

ME 603
Computing Assignment - Part 1
3/10/17

Consider steady conduction in one space dimension with constant material properties. The boundary conditions are $T = 100C$ on the left boundary and $T = 200C$ on the right boundary. The governing equation is

$$\frac{d^2T}{dx^2} = 0.$$

With uniform grid spacing, a difference equation that approximates this differential equation is

$$\frac{T_{m+1} + T_{m-1} - 2T_m}{\Delta x^2} = 0.$$

Given the number of gridpoints, This difference equation may be used to create the matrix equation

$$Ax = b.$$

Write a matlab program to perform the following steps:

1. Fill the matrix A and vector b for an arbitrary number of gridpoints.
2. Pass the matrix and vector to a function, then solve the matrix equation for the solution x using the matlab function ' A/b '.
3. Return to the main program and pass the solution vector to another function that outputs the results to a file. The format in this file must be ascii, and must have only one number on each line.
4. Pass the solution to another function that makes a plot of the results. Save the plot as a pdf file.

Submit your program and associated files electronically.

Honors students must also have a separate function that solves the matrix equation using Gauss-Seidel (in addition to ' A/b '), and compare the two answers.