A simple template for a lab report

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Contents

Foreword

When writing a scientific report it is very important to think carefully how to structure it. Most reports and scientific papers follow the so called IMRAD structure, that is they are subdivided in four sections: **I**ntroduction, **M**ethods, **R**esults **A**nd **D**iscussion. This is a well-tried format and an efficient way of writing a report, it is highly recommended to stick to it: the goal of a report or a scientific paper is not to impress the readers by poetic language but to transfer facts and new insights as clearly as possible. More importantly structuring your paper helps you understand more about the topic you are examining.

Note: This document is not meant to be a tutorial for how to write a good scientific report, although it contains some useful advices. A more complete tutorial can be found on the web at the URL:

`http://www.wisc.edu/writing/Handbook/ScienceReport.html`

You are highly encouraged to take a look at that!

1 Introduction

The introduction should state clearly why the study was started and give a relatively short and essential overview of the topic you are exploring. References to previous works ought to be made here.

The introduction should not contain the conclusions. At the end of the introduction the outline of the paper may be described.

2 Methods

Here you describe the strategy you adopted and the tools you used in your study.

2.1 Example of subsection

This is a subsection.

2.1.1 Example of subsubsection

This is a sub-subsection.

2.2 Example of mathematical formulas

LaTeXis a very powerful tool when it comes to typesetting of mathematical equations. The quality of the output is extremely high and hardly matched by other word processors. It takes little time with LaTeX to learn how to handle very complicated mathematical expressions.

$$\sigma_0 = \frac{\pi}{\sqrt{8}} \frac{1}{\tau_{\mathrm{ff}}} \tag{1}$$

$$K = \frac{\sqrt{32}}{\pi} \frac{1}{\delta} \frac{\tau_{\mathrm{ff}}}{\tau_{\mathrm{co}}}\,; \tag{2}$$

LaTeXuses a simple and convenient system for assigning numbered labels to equations and other objects (figures, tables, etc...) and refer to them. After having edited the source file and rearranged the position of the equations LaTeX will process it and change labels and references consistently throughout the text (if you did the things right of course...)

Examples of text containing mathematical expressions and equations:

M_r	mass internal to the radius r
m	mass of the zone
r_0	unperturbed zone radius
ρ_0	unperturbed density in the zone
T_0	unperturbed temperature in the zone
L_{r0}	unperturbed luminosity
$E_{\rm th}$	thermal energy of the zone

$$\tau_{\rm co} = \frac{E_{\rm th}}{L_{r0}}\,, \tag{3}$$

$$\tau_{\rm ff} = \sqrt{\frac{3\pi}{32G}\frac{4\pi r_0^3}{3M_{\rm r}}}\,, \tag{4}$$

$$\nabla_{\rm ad} = \left(\frac{\partial\ln T}{\partial\ln P}\right)_S\,,\; \chi_T = \left(\frac{\partial\ln P}{\partial\ln T}\right)_\rho\,,\; \kappa_T = \left(\frac{\partial\ln \kappa}{\partial\ln T}\right)_T$$

$$\frac{\pi^2}{8}\frac{1}{\tau_{\rm ff}^2}(3\Gamma_1 - 4) > 0 \tag{5}$$

$$\frac{\pi^2}{\tau_{\rm co}\tau_{\rm ff}^2}\Gamma_1\nabla_{\rm ad}\left[\frac{1-3/4\chi_\rho}{\chi_T}(\kappa_T - 4) + \kappa_P + 1\right] > 0 \tag{6}$$

$$\frac{\pi^2}{4}\frac{3}{\tau_{\rm co}\tau_{\rm ff}^2}\Gamma_1^2\,\nabla_{\rm ad}\left[4\nabla_{\rm ad} - (\nabla_{\rm ad}\kappa_T + \kappa_P) - \frac{4}{3\Gamma_1}\right] > 0 \tag{7}$$

2.3 Example of verbatim text

In LaTeXYou can enter text `verbatim`: that means that LaTeXwill print it exactly as you enter it in the source file. The output resembles closely the one from old typewriters and it is usually good to print out portions of computer code:

```
PROGRAM area
REAL base, height, area
PRINT *,'Enter the values for the base and height of a triangle.'
READ *, base, height
area = (1.0/2.0) * base * height
PRINT *,'The area of a triangle with base ', base
PRINT *,'and height ', height,' is ', area
STOP
END
```

Note: In `verbatim` mode you can easily end up outside the margins, as in the example above: pay attention to that!

2.4 Lists

Example of a list with numbered items:

1. Planets, asteroids, moons ...
2. Stars, galaxies, quasars

Example of a list with unnumbered items:

- Planets, asteroids, moons ...
- Stars, galaxies, quasars

3 Results

In this section you present your findings and results.

4 Tables and figures

Figures demonstrate and prove conclusions. They should convince the reader, preferably at first glance. Figures should be self-explanatory. The legends should have a well-defined meaning. The lettering and the thickness of lines and symbols should be large enough to remain recognizable in the final print. We urge the author to limit the empty space in and around figures.

The figure captions should contain all the information needed to understand the data presented and references to the text of the paper should be minimized.

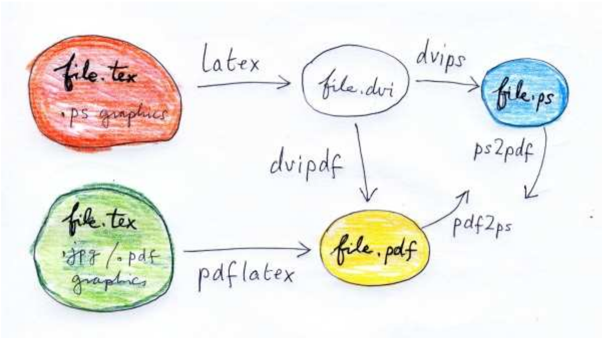

Figure 1: Tables and figures are floating objects, LaTeXwill place them where it thinks it's best. Vibrational stability equation of state $S_{\mathrm{vib}}(\lg e, \lg \rho)$. > 0 means vibrational stability.

Tables should be self-explanatory. The table headings should contain the essential information needed to understand the data presented. Details should not clutter the header and are better added as explanatory footnotes.

Table 1: Example of table caption: opacity sources.

Source	$T/[\mathrm{K}]$
Yorke 1979, Yorke 1980a	≤ 1700
Krügel 1971	$1700 \leq T \leq 5000$
Cox & Stewart 1969	$5000 \leq$

5 Discussion

In this section you analyse and discuss your results. This section is paramount as it gives indication about the hability of the author to interpret the results and critically discuss his or her findings.

6 Conclusions

Here you summarize the essential aspects and findings of your work and analysis.

Finally, remember to include a section with the bibliography. It is very important to cite the sources you used for your study and for writing the report.

References

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