DeclareOption{fleqn}{%
16   \def\subeqn@start{%
17     \tabskip\mathindent
18     \abovedisplayskip\topsep
19     \ifvmode\advance\abovedisplayskip\partopsep\fi
20     \belowdisplayskip\abovedisplayskip
21     \belowdisplayshortskip\abovedisplayskip
22     \abovedisplayshortskip\abovedisplayskip
23     $$\everycr{}\halign to \linewidth}}% $$

```

The default will be to have displayed equations to the width of `\displaywidth`.

```

24 \DeclareOption{deqn}{%
25   \def\subeqn@start{%
26     \tabskip\@centering
27     $$\everycr{}\halign to \displaywidth}}% $$

```

We don't support any other options

```

28 \DeclareOption*{\OptionNotUsed}

```

3 Executing Options

Make sure the `\@eqnnum` is defined by specifying `reqno` as a default option. Specifying `deqn` as a default option defines `\subeqn@start`.

```

29 \ExecuteOptions{reqno,deqn}

```

Now see if the user specified any options.

```

30 \ProcessOptions

```

4 The main code

`\slabel` A new label command to refer to subequations. It works like the `\label` command and was taken from `latex.ltx`.

`\slabel{F00}` writes the following on file `\@auxout`:

```

\slabel{F00}{\eval{\@currentlabel}}{\eval{\thepage}}

```

```

31 \newcommand\slabel[1]{%
32   \@bsphack
33   \if@filesw
34     {\let\thepage\relax
35     \def\protect{\noexpand\noexpand\noexpand}%
36     \edef\@tempa{\write\@auxout{\string
37       \newlabel{#1}{\thesubequation}{\thepage}}}%
38     \expandafter\@tempa
39     \if@nobreak \ifvmode\nobreak\fi\fi
40   \fi\@esphack}

```

`subeqnarray` (*env.*) The `subeqnarray` environment steps the equation counter, sets the subequation counter equal to 1 and behaves much like the `eqnarray` environment. Note the `\@currentlabel` is defined to use the equation counter. This is done so that an entire array can be referred to using the value of the equation counter. Hence the need for the `\slabel` command.

```

41 \newenvironment{subeqnarray}%
42   {\stepcounter{equation}%
43    \def\@currentlabel{\p@equation\theequation}%
44    \global\c@subequation\@ne
45    \global\@eqnswtrue\m@th
46    \global\@eqcnt\z@\let\\\@subeqnocr
47    \subeqn@start
48    \bgroup\hskip\@centering
49    $\displaystyle\tabskip\z@skip{##}$\@eqnset
50    &\global\@eqcnt\@ne \hskip \tw@arraycolsep \hfil${##}$\hfil
51    &\global\@eqcnt\tw@ \hskip \tw@arraycolsep
52    $\displaystyle{##}$\hfil \tabskip\@centering
53    &\global\@eqcnt\thr@@
54    \hbox to\z@\bgroup\hss#\egroup\tabskip\z@skip\cr}
55   {\@subeqnocr\egroup $$\global\@ignoretrue}

```

`\@subeqnocr` These macros handle the user command `\\`; they are adapted from the ones used or the `eqnarray` environment.

First the presence of a `*` detected and the right penalty selected.

```

56 \def\@subeqnocr{\ifnum0='}\fi\@ifstar{\global\@eqpen\@M
57   \@subeqnocr}{\global\@eqpen\interdisplaylinepenalty \@subeqnocr}}

```

`@ysubeqnocr` This macro is called by `\@subeqnocr` and checks if the user requested any extra vertical space. It calls `\@xsubeqnocr` with the wanted amount of space as its argument.

```

58 \def\@ysubeqnocr{\@ifnextchar [{\@xsubeqnocr}{\@xsubeqnocr[\z@skip]}}

```

`\@xsubeqnocr` This macro calls `\@@subeqnocr` to put in extra `&`'s if needed, generating an error if the number of columns is too large. Then the penalty selected earlier and the white space requested are inserted.

```

59 \def\@xsubeqnocr[#1]{\ifnum0='{ \fi}\@@subeqnocr
60   \noalign{\penalty\@eqpen\vskip\jot\vskip #1\relax}}

```

`\@@subeqnocr` Check the number of columns, and insert extra `&` if needed. If there appear to be more than 3 columns an error is signalled.

```

61 \def\@@subeqnocr{\let\@tempa\relax
62   \ifcase\@eqcnt \def\@tempa{& & &}\or \def\@tempa{& &}
63   \or \def\@tempa{&}\else
64     \let\@tempa\@empty
65     \@latexerr{Too many columns in subeqnarray environment}\@ehc\fi
66   \@tempa \if@eqnsw\@subeqnnum\refstepcounter{subequation}\fi
67   \global\@eqnswtrue\global\@eqcnt\z@\cr}

```

`subeqnarray*` (*env.*) This environment is basically the same as the `eqnarray` environment, but it is provided just or completeness.

```

68 \newenvironment{subeqnarray*}%
69   {\def\@subeqnocr{\nonumber\@ssubeqnocr}\subeqnarray}
70   {\global\advance\c@equation\m@ne\nonumber\endsubeqnarray}

```

`\@ssubeqnocr` This is used in the `esubqarray*` environment.

```

71 \let\@ssubeqnocr\@subeqnocr
72 \end{package}

```

5 An example of the use of this package

When you run the following document through L^AT_EX you will see the difference between the `subeqnarray` and `eqnarray` environments.

```

73 (*sample)
74 \documentclass[fleqn]{article}
75 \usepackage{subeqnarray}
76 \begin{document}
77 \title{Sample subeqnarray}
78 \author{Johannes L. Braams}
79 \date{\today}
80 \maketitle
81
82 This document shows an example of the use of the \emph{subeqnarray}
83 environment. Here is one:
84 \begin{subeqnarray}
85 \label{eqw}
86 \slabel{eq0}
87 x &= & a \times b \\
88 \slabel{eq1}
89 &= & z + t \\
90 \slabel{eq2}
91 &= & z + t
92 \end{subeqnarray}
93 The first equation is number~\ref{eq0}, the last is~\ref{eq2}. The
94 equation as a whole can be referred to as equation~\ref{eqw}.
95
96 To show that equation numbers behave normally, here's an
97 \emph{eqnarray} environment.
98 \begin{eqnarray}
99 \label{eq10}
100 x &= & a \times b \\
101 \label{eq11}
102 &= & z + t \\
103 \label{eq12}
104 &= & z + t
105 \end{eqnarray}
106
107 These are equations~\ref{eq10},~\ref{eq11} and~\ref{eq12}.
108 \end{document}
109 (/sample)

```

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; numbers in roman refer to the code lines where the entry is used.

Symbols		
<code>\@subeqncr</code> .. 55, 59, <u>61</u>	<code>\c@subequation</code> ... <u>1</u> , 44	<code>\ifcase</code> 62
<code>\@M</code> 56	<code>\cr</code> 54, 67	<code>\ifnum</code> 56, 59
<code>\@auxout</code> 36		<code>\ifvmode</code> 19, 39
<code>\@bsphack</code> 32	D	<code>\interdisplaylinepenalty</code> 57
<code>\@centering</code> .. 26, 48, <u>52</u>	<code>\date</code> 79	
<code>\@currentlabel</code> 43	<code>\DeclareOption</code> 10, 13, 15, 24, 28	J
<code>\@ehc</code> 65	<code>\def</code> 3, 11, 14, 16, 25, 35, 43, 56, 58, 59, 61, 62, 63, 69	<code>\jot</code> 60
<code>\@empty</code> 64	<code>\displaystyle</code> ... 49, 52	L
<code>\@eqcnt</code> 46, 50, 51, 53, 62, 67	<code>\displaywidth</code> ... 12, 27	<code>\label</code> .. 85, 99, 101, 103
<code>\@eqnsw</code> 49	<code>\documentclass</code> 74	<code>\let</code> ... 34, 46, 61, 64, 71
<code>\@eqnswtrue</code> 45, 67		<code>\linewidth</code> 23
<code>\@eqpen</code> 56, 57, 60	E	<code>\Lopt</code> 5
<code>\@esphack</code> 40	<code>\edef</code> 36	M
<code>\@ifnextchar</code> 58	<code>\egroup</code> 54, 55	<code>\m@ne</code> 70
<code>\@ifstar</code> 56	<code>\else</code> 63	<code>\m@th</code> 45
<code>\@ignoretrue</code> 55	<code>\emph</code> 82, 97	<code>\maketitle</code> 80
<code>\@latexerr</code> 65	<code>\end</code> 92, 105, 108	<code>\mathindent</code> 17
<code>\@ne</code> 44, 50	<code>\endsubeqnarray</code> ... 70	N
<code>\@ssubeqncr</code> 69, <u>71</u>	environments:	<code>\newcommand</code> 31
<code>\@subeqncr</code> 46, 56, 69, 71	<code>subeqnarray</code> <u>41</u>	<code>\newcounter</code> 2
<code>\@subeqnnum</code> 7, 11, 14, 66	<code>subeqnarray*</code> ... <u>68</u>	<code>\newenvironment</code> . 41, 68
<code>\@tempa</code> 36, 38, 61, 62, 63, 64, 66	<code>\everycr</code> 23, 27	<code>\newlabel</code> 37
<code>\@xsubeqncr</code> 58, <u>59</u>	<code>\ExecuteOptions</code> ... 29	<code>\noalign</code> 60
<code>\@ysubeqncr</code> .. 57, 58, 58	<code>\expandafter</code> 38	<code>\nobreak</code> 39
<code>\@</code> .. 46, 87, 89, 100, 102	F	<code>\noexpand</code> 35
	<code>\fi</code> 19, 39, 40, 56, 59, 65, 66	<code>\nonumber</code> 69, 70
A		O
<code>\abovedisplayskip</code> 22	G	<code>\OptionNotUsed</code> 28
<code>\abovedisplayskip</code> . .. 18, 19, 20, 21, 22	<code>\global</code> 44, 45, 46, 50, 51, 53, 55, 56, 57, 67, 70	<code>\or</code> 62, 63
<code>\advance</code> 19, 70		P
<code>\alph</code> 3	H	<code>\p@</code> 11
<code>\arraycolsep</code> 50, 51	<code>\halign</code> 23, 27	<code>\p@equation</code> 43
<code>\author</code> 78	<code>\hbox</code> 11, 54	<code>\partopsep</code> 19
B	<code>\hfil</code> 50, 52	<code>\penalty</code> 60
<code>\begin</code> 9, 76, 84, 98	<code>\hskip</code> ... 12, 48, 50, 51	<code>\ProcessOptions</code> ... 30
<code>\belowdisplayskip</code> 21	<code>\hss</code> 54	<code>\protect</code> 35
<code>\belowdisplayskip</code> . 20	I	R
<code>\bgroup</code> 48, 54	<code>\if@eqnsw</code> 66	<code>\ref</code> 93, 94, 107
C	<code>\if@files</code> 33	<code>\refstepcounter</code> ... 66
<code>\c@equation</code> 70	<code>\if@nobreak</code> 39	<code>\relax</code> 34, 60, 61
		<code>\reset@font</code> 11, 14
		<code>\rlap</code> 11

<code>\rmfamily</code>	11, 14	T	U
		<code>\tabskip</code> 17, 26, 49, 52, 54	<code>\usepackage</code> 75
S		<code>\theequation</code> 3, 43	
<code>\slabel</code>	31, 86, 88, 90	<code>\thepage</code> 34, 37	V
<code>\stepcounter</code>	42	<code>\thesubequation</code> 3, 12, 14, 37	<code>\vskip</code> 60
<code>\string</code>	36	<code>\thr@@</code> 53	W
<code>\subeqn@start</code> 16, 25, 47		<code>\times</code> 87, 100	<code>\write</code> 36
<code>\subeqnarray</code>	69	<code>\title</code> 77	Z
<code>subeqnarray</code> (env.)	41	<code>\today</code> 79	
<code>subeqnarray*</code> (env.)	68	<code>\topsep</code> 18	<code>\z@</code> 46, 54, 67
		<code>\tw@</code> 50, 51	<code>\z@skip</code> 49, 54, 58

Change History

1.1	General: Fixed bug in subeqnarray* environment	1
2.0	General: Added support for the fleqn option	1
	Added support for the leqno option	1
2.1	General: Upgrade for LaTeX2e	1
v2.1b	General: Changed licensing remarks to use LPPL	1