

Using the `mhequ` package

Martin Hairer

Version 1.71, March 9, 2022

This package provides two environments: `equ` for single-line equations and `equs` for multi-line equations. They behave similarly to the built-in `equation` and `amsmath`'s `align` environments and can essentially be used as drop-in replacements. The main difference is that equation numbers are handled differently: equations are numbered if and only if they have a `\label`, so there is no need for starred versions. This also applies to individual lines in a multiline equation. Also, the `equs` environment supports blocks of equation with more

Since `mhequ` redefines the `\tag` and `\intertext` commands, it should always be loaded *after* the `amsmath` package. However, these two commands should still behave correctly inside the `amsmath` environments. The rest of this document demonstrates the usage of the `mhequ` package, it is easiest to just read the source code of this document to see how it works. See also the description given at the start of the file `mhequ.sty`.

Here is a simple labelled equation:

$$e^{i\pi} + 1 = 0 . \tag{1}$$

Removing or adding the label does not require a change of environment:

$$e^{i\pi} + 1 = 0 .$$

However, if the option `numberall` is set, then every single equation is numbered. A simple list of equations can be displayed either with one number per equation

$$f(x) = \sin(x) + 1 , \tag{2}$$

$$h(x) = f(x) + g(x) - 3 , \tag{3}$$

$$f(x) = \sin(x) + 1 , \tag{4}$$

$$h(x) = f(x) + g(x) - 3 , \tag{5}$$

or with one number for the whole list

$$f(x) = \sin(x) + 1 , \tag{6}$$

$$h(x) = f(x) + g(x) - 3 .$$

Of course, it can also have no number at all:

$$f(x) = \sin(x) + 1 ,$$

$$h(x) = f(x) + g(x) - 3 .$$

The command `\minilab{label_name}` allows us to create a counter for the lines in a block of equations.

$$f(x) = \sin(x) + 1 , \tag{7a}$$

$$g(x) = \cos(x) - x^2 + 4, \quad (7b)$$

$$h(x) = f(x) + g(x) - 3. \quad (7c)$$

One can refer to the whole block (7) or to one line, like (7a) for example. It is possible to use any tag one likes with the `\tag{displayed_tag}` command

$$x = y, \quad (\star)$$

which in this case was used as `\tag{\$ \star \$}`. Such an equation can be referred to as usual: (\star) . Of course, `mhequ` can be used in conjunction with the usual `equation` environment, but `mhequ` is great, so why would you want to do this?

$$x = y + z \quad (8)$$

Typesetting several columns of equations is quite easy and doesn't require 10 different environments with awkward names:

$$x = y + z \quad a = b + c \quad x = v \quad (9)$$

$$x = y + z \quad a = b + c \quad x = u + 1 \quad (9')$$

$$\text{(multicol)} \quad x = y$$

$$a = b \quad \text{(multicol)}$$

$$x = y + z \quad a^2 = (b - c)^3 + y$$

and also (this is some `\intertext`)

$$x = y + z \quad a = (b + c)^2 - 5 \quad \ell = m \quad (10)$$

We can even extend the block (7) much later using the `\minilab{label_name}` command:

$$x = y + z \quad x = y + z \quad f(x) = b \quad (7d)$$

$$x = y + z \quad x = y + z \quad g(x) = b \quad (7e)$$

$$\sin^2 x + \cos^2 x = 1 \quad (7f)$$

It is possible to change the type of subnumbering and to use the `\text` command without having to load `amstext`:

$$I_1 = \int_a^b g(x) dx, \quad \text{(First equation)} \quad (11A)$$

$$I_2 = \int_a^b g(x^2 - 1) dx. \quad \text{(Second equation)} \quad (11B)$$