

PHY 422

Computational methods in Physics -I

Lab 6

Pdf file should be inside the .zip folder

1) Write a code to get the inverse of a 20 x 20 matrix using Partition matrix method

$$A = \left[\begin{array}{c|c} B & C \\ \hline D & E \end{array} \right]$$

And compare the time taken.

Use any 2 different methods for taking inverse of the matrix and compare.

2) Solve the following using

a) Jacobi

b) Gauss-Seidel

$$10x_1 - 2x_2 - x_3 - x_4 = 3; \quad -2x_1 + 10x_2 - x_3 - x_4 = 15;$$

$$-x_1 - x_2 + 10x_3 - 2x_4 = 27; \quad -x_1 - x_2 - 2x_3 + 10x_4 = -9$$

Compare them and also prepare a general code

3) Solve using relaxation method

$$x_1 + 3x_2 + 2x_3 - x_4 = 9; \quad -4x_1 + 2x_2 + 5x_3 + x_4 = 27;$$

$$3x_1 - 3x_2 + 2x_3 + 4x_4 = 19; \quad -x_1 + 2x_2 - 3x_3 + 5x_4 = 14;$$

a) Play with the relaxation parameter value.

b) Try to get the optimized omega value using the Gerschgorin bound

4) Get the eigenvalues for following matrix using Rutishauser method

$$\begin{bmatrix} 4 & 3 & 2 & 19 \\ 6 & 7 & 8 & 49 \\ 10 & 11 & 12 & 13 \\ 15 & 16 & 17 & 18 \end{bmatrix}$$

Lab Report Submission

PDF file with the flow chart, code and output

MS31199_3.pdf

If my Roll No. is MS31199 and submitting Lab Report No. 3 then

Prepare folder MS31199_3 containing files as:

MS31199_3.pdf
MS31199_3_code1.C
MS31199_3_code2.C
MS31199_3_code3.C and so on.
MS31199_3_output3.out
MS31199_3_input2.in

Assume that MS31199_3_output3.out is output of code3
And MS31199_3_input2.in is input for code2

Zip the folder as MS3119_3.zip and upload to moodle

Should contain

- 0)** Problem
- 1)** Algorithm
- 2)** The code, just add the image of code
- 3)** Instructions on system done
- 4)** Output, just image of output
- 5)** Summary

If you are given the Lab exercise today (Thursday), then deadline is **next week Thursday afternoon (13:01)**

Thursday, Friday, Saturday, Sunday, Monday, Tuesday, Wednesday