

Lab 1: Monte Carlo Methods

Alex Matheson, Austin Nhung

February 12, 2018

1 Introduction

2 Methods

Fourier series are defined by calculating the fourier coefficients a_n and b_n . These coefficients may be replaced when in a complex fourier series using a term c_n . Using the following equations:

$$\begin{aligned}a_n &= c_n + c_{-n} \\ b_n &= i(c_n - c_{-n}) \\ c_n &= \frac{1}{2}(a_n - ib_n)\end{aligned}\tag{1}$$

In fourier series, the a_n and b_n correspond to even and odd 'components' of the function. In the case of an even function:

$$\begin{aligned}a_n &= c_n + c_{-n} \\ b_n &= 0 \\ c_n &= \frac{1}{2}(a_n)\end{aligned}\tag{2}$$

And for odd functions:

$$\begin{aligned}a_n &= 0 \\ b_n &= i(c_n - c_{-n}) \\ c_n &= \frac{-ib_n}{2}\end{aligned}\tag{3}$$

It may be shown in both of the above series that the a_n term for even functions and b_n for odd functions will be proportional to the c_n terms.

3 Conclusion

References

- [1] Ouyed and Dobler, PHYS 581 course notes, Department of Physics and Astrophysics, University of Calgary (2016).
- [2] W. Press et al., *Numerical Recipes* (Cambridge University Press, 2010) 2nd. Ed.
- [3] C. Hass and J. Burniston, MCMC Hill Climbing. Jupyter notebook, 2018.

4 Appendix

For access to the source codes used in this project, please visit https://github.com/Tsintsuntsini/PHYS_581 for a list of files and times of most recent update.