LaTeX Template

James Cook University Cairns

Hunter Kruger-Ilingworth (14198489)

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Intro

This is my cool document. I have a lot of cool things to say. note to self: Improve this introduction

Feature Demonstration

Images

I made a couple of latex commands that make inserting images a bit shorter. I made a command called `\insertimage {}{}{}`, which takes three arguments: the image filename, the caption, and the label. I also made a command called `\insertbigimage {}{}{}`, which does the same thing, but for big images that are too wide to be placed in a single column. Figures 1 and 2 are the result of using these commands (Though the big image is too big to fit on this page).

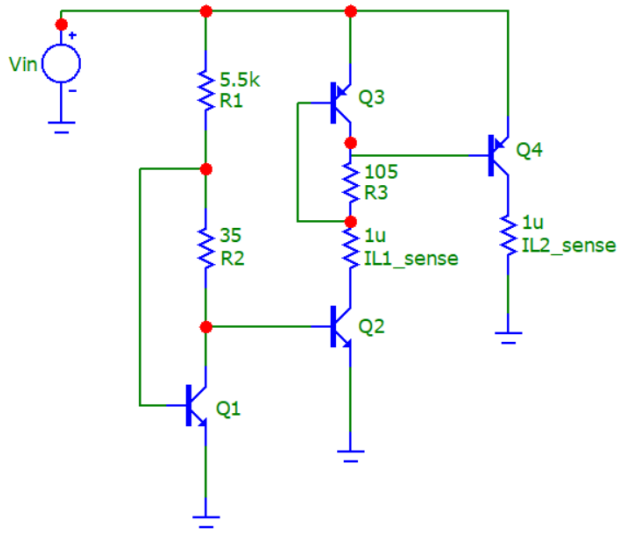

Fig. 1. Example Image

Math

This isn't really a feature of my template, but more a feature of LaTeX itself. Here is some Math:

$$C = A \times B = \begin{bmatrix} c_{11} & c_{12} & c_{13} \\ c_{21} & c_{22} & c_{23} \\ c_{31} & c_{32} & c_{33} \end{bmatrix} \tag{1}$$

Here is some more ChatGPT gave me:

$$\hat{f}(\xi) = \int_{-\infty}^{\infty} f(x) e^{-2\pi i x \xi}\,dx \tag{2}$$

I made a couple of commands that make writing math a bit easier. For example, I made a command called `\E {}`, which takes one argument, the exponent. For example, `\E {3}` will display as $\cdot 10^3$. I also made a command called `\abs {}`, which takes one argument, the value to be enclosed in absolute value bars. For example, `\abs {-3}` will display as $|-3|$ [1]

Tables

I don't have any custom commands to make tables, but I can still make them My recommendation is to use ChatGPT to generate the table for you.

Column 1	Column 2
Data 1	Data 2
More Data 1	More Data 2
Even More Data 1	Even More Data 2
Dummy Data 1	Dummy Data 2
Another Data 1	Another Data 2

Table 1: A small table

I (mostly ChatGPT) have configured a way for latex to read `.xlsx` and `.csv` files, which can be seen in table 2. This table was generated using a `.csv` file, with the column names changed to have nice math in them. Table 2 shows this.

Recording	ΔP_{avg} $-\Delta P'_{avg}$ (m)	ΔP_{fin} $-\Delta P'_{fin}$ (m)	ΔP_{max} $-\Delta P'_{max}$ (m)
1	-0.0091	-0.0611	-0.0601
2	0.006	0.2037	-0.0651
3	0.0002	0.0018	-0.0029
4	0.0008	0.1437	0.1447
5	0.0062	0.0154	0.0139
6	0.0286	0.1566	-0.0558

Table 2: Data from `tables/data.csv`

[1] Only works in a math environment, either in an align/equation environment or between $ $ symbols. By the way footnotes are also a thing in LaTeX.

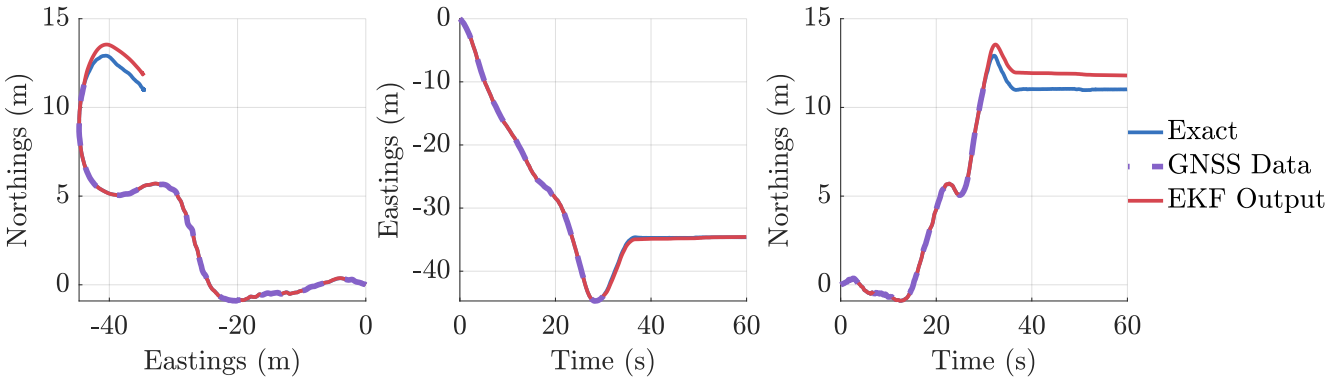

Fig. 2. Example Big Image (Made using MATLAB)

Code

I also made a command for inline code, `\code {}`. This command takes one argument, the code to be displayed. For example, `\code {print("Hello World")}` will display as `print("Hello World")`. Groundbreaking, I know.

I also made a command for code blocks, `\codeblock {}{}`

Listing 1: Example Python Code

```
1  import numpy as np
2  def incmatrix(genl1,genl2):
3      m = len(genl1)
4      n = len(genl2)
5      M = None #to become the incidence matrix
6      VT = np.zeros((n*m,1), int)  #dummy
       variable
7      x = 0
8      #compute the bitwise xor matrix
9      M1 = bitxormatrix(genl1)
10     M2 = np.triu(bitxormatrix(genl2),1)
11
12     for i in range(m-1):
13         for j in range(i+1, m):
14             [r,c] = np.where(M2 == M1[i,j])
15             for k in range(len(r)):
16                 VT[(i)*n + r[k]] = 1;
17                 VT[(i)*n + c[k]] = 1;
18                 VT[(j)*n + r[k]] = 1;
19                 VT[(j)*n + c[k]] = 1;
20
21                 if M is None:
22                     M = np.copy(VT)
23                 else:
24                     M = np.concatenate((M, VT
       ), 1)
25
26                 VT = np.zeros((n*m,1), int)
27
28     return M
```

This command takes four arguments: the language, the caption, the label, and the filename. Mostly, I'd reccommend using `\onecolumn` before using this command. This way, the code won't do any weird overflowing stuff, like you can see on line 24 in listing 1.

Tikz Plots and Pictures

If you want a really simple figure, it may be worth it to use Tikz which is an inbuilt LaTeX figure rendering tool. Here are a couple of examples of things you can do. For most things it's more worth it to either hand draw it or use draw.io. Either way figs. 3 to 6 show some examples of what you can do with Tikz.

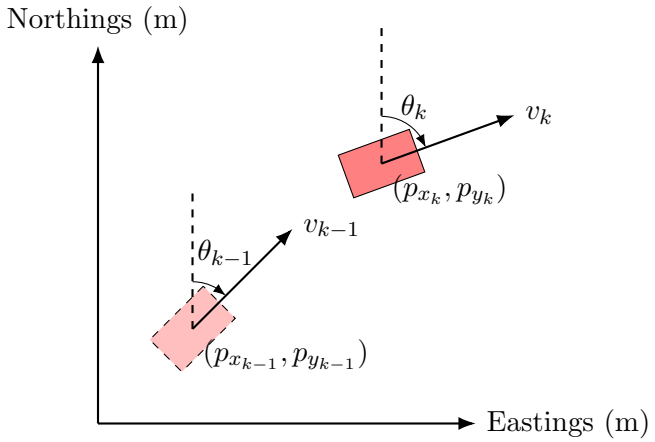

Fig. 3. Representation of State Vector Components in Physical Space

circuits in particular are a major pain. If you want a circuit in your document, make it in Microcap and screenshot that (like fig. 1)

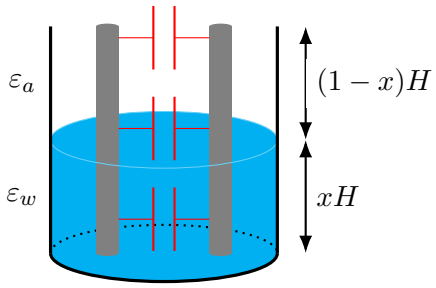

Fig. 4. Ideal model of Capacitive Sensor

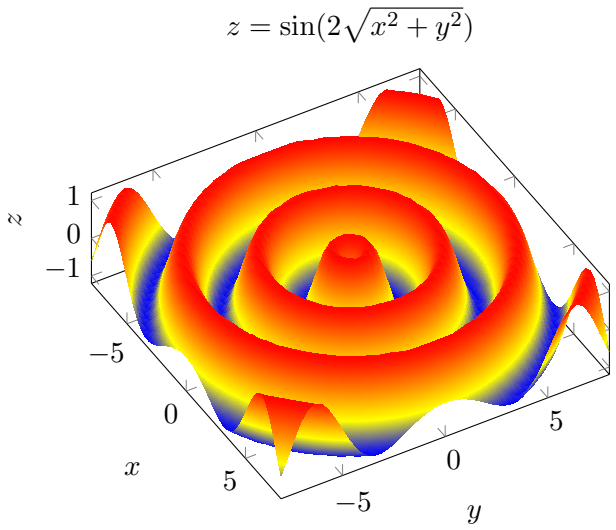

Fig. 5. 3D plot of $z = \sin(2\sqrt{x^2+y^2})$

tcolorboxes

My nice heading

This is a tcolorbox with a heading. I never use tcolourboxes except for the inline code command. They're just small tcolourboxes. I thought I'd put it here anyway in case people want to use them.

Upper part of my box.

Lower part of my box. WOW!

Discussion

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

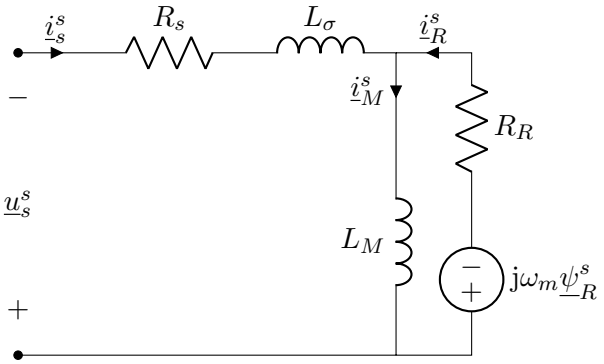

Fig. 6. Random Circuit I found on the internet lol

Conclusion

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.