Faculty of Mathematics and Computer Science
Babeş-Bolyai University, Cluj-Napoca
Numerical Analysis
MIE - semester IV

Laboratory 11

Deadline: 27 – 31 May 2024

Iterative methods for solving linear systems II

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1. Let us consider the following system

$$\begin{cases} 8x_1 + 2x_2 + 4x_3 = -16 \\ 3x_1 + 5x_2 + x_3 = 4 \\ 2x_1 + x_2 + 4x_3 = -12 \end{cases}$$

and $\varepsilon = 10^{-3}$. Determine the solution of the system using the classical formulas (not matriceal) for

- Jacobi iterative method;
- Gauss-Seidel iterative method;
- Relaxation iterative method.

Hint: the exact solution is $(-1, 2, -3)$.

2. Solve the following system using the matriceal form of Jacobi, Gauss-Seidel and Relaxation method. Consider the precision $\varepsilon = 10^{-3}$.

$$\begin{cases} 5x_1 - x_2 = 7 \\ -x_1 + 5x_2 - x_3 = -10 \\ -x_2 + 5x_3 - x_4 = -6 \\ -x_3 + 5x_4 = 16 \end{cases}$$

Hint: the exact solution is $(1, -2, 1, 3)$.

3. Application of iterative methods:

`https://www.math.ubbcluj.ro/ didactica/pdfs/2020/didmath2020-05.pdf`

Remark: 1 (1.5p), 2 (1p)