Spaceflight AOE Lecture: Full Intro Example

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October 2024

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Chapter 1

Introduction

Revise my intro

Here's the start of the intro....

1.1 Adding & Modifying Text

Modifying text is not too hard in LaTeX. Text commands are fairly straight forward for bold, italic, sizing, and special characters as demonstrated below:

- Bold: **Bold**
- Italic: *Italic* or *italic*
- Sizing: tiny text Huge text! normal text
- Special characters (examples): è or ä

Superscripts and subscripts were designed for mathematical expressions first in LaTeX, so they are longer commands (a good place to consider adding a new command for shorthand): $\text{text}^{\text{super}}$ and text_{sub}

Links are straightforward with the hyperref package as demonstrated here: NASA. Last, remember to use quote symbols appropriately as "a" only half works, but "a" does (individual characters).

1.2 Figures

Figures are a type of content in LaTeX called "floats" that can move around on the page depending on the instructions you provide. Tables and numbered equations also fall under this category. For larger projects, it can be convenient to have all of your pictures in a subfolder to stay organized (even consider naming them by chapter).

In Overleaf you can upload figures or add them via a website address as done here, but make sure to credit your images too!

Figure 1.1: Make sure to add descriptions for your figures. Credit: nasa.gov

Any figure or other content added like this can also be referred to in the text like this: Figure 1.1.

1.3 Tables

There are many, many options for tables in LaTeX! Below is a basic example with a highlight added:

Basic table setup:

Table 1.1: Sample table with highlight

A	B
C	D

One other common option for tables uses the booktabs package:

Table 1.2: Caption

Table with booktabs

A	B
C	D

Some other useful packages to know for tables include: longtable (multi-page tables), multirow (text in multiple rows), and sidewaystable (horizontal table).

Chapter 2

Math Expressions

2.1 Math in LaTeX

Math is what LaTeX was designed to do from early on, so there are many, many options available. Below are just a few demonstrations with some options you might need.

2.1.1 Mathematical Expressions

In line equations are simple - just make sure to add the dollar symbol around them to enter math mode like this: $E = mc^2$. If you would like numbered equations, be sure to use the begin and end similarly to figures (and you can set cross references too for Equations 2.1 and 2.2):

$$v_{esc} = \sqrt{\frac{2\mu}{r}} \tag{2.1}$$

$$\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t} \tag{2.2}$$

LaTeX will generally automatically size brackets and parentheses for you, but sometimes you need to specify left and right:

$$n(z) = n_0 \exp\left(-\frac{z}{H}\right) \tag{2.3}$$

2.1.2 Matrices

Matrices are also easy to add in LaTeX - just make sure to be in math mode via $ or using the begin equation command (similar to tabular for tables):

$$\mathbf{R_1}[\beta] = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos\alpha & \sin\alpha \\ 0 & -\sin\alpha & \cos\alpha \end{bmatrix} \tag{2.4}$$

Chapter 3

References & Citing

3.1 References

You will always want to use a citation manager and then sync or export to your LaTeX file structure. Zotero is your best bet as it also has Better BibTeX which will format your citation data well for use in LaTeX.

There are a few different ways to do citations:

- No package (built-in options)
- BibTeX packages (natbib very common)
- BibLaTeX package (uses biber, not BibTeX on backend)

It is recommended to use natbib or BibLaTeX as those will have more options available. See below for in-text citations for natbib and see main.tex for how it is implemented there in adding a package and the bibliography at the end.

Here's a paraphrasing citation for a couple references [1, 2]. Depending on the style, you can also do the "Smith" et al type, but here just the usual is demonstrated [3, 4].

Can also specify parenthetical or in-text citation with [5] or Hayakawa et al. [6].

Chapter 4

Resources

- Overleaf has lots of tutorials and help, be sure to check those out! Plus VT's Overleaf page has templates and other info. Also see Overleaf's Quick Guide and Keyboard Shortcuts.
- StackExchange and similar sites have lots of Q&A (I use these all the time!)
- For packages and documentation, check out ctan.org (over 6k - no way to know all and some conflict)
- Last you can check our library for LaTeX books - there have been lots published, including ones for other types of documents like presentations (Beamer).

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Appendix

Some test text for your appendix material...