Project 1 FYS3150

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CONTENTS

I. INTRODUCTION

One of the most versitile tools in modern science is numerical integration, thus it it simportant to understand its limits. In this paper we have performed numerial integration of a second order differential equation. This was done by discretizing the differential equation, and formulating it as a matrix-vector equation. The matrix-vector equation was then solved using both a general, and specialzed Thomas algorithm, as well as LU-decomposition. T

II. FORMALISM

III. IMPLEMENTATION

IV. ANALYSIS

$\log_{10}(h)$:	$\log_{10}(\epsilon)$ general algorithm	$\log_{10}(\epsilon)$ special algorithm	N
$-1.041\,393$	$3.026\,200 \times 10^{-1}$	$3.601\,314 \times 10^{-1}$	10^1
$-2.004\,321$	$3.426\,303 \times 10^{-2}$	$4.249\,885 \times 10^{-2}$	10^2
$-3.000\,434$	$3.474\,750 \times 10^{-3}$	$4.338\,587 \times 10^{-3}$	10^3
$-4.000\,043$	$3.479\,720 \times 10^{-4}$	$4.347\,831 \times 10^{-4}$	10^4
$-5.000\,004$	$3.480\,179 \times 10^{-5}$	$4.348\,760 \times 10^{-5}$	10^5
$-6.000\,000$	$4.210\,129 \times 10^{-6}$	$4.348\,746 \times 10^{-6}$	10^6
$-7.000\,000$	$1.005\,169 \times 10^{-6}$	$4.343\,971 \times 10^{-7}$	10^7
$-8.000\,000$	$-1.140\,500 \times 10^{-3}$	$3.765\,295 \times 10^{-8}$	10^8

V. CONCLUSION

Appendix A: Source code

All code for this report was written in C++ and Python 3.8, and the complete set of files can be found at https://github.com/FunkMarvel/FYS3150_Project_1.git