1 Introduction

A running theme through many of these presentation has been the idea of reuseable code. The idea being that once you code something up in a way that you like, say for example your preamble, you can reuse it the next time you're writing a report. But this is code, so we want to simplify this as much as possible. In fact, we don't ever want to copy and paste, we want it to be set up so that if something goes wrong and we fix some issue that fix propagates out everywhere. So how do we do that? LaTeX has a variety of commands and packages that facilitate this sort of thing at different levels as we explore these, keep in mind a couple of different ideas:

- Reusing material from your report in your presentation
- Modularizing documents; especially big documents
- Reusing general code

2 input Command

- Reusing your preambles (without copying and pasting)
- Reusing glossaries

3 A Quick Pathing Primer

Relative Paths

`../../`

- Report Directory
  - Assets
    - Images
      - Tikz
        - texfamilytree
          - texfamilytree.pdf
          - texfamilytree.tex
        - ...
    - ...
  - Presentation
    - modularPresentation.pdf
    - modularPresentation.tex
  - ReportChapters
    - 001-ch1
      - chapt1.pdf
      - chapt1.tex
    - ...
  - Shared
    - Imports
      - preamble.tex
      - glossary.tex
      - ...
    - ...
  - modularReport.pdf
  - modularReport.tex

Figure 1: The directory structure for this report (as an example of a modular structure)

4 Import Package

The import package is useful for allowing imports

5 Standalone Package

- Breaking your document into mular parts
- TikZ Images

6 catchfilebetweentags Package

6.1 catchfilebetweentags

This handy package allows you to store a bunch of different things (say for example, equations) and pull them in to your document. This is really nice because it makes your document's code more easily read. It also makes it that you can reuse the equations in another place, say for example an associated presentations

$$\begin{aligned}
\Delta E_B &\equiv \sum E_D(Reactants) - \sum E_D(Products) \qquad (1)\\
\Delta E_B &= (E_D(^2\mathrm{H}) + E_D(^2\mathrm{H})) - (E_D(^3\mathrm{He}) + E_D(\mathrm{n}^0))\\
\Delta E_B &= (13.135\mathrm{MeV} + 13.135\mathrm{MeV}) - (14.931\mathrm{MeV} + 8.071\mathrm{MeV})\\
\Delta E_B &= 3.27\mathrm{MeV}
\end{aligned}$$

$$\Delta = \begin{cases} \delta, & \text{for } A \text{ and } N \text{ both even} \\ 0, & \text{for } A + N \text{ odd} \\ -\delta, & \text{for } A \text{ and } N \text{ both odd} \end{cases} \tag{2}$$

$$E_B(Z,N) = \alpha_1 A - \alpha_2 A^{2/3} - \alpha_3 \frac{Z(Z-1)}{A^{1/3}} - \alpha_4 \frac{(N-Z)^2}{A} + \Delta \tag{3}$$

Table 1: Table of specified parameters and achieved values

Parameter	**Target**	**Calculated**	**Simulated**
NF_{dsb}	≤ 4	11.17	5.95
$IIP3$	≥ -22	≥ -2.73	-4.98
1 dB Compression	≥ -32	≥ -12.73	-14.2
Gain	≥ 16	≥ -3.26	-4.58
I_{bias}			
I_{buf}			
I_{ref}		1	1
R_D	≤ 10	570	600
V_{lo}	≤ 1		
V_{rf}	≤ 1		

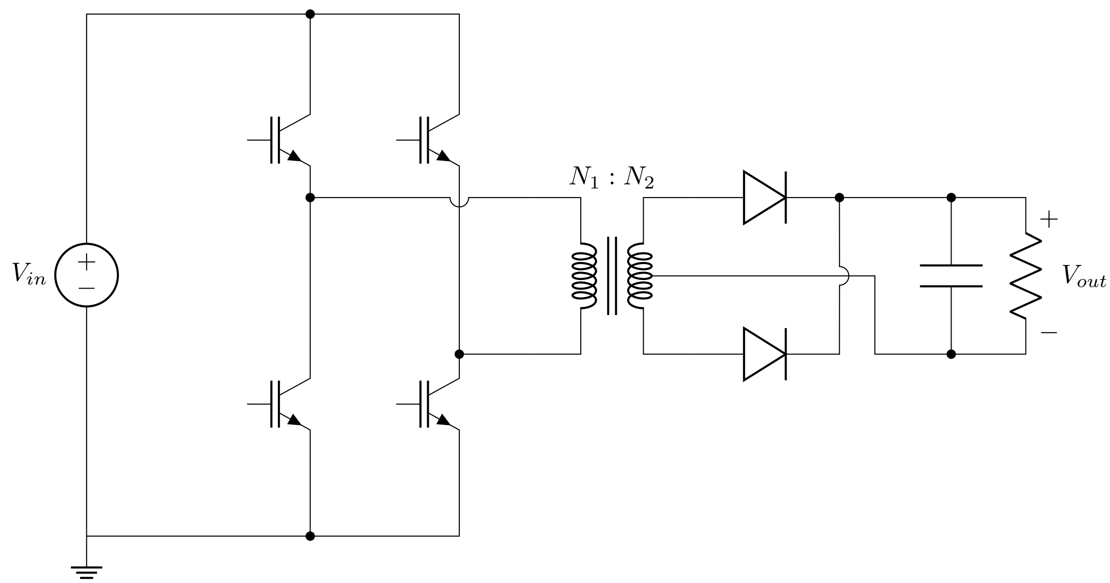

Figure 2: An Example of a circuit (an isolated boost converter) done in circuit TikZ

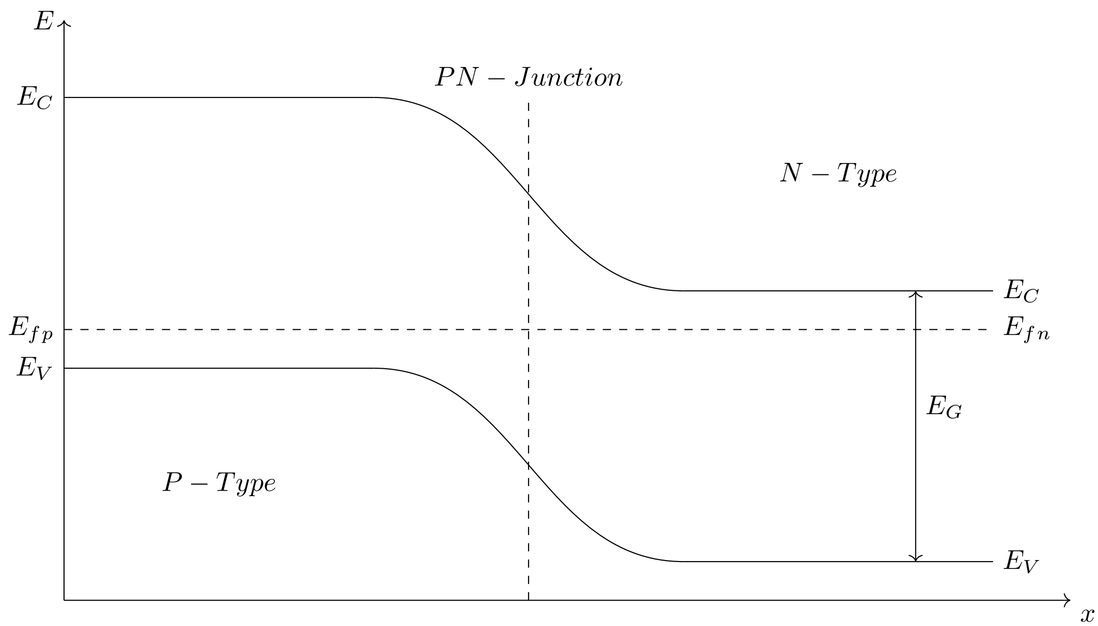

Figure 3: A simple Example TikZ showing the band diagram of a PN-junction

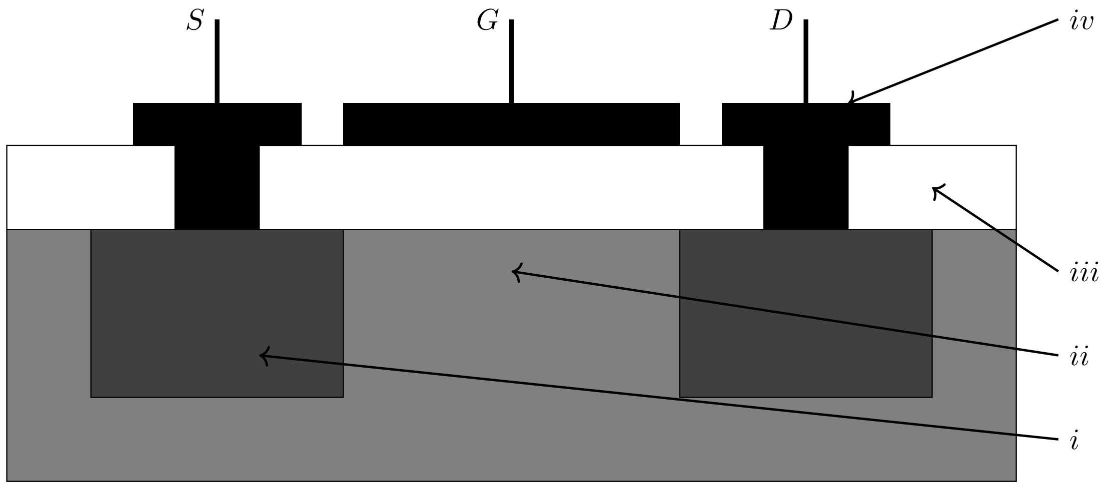

Figure 4: A simple TikZ diagram showing a MOSFET

So this is cool right, even the gls code is applied and you can have your axis labels be the symbols you defined earlier. Portability rules. But remember our little gif that was created from the video? Well thats not a function of beamer but instead a function of pdfs. So lets bring it all together and use our lua code, with tikz, to create an animation of the process of the attractors being formed.

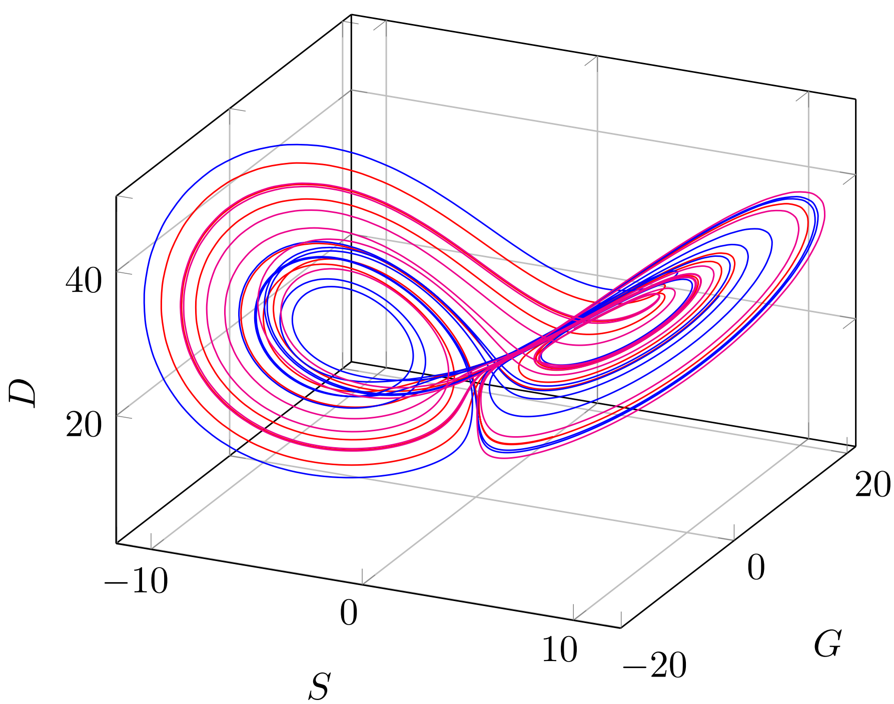

Figure 5: Lorenz Double Scroll Produced in LuaLatex

$$\frac{\mathrm{d}x}{\mathrm{d}t} = \sigma(y - x) \tag{4}$$

$$\frac{\mathrm{d}y}{\mathrm{d}t} = x(\rho - z) - y \tag{5}$$

$$\frac{\mathrm{d}z}{\mathrm{d}t} = xy - \beta z \tag{6}$$

$$\tag{7}$$

Symbols

A total number of nucleons in nucleus (unitless). 3

D Mosfet Drain. 5

E_B nuclear binding energy (eV). 3

E_C Conduction band energy level. 4

E_D mass defect (eV). 3

E_G Bandgap. 4

E_V Valence band energy level. 4

E_f Fermi Energy of a Material. 4

E Energy. 4

G Mosfet Gate. 5

N number of neutrons in nucleus (unitless). 3

S Mosfet Source. 5

V_{in} Input voltage. 4

V_{out} Output voltage. 4

Z number of protons in nucleus (atomic mass number - unitless). 3

ΔE_B change in nuclear binding energy i.e. energy released in reaction (eV). 3

Δ pairing energy parameter (eV). 3

β Lorenz Parameter. 6

ρ Lorenz Parameter. 6

σ Lorenz Parameter. 6