FYS4150 - Project 1

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github.com/sindrerb/FYS4150-Collaboration/tree/master/Doc/Project2

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Abstract

I. Introduction

Bla bla

II. Methods

i. Jacobi's method

Jacobi's method implements Jacobi's rotation in order to solve $\hat{A}\vec{v} = \lambda\vec{v}$.

ii. Unit tests

A unit test is a small piece of code that tests parts of a program for calculation errors. This to ensure that the program runs as expected and delivers correct results throughout the program. The unit tests we have used in this assignment are as follows.

ii.1 Orthogonality test

The Jacobi method preforms orthogonal or unitary transformations to the matrix it operates on. That means the orthogonality of each column in a matrix $\hat{A}$ is conserved.

If $\hat{A}$ is a orthogonal matrix with orthogonal column vectors $\hat{A} = [\vec{a}_1 \vec{a}_2 \cdots \vec{a}_n]$ the dot product of any column vector can be described by a Kronecker delta δ_{ij}.

$$\vec{a}_i{}^T \vec{a}_j = \delta_{ij} = \begin{cases} 1 | i = j \\ 0 | i \neq j \end{cases}$$

For a transformation done by a matrix $\hat{S}$ to be unitary any column all vectors $\vec{w}_i$ produced by the transformation $\hat{S}\vec{v}_i = \vec{w}_i$ must also be orthogonal.

$$\vec{w_i^T} \vec{w}_j = (\hat{S}\vec{v}_i)^T \hat{S}\vec{v}_j = \hat{S}^T \vec{v}_i{}^T \hat{S}\vec{v}_j = \\ \vec{v}_i{}^T \hat{S}^T \hat{S}\vec{v}_j = \vec{v}_i \vec{v}_j = \delta_{ij}$$

III. Results and discussion

IV. Summary and Conclusion

References