

Project 2



Håkon Olav Torvik, Vetle Vikenes and Sigurd Sørli Rustad

FYS-STK4155 – Applied Data Analysis and Machine Learning

Autumn 2021

Department of Physics

University of Oslo

October 16, 2021

ABSTRACT: The diffusion equation is used to predict the evolution of many phenomena. In this report we are working with a constant collective diffusion coefficient, giving us a linear differential equation identical to the heat equation. We study it in both one and two dimensions, for each comparing numerical results with analytic results for various values of parameters such as the the number of integration points and time step size. In one dimension we use explicit forward Euler, implicit backward Euler and implicit Crank-Nicolson, and in two dimensions only forward Euler.

Contents

1	Introduction	2
2	Theory	2
3	Methods	2
4	Results	2
5	Discussion	2
6	Conclusion	2
A	Appendix	2

1 Introduction

2 Theory

3 Methods

4 Results

5 Discussion

6 Conclusion

A Appendix

References

- [1] Morten Hjorth-Jensen, Computational Physics, Lecture Notes Fall 2015,
August 2015,
<https://github.com/CompPhysics/ComputationalPhysics/blob/master/doc/Lectures/lectures2015.pdf>.