FYS3150 Computational Physics - Project 2

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This is an abstract

INTRODUCTION

Preservation of scalar product & orthogonality in unitary transformations

Consider an orthonormal set of basis vectors $\mathbf{v}_i$ such that $\mathbf{v}_j^T\mathbf{v}_i = \delta_{ij}$. Let unitary matrix U where $U^TU = I_N$, where I_N denotes the $N \times N$ identity matrix, operate on $\mathbf{v}_i$ to get $\mathbf{w}_i$

$$\mathbf{w}_i = U\mathbf{v}_i \tag{1}$$

Then

$$\mathbf{w}_j^T\mathbf{w}_i = (U\mathbf{v}_j)^TU\mathbf{v}_i = \mathbf{v}_j^TU^TU\mathbf{v}_i = \mathbf{v}_j^T\mathbf{v}_i = \delta_{ij} \tag{2}$$

In the unitary transformation of $\mathbf{v}_i$ both the scalar product and orthogonality has been preserved.

THEORY, ALGORITHMS AND METHODS

RESULTS AND DISCUSSIONS

CONCLUSIONS

[1] M. Hjorth-Jensen, Computational Physics - Lecture Notes 2015, (2015).