

PHY 480 - Computational Physics

Project 1: Linear Algebra Methods

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Github Repository at <https://github.com/ThomasBolden/PHY-480-Spring-2016>

Abstract

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Introduction

An important part of physics is being able to efficiently solve systems of linear equations. . . Given a differential equation of the form

$$-\frac{d^2}{dx^2}u(x) = f(x) \quad (1)$$

where $f(x)$ is continuous on the domain $x \in (0,1)$. We also assume the boundary conditions $u(0) = u(1) = 0$. The second derivative can be approximated as

$$u'' = \frac{u_{i+1} + u_{i-1} - 2u_i}{u^2} \quad (2)$$

Methods

.

Results

.

Conclusions

.

Code

../Code/Project1.cpp

```
1 // Project 1 - Vector and Matrix Operations
2
3 #include <iostream>
4 #include <fstream>
5 #include <cmath>
6 #include <iomanip>
7 #include <string>
8 // #include "armadillo"
9
10 using namespace std;
11 //using namespace arma;
12 ofstream myfile;
13
14
15 int main(){
16
17     // --- Declaration of Variables --- \
```

```
18     double n;
19     string outfilename;
20
21     cout << "Enter a number: "; // user enters a number
22     cin >> n;
23     cout << "Enter a name for the output file: ";
24     // user enters a name for the output file
25     cin >> outfilename;
26
27     // body of the program
28
29
30
31     // writing value to file, to be read and graphed in python later
32     myfile.open(outfilename);
33     //myfile << setiosflags(ios::showpoint | ios::uppercase);
34     // setting scientific notation of numbers
35     myfile << n << endl;
36
37     myfile.close();
38
39     return 0;
40
41 }
```

References

- [1] M. Hjorth-Jensen, *Computational Physics*, University of Oslo (2013).