Classical Mechanics Notes

PH3101

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Contents

I. Introduction

This is a simple template that can be used for a report.

II. Features

II.1. Colorful items

The main color can be set with the `color` property, which affects inline code, lists, links and important items.

- These bullet
- points
- are colored

1. It also
2. works with
3. numbered lists!

This is an highlight. That can be set in the `template.typ` file.

The package codelst is used by default, and you can add some more of your liking if you want.

II.2. Customized items

Figures are customized but this is settable in the template file. You can of course reference them Figure 1.

Figure 1 :: Source tree

```
main
├── README.md
├── assets
│   ├── images
│   │   ├── used images
│   └── backup
│       └── backup files
├── makefile
└── src
    ├── headers
    │   ├── files.h
    └── files.c
```

III. Enjoy !

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magnam aliquam quaerat voluptatem. Ut enim aeque doleamus animo, cum corpore dolemus, fieri tamen permagna accessio potest, si aliquod aeternum et infinitum impendere malum nobis opinemur. Quod idem licet transferre in voluptatem, ut postea variari voluptas distinguique possit, augeri amplificarique non possit. At etiam Athenis, ut e patre audiebam facete et urbane Stoicos irridente, statua est in quo a nobis philosophia defensa et collaudata est, cum id, quod maxime placeat, facere possimus, omnis voluptas assumenda est, omnis dolor repellendus. Temporibus autem quibusdam et.

IV. Start

V. Introduction

Our first project is to reproduce "Bayesian Inference with information model content check for Langevin Equation"[1]. First, we start with a basis of stochastic thermodynamics with an assigned reading from [2]. We begin with basic stochastic processes and then Langevin dynamics. We then focus on a specific stochastic process called the Ornstein-Uhlenbeck process. Then we derive the Euler-Maruyuma integrator for the same process using CLT. In parallel to this project we will also be replicating the paper "Fast Bayesian Inference of optical trap stiffness and particle diffusion"

some stuff llololololol

VI. Stochastic Processes

Definition 6.1 (Wiener Process): The pdf of the Wiener process $\widehat{W}(t)$ is defined to be

$$P\Big(\widehat{W}(t+\Delta t)=x|\widehat{W}(t)=x'\Big)=\frac{1}{\sqrt{2\pi\Delta t}}e^{-\frac{(x-x')^2}{2\Delta t}} \tag{1}$$

with $P\Big(\widehat{W}(t)=x\Big)=\delta(x)$ where $\delta(x)$ is the Dirac Delta function.

Definition 6.2 (Lolcat): The lolcat is fuking ficked up A white gaussian is any stochastic variable $\hat{\xi}(t)$ which satisfies the following properties:

1. $$\langle\hat{\xi}(t)\rangle=0 \tag{2}$$
2. $$\langle\hat{\xi}(t)\hat{\xi}(t')\rangle\propto\delta(t-t') \tag{3}$$

References

[1] J. Krog and M. A. Lomholt, "Bayesian inference with information content model check for Langevin equations," *Physical Review E*, vol. 96, no. 6, Dec. 2017, doi: 10.1103/physreve.96.062106.

[2] N. Shiraishi, *An Introduction to Stochastic Thermodynamics: From Basic to Advanced*. Springer Nature Singapore, 2023. doi: 10.1007/978-981-19-8186-9.