CAAM 519: COMPUTATIONAL SCIENCE I
LATEX EXAMPLE 1.

LOÏC CAPPANERA

Abstract. Recently, I have been reading about optimal way to train neural ODEs from [1].

1. Tree of the article

An article starts with a section, then subsection (then subsubsection if required). A book start with chapters.

1.1. **Subsection.** This is my first subsection.

1.2. **Subsection.** This is my second subsection.

1.2.1. *Subsubsection.*
Hello this is a paragraph in a subsubsection.
Hello this is another paragraph.

1.2.2. *Subsubsection.* You do not need to use the command paragraph to write text.
Here is a new paragraph without using the paragrah command.

2. Citing scientific article or book

The Latex companion of Mittelbach et al[3]
The C programming language of Kernighan et al[2]
The C++ programming language of Stroustrup [4]

3. Include mathematics formulae

3.1. **Equations.** You can write mathematical formulae using $\$formula\$$ as follows: $a = b$.

It is possible to center the formulae.

$$a = b$$

$$a = b$$

Write an equation.

$$a = b \tag{1}$$

Write an equation that is longer than one line.

$$a + b + c + d + e + f + g + h + i + j + k + l + m + n - o - p - q - u - r - s - t - v - w - x - y = z. \tag{2}$$

Align multiple equations (see in comment how to remove the numbering of the equations).

$$a = b, \tag{3}$$

$$c = d. \tag{4}$$

To be able to label each aligned equations, use subequations as follows:

$$\partial_t \rho + \nabla\cdot\mathbf{m} = 0 \tag{5a}$$

$$\partial_t(\rho\mathbf{u}) + \nabla\cdot(\mathbf{m}\otimes\mathbf{u}) - \nabla\cdot(\eta\nabla(\mathbf{u})) + \nabla p = \mathbf{f}, \tag{5b}$$

$$\nabla\cdot\mathbf{u} = 0, \tag{5c}$$

3.2. **Tables.** Table can be used to contain tabular or array. The main difference is that an array is written in a mathematical mode (between $ sign).

Here is an array.

$Firstrow$	$\cos(e^x)$	$x_1 + x_2$
Second Row	a	b

TABLE 1. My first array

Here is a tabular.

First row	$\cos(e^x)$	$x_1 + x_2$
Second Row	a	b
Third row	c	d

TABLE 2. My first tabular

Here is a the block of code used to generate the table 2.

```
\begin{table}[h]
\begin{tabular}{|c|c|c|}
\hline
First row & $\cos(e^x)$ & $x_1+ x_2$ \\
\hline
Second Row & a & b \\
\hline
Third row &c  & d\\
\hline
\end{tabular}
\caption{My first tabular}
\label{tab:tabular}
\end{table}
```

Here is a tabular with multirow and multicolumn:

4. INCLUDE FIGURES

One figure

Four figures aligned horizontally using minipage and subcaption.

$\mathbf{L}^2$-norm of error			Velocity		Pressure	
	h	n_{df}	Error	Rate	Error	Rate
Test 1	0.1	270	2.22E-3	–	5.03E-4	–
	0.05	986	7.90E-4	1.60	2.14E-4	1.32
	0.025	3810	3.66E-4	1.14	1.04E-4	1.07
	0.0125	14993	1.82E-4	1.02	5.16E-5	1.02
	0.00625	59628	5.80E-5	1.65	1.65E-5	1.65
Test 2	0.1	270	1.20E-2	–	9.12E-2	–
	0.05	986	1.48E-3	2.99	3.88E-2	1.32
	0.025	3810	3.96E-4	1.96	1.43E-3	1.48
	0.0125	14993	1.77E-4	1.18	6.72E-3	1.10
	0.00625	59628	5.63E-5	1.66	2.14E-3	1.66

TABLE 3. Examples of table with multirow and multicolumn. h is hte mesh size qnd n_{df} the number of degree of freedom. Table from Cappanera et al 2017 (IJNMF).

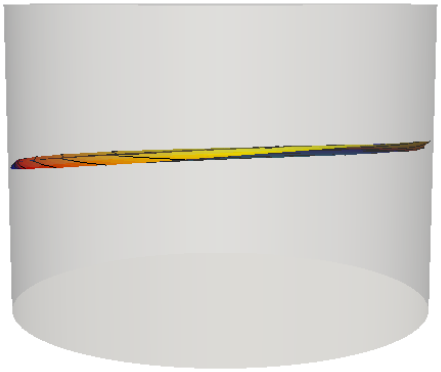


FIGURE 1. Snapshot interface between two fluids. Image from Cappanera et al 2017 (IJNMF).

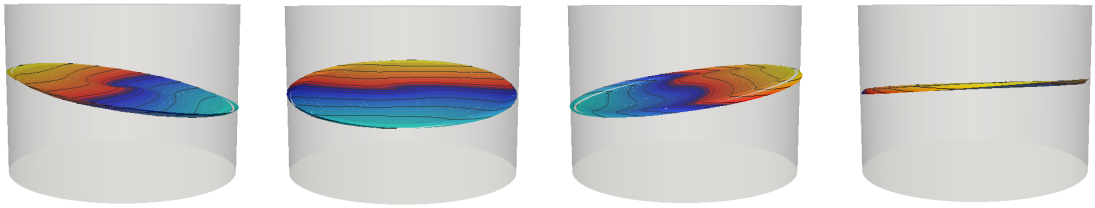
REFERENCES

[1] C. Finlay, J.-H. Jacobsen, L. Nurbekyan, and A. M. Oberman. How to train your neural ode: the world of jacobian and kinetic regularization, 2020. URL `https://arxiv.org/abs/2002.02798`.

[2] B. W. Kernighan and D. M. Ritchie. *The C programming language*. 2006.

[3] F. Mittelbach, M. Goossens, J. Braams, D. Carlisle, and C. Rowley. *The LATEX companion*. Addison-Wesley Professional, 2004.

[4] B. Stroustrup. *The C++ programming language*. Pearson Education, 2013.



(a) t=8 (b) t=8.2 (c) t=8.4 (d) t=8.6

FIGURE 2. Evolution of interface between two fluids. Images from Cappanera et al 2017 (IJNMF).