My LaTeX Document

Jack Davison* Shona E. Wilde* Craig Poku*
David C. Carslaw‡

December 2021

Contents

*Wolfson Atmospheric Chemistry Laboratories
†Ricardo Energy & Environment

1 Introduction

Your introduction goes here! Simply start writing your document and use the Recompile button to view the updated PDF preview. Examples of commonly used commands and features are listed below, to help you get started.

With shortcut macros it is easy to write chemical names / units etc., such as NO_x and $PM_{2.5}$ and NH_3 ... all in µg m^{-3}.

We can even really easily format chemical names, like this long (and fictional!) species: $C_2H_3O_8N_2S^{2+}$.

1.1 How to add Lists

You can make lists with automatic numbering ...

1. Like this,
2. and like this.

... or bullet points ...

- Like this,
- and like this.

2 Methods

2.1 Sections and Subsections

You can have sections, subsections and *sub*subsections to split up your document. All can be labelled and later referred to. For example, we'll be talking about maths in subsection 2.2 and tables in subsection 3.1. If we added additional subsections before these, LaTeXwould automatically update their numbers.

2.2 Maths

LaTeX is super useful when it comes to writing equations. So if I want to change anything into mathematical text, I can surround text with $ signs, which will turn y = mx + c into $y = mx + c$. I can also use LaTeX to make equations into their own separate lines,

$A + B = C$

and therefore turning $y = mx + c$ into Equation 1;

$$y = mx + c. \tag{1}$$

Having the flexibility to define equations both outside and inline with the text makes writing maths in LaTeX pretty useful when working on long documents. For example, suppose we want to know the answer for a super complicated equation:

$$\int_{-\infty}^{\infty} e^{-x^2} dx = X \tag{2}$$

$$Y = X \tag{3}$$

We can define our answer for Equation 2 either as $X = \sqrt{\pi}$, or in its own equation line as:

$$X = \sqrt{\pi}, \tag{4}$$

which you may decide to change depending on your specific needs. Finally, a useful tool to have if you're doing something maths heavy is the `amsmath` package. See this incredibly long equation, Equation 5.

$$F = \{F_x \in F_c : (|S| > |C|) \cap (\tau < |S| < \beta) \cap (|S_i| > |S| - \epsilon)\}, \tag{5}$$

Some journals want you to have have the full word "Equation" and instead want "Eq.". Using `amsmath`, you can use the function `eqref`, allowing you refer to our super long equation as either Equation 5 or Eq. (5).

3 Discussion

3.1 Tables

Tables live inside of "tabular" environments which you'd usually contain inside of "table" environments. The syntax can be slightly strange, but gives you a high amount of control over table layouts. There are useful packages to enhance the use of tables - "booktabs" enhances their appearance, "tabularx" can *justify* tables, and "longtable" allows for tables to be split across multiple pages.

An example of a table is found in Table 1, using "booktabs" to add horizontal lines.

		Emissions	
Fuel	**Type**	**NO_x**	**CO**
Diesel	Cars	High	Low
Petrol	Cars	Low	High
Diesel	Heavy	Really high!	Low

Table 1: NO_x and CO emissions from different vehicle types.

A wider table is shown in Table 2, justified to be the width of the text using the "tabularx" package.

3.2 Figures

Figures can be inserted in a "figure" environment. The important things to include are:

Species	Petal Length	Petal Width	Sepal Length	Sepal Width
Setosa	1.462	0.246	5.006	3.428
Versicolor	4.260	1.326	5.936	2.770
Virginica	5.552	2.026	6.588	2.974

Table 2: Mean values from Fischer's "iris" data set.

1. "includegraphics", which needs a path to your image. This also allows you to define the width of the figure if you have the "graphicx" package loaded.
2. A "caption" to describe your figure.
3. A "label" so you can refer to your figure in-text
4. The "centering" command, so that the figure is centred on the page.

It's a good idea for your figures to be **vectors** rather than **rasters**. This means that they won't look really blurry when zoomed in! It'll also make them more scalable if you want to put them on slides or an A0 conference poster. An example of a PDF figure is found in Figure 1.

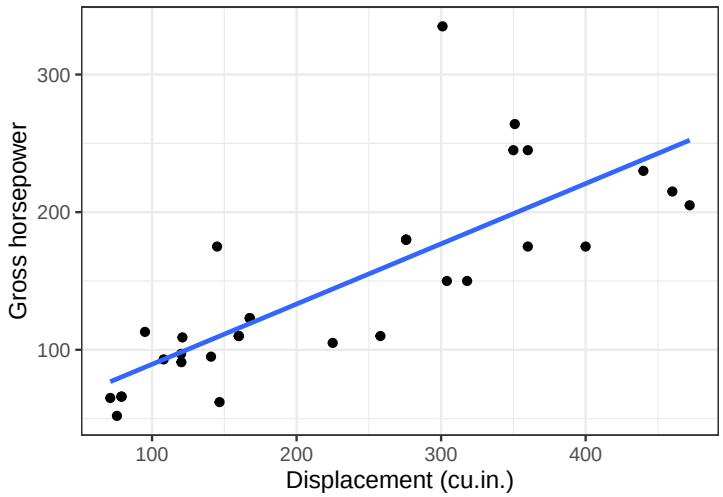

Figure 1: A lovely R plot, saved as a PDF rather than a PNG or JPEG.

3.3 References

Some examples of recent papers (Davison et al., 2020; Wagner et al., 2021; Farren et al., 2020; Farren et al., 2021). Or we can talk about them in-text; Carslaw et al. (2011) is an example.

References

Davison, Jack, Yoann Bernard, Jens Borken-Kleefeld, Naomi J. Farren, Stefan Hausberger, Åke Sjödin, James E. Tate, Adam R. Vaughan, and David C. Carslaw (Oct. 2020). "Distance-based emission factors from vehicle emission remote sensing measurements". In: *Science of the Total Environment* 739, p. 139688. ISSN: 18791026. DOI: 10.1016/j.scitotenv.2020.139688 (cit. on p. 4).

Wagner, Rebecca, Naomi Farren, Jack Davison, Stuart Young, James Hopkins, Alastair Lewis, David Carslaw, and Marvin Shaw (2021). "Application of a mobile laboratory using a Selected-Ion Flow-Tube Mass Spectrometer (SIFT-MS) for characterisation of volatile organic compounds and atmospheric trace gases". In: *Atmospheric Measurement Techniques Discussions*, pp. 1–21. DOI: 10.5194/AMT-2021-85 (cit. on p. 4).

Farren, Naomi J., Jack Davison, Rebecca A. Rose, Rebecca L. Wagner, and David C. Carslaw (Dec. 2020). "Underestimated ammonia emissions from road vehicles". In: *Environmental Science and Technology* 54.24, pp. 15689–15697. ISSN: 15205851. DOI: 10.1021/acs.est.0c05839. URL: https://pubs.acs.org/doi/abs/10.1021/acs.est.0c05839 (cit. on p. 4).

— (Oct. 2021). "Characterisation of ammonia emissions from gasoline and gasoline hybrid passenger cars". In: *Atmospheric Environment: X* 11. DOI: 10.1016/J.AEAOA.2021.100117 (cit. on p. 4).

Carslaw, D C, S D Beevers, J E Tate, E J Westmoreland, and M L Williams (2011). "Recent evidence concerning higher NOx emissions from passenger cars and light duty vehicles". In: *Atmospheric Environment* 45.39. ISSN: 13522310 18732844. DOI: 10.1016/j.atmosenv.2011.09.063 (cit. on p. 4).