

Numerical PDE HW 3

We need to build sparse matrices and vectors for our solvers. We also need to remember some linear algebra!

1. Create a sparse 99×99 matrix with -2 on the diagonal and 1 on the sub and super diagonals and 1 in the other corners.
2. Compute and plot the eigenvalues of this matrix.
3. Attempt to solve the linear system $A.x = b$ where b is the vector which is zero except for a 1 in the first and a -1 in the last entry. Explain any errors/warnings you may get. Compute the norm of the residual $A.x - b$. Comment.
4. Attempt to solve the linear system $A.x = b$ where b is the vector which is zero except for a 1 in the first and a 1 in the last entry. Explain any errors/warnings you may get. Compute the norm of the residual $A.x - b$. Comment.
5. Convert A to a dense matrix and repeat the last two experiments. Comment.