FYS4150 Project 1: 1-dimensional Poisson equation

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Abstract. We discovered ...

1. Introduction

In this project we will solve the one-dimensional Poissson equation with Dirichlet boundary conditions by rewriting it as a set of linear equations.The equation to be solved is:

$$-u''(x) = f(x) \qquad x \in (0,1), \qquad u(0) = u(1) = 0 \tag{1}$$

MORE COMING HERE.

2. Solving the problem

2.1. Simple algorithm

In our case we are dealing with a simple tridiagonal matrix **A**:

$$\mathbf{A} = \begin{pmatrix} 2 & -1 & 0 & \dots & \dots & 0 \\ -1 & 2 & -1 & 0 & \dots & \dots \\ 0 & -1 & 2 & -1 & 0 & \dots \\ & \dots & \dots & \dots & \dots & \dots \\ 0 & \dots & & -1 & 2 & -1 \\ 0 & \dots & & 0 & -1 & 2 \end{pmatrix} \tag{2}$$

We can therefore rewrite our matrix **A** in terms of one-dimensional vectors *a, b, c* of length 1:*n*.

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2.2. Using a library package

In addition to solving the linear second-order differential equation Eq. XX using the simple algorithm described above, we want to solve the equation using Gaussian elimination and LU decomposition, then compare the results.

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3. Analaysis

The modeling of ...

4. Conclusions

The answer is 42.

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