

# Chapter 1

## Creating documentation

This document provides an overview of how to prepare documentation for inclusion within `oomph-lib`.

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### 1.1 Setting up the documentation

#### 1.1.1 Makefiles

1. Within an appropriate subdirectory of the `doc` directory, create a directory for your documentation, e.g.  

```
cd doc/axisym_navier_stokes/  
mkdir spin_up
```
2. Add this new directory to the parent directory's `Makefile.am`
3. Add the entry `doc/axisym_navier_stokes/spin_up` to the file `config/configure.ac`↵  
`scripts/doc.dir_list`
4. Create a new `*.txt` file with the same name as the newly-created directory, e.g.  

```
touch spin_up.txt
```

This is the "source" file from which the documentation will be generated.

5. From an existing documentation directory, copy across the following files into the newly created directory:
  - `Makefile.am`
  - `Doxyfile`
6. In `Makefile.am` after `"docfile =",` add the stem of the `*.txt` file created in step 4, e.g.  

```
docfile = spin_up
```
7. In `Doxyfile` update the (relative) path to the demo-driver directory. Two entries must be updated, one following `"INPUT"` and the other following `"EXAMPLE_PATH"`. To find these, search for `"../.."`.
8. Return to `oomph-lib`'s top-level directory and re-run `autogen.sh`:  

```
./autogen.sh
```

#### 1.1.2 Figures

If your documentation is to contain figures or animations, the following subdirectories must be created within your documentation directory:

- `figures`
  - This must contain all figures used in the documentation in both `*.gif` and `*.eps` formats (`*.gif` is used for the `html` documentation whilst `*.eps` is used for `LaTeX`).
- `non_distfigures`
  - This contains any additional files (etc.) used to create or maintain the documentation. It is good practise to always keep any `*.lay` and `*.lpk` files that were used to create figures, along with any macro (`*.mcr`) files.

## 1.2 Writing the documentation

The "source" of the documentation is contained in the \*.txt file (a mixture of html/doxygen markup). The title must follow the tag `\mainpage` and be all on one line, e.g.

```
\mainpage Demo problem: Spin-up of a viscous fluid
```

The main body of the text just follows as in a LaTeX document, with line spacings indicating paragraph breaks.

### 1.2.1 HTML

Any standard html tags can be used (for example, `<hr>` inserts a horizontal line). Hyperlinks are inserted in the following way:

```
This is illustrated in an <A HREF="../../../figures/my_movie.avi">animation</A>.
```

Note that the `".."` is present in the path above because during the build process the documentation is created in subdirectories of the directory in which the source file is located. See the section [Generating the documentation](#) below for more details.

To link to the documentation of another demo driver, `poisson/one_d_poisson` for example, hyperlink to the `index.html` file within the `html` directory of that demo driver's documentation. Note that because the processed (html) version of the documentation you are working on will live in its own `html` subdirectory, it is necessary to go up three directories in order to be in `oomph-lib's doc` directory.

```
...see <A HREF="../../poisson/one_d_poisson/html/index.html">the
Poisson tutorial</A>.
```

### 1.2.2 Sections

Sections are created as follows:

```
\section section_label This is the title of my section
```

Likewise, subsections are created in the following way:

```
\subsection subsection_label This is the title of my subsection
```

Any LaTeX section types can be used in this way. To link to a section within a document, use the syntax `\ref section_label`, as in this example:

```
...can be found in the section \ref theory below.
```

### 1.2.3 Equations

Equations are generated as in LaTeX except `\f` must be added before `$` or `[, ]`.

- E.g. inline maths:  
...is given by `\f$ \sin(x) \f$`
- E.g. equation environment:  
`\f[`  
`\sin(x)`  
`\f]`

To label equations, the normal LaTeX system cannot be used. Instead, mark an equation with the tag `@E [ LABEL ] @` and refer to it later using `@R [ LABEL ] @`, e.g.

```
\f[
\nabla \cdot \mathbf{u} = 0 \ \ \ \ \ \ @E[eqn:cont]@
\f]
```

and then later on...

```
...is given by equation (@R[eqn:cont]@).
```

### 1.2.4 Lists

To create bullet point lists, precede each item with a `-`, e.g.

```
- First item
- Second item
```

To create enumerated lists, precede each item with a `-#`, e.g.

```
-# First item
-# Second item
```

### 1.2.5 Figures

A figure with the filename `my_figure.*` is inserted in the following way:

```
@I w 0.75\textwidth my_figure "This is the caption. "
```

Note the space between the last character in the caption and the quotation marks. Like the equation labelling, this line is processed by the `txt2h.sh` script (which is run automatically as part of the `make` process) and replaced with the necessary commands that tell `doxygen` to use the `*.gif` files for the html documentation and the `*.eps` files for the `LaTeX` documentation.

### 1.2.6 Code

To insert single words of code into prose, precede the word with a `\c`, e.g.

The function `\c FiniteElement::output(...)` is used to...

To include blocks of code such as the one immediately above this line of text, use the `\code` environment, e.g.

```
\code
for(unsigned i=0; i<10; i++) { cout << This is my sample code << endl; }
\endcode
```

To include sections of the demo code which you are documenting, e.g. the main function of `spin_up.cc`, use the following syntax:

```
\doinclude spin_up.cc
\skipline start_of_main
\until end of main
```

This only works if `start_of_main` exists somewhere in `spin_up.cc` file, but any word(s) can be used as a start/endpoint. However, **do not use dashes as targets** because more recent versions of `doxygen` get very confused by this, so **don't** do

```
\skipline ----
say.
```

### 1.2.7 Miscellaneous

- To tell `doxygen` to ignore everything in the source file below a certain point, denote this point with `@@END@@`.
- To tell `doxygen` that a certain section of the source file is only to be included in the html version of the documentation and omitted in the `LaTeX` version, enclose this section within `\htmlonly` and `\endhtmlonly` tags. CAREFUL: With recent version of `doxygen`, this has caused problems with certain commands not being interpreted correctly. Best not to use this... The following item is a work-around:
- Add the variable `suppress_latex_in_this_directory` to the `Makefile.am` and set it to 1 to bypass the generation of latex-based documentation for a specific directory (which may contain difficult to render tables etc. and therefore cause latex to hang...). Here's an example of a `Makefile.am` from the directory `doc/order_of_action_functions`:  

```
suppress_latex_in_this_directory=1

include $(top_srcdir)/config/makefile_templates/doc

docfile = order_of_action_functions
```
- To tell `doxygen` that a certain section of the source file is only to be included in the `LaTeX` version of the documentation and omitted in the html version, enclose this section within `\latexonly` and `\endlatexonly` tags.

## 1.3 Generating the documentation

Once the source file has been written, simply type `make` in the documentation directory to build the html and `LaTeX` versions, e.g.

```
cd doc/axisym_navier_stokes/spin_up
make
```

Two subdirectories, `html` and `latex`, are now created containing the two versions of the documentation. A `*.pdf` file of the `LaTeX` version is also placed in the current directory.

## 1.4 PDF file

A [pdf version](#) of this document is available.