

MAP55672 Assignment

March 26, 2024

1. In Matlab, create a recursive V-Cycle solver for the 2D discrete Laplacian with Dirichlet boundary conditions of arbitrary grid size. Given a fine grid of arbitrary size, the code should be able to utilize an arbitrary number of levels
2. Make a plot of the time to solution using a grid size of $N_x = 2^p - 1$ and $N_y = 2^q - 1$ for $p = q = 4, \dots, 7$ using a multigrid hierarchy whos smallest grid is of size $N_x = 2^p - 1$ and $N_y = 2^q - 1$ with $p = q = 3$. Repeat this, but use GMRES and weighted Jacobi with $\omega = 2/3$ (Typing “help gmres” in Matlab will show you how to call the built in GMRES function). Include the time to solution for these on the plot. Set the y-axis in log scale by using “set(gca,'yscale','log')”

The due date for the assignment is 11:59 PM April 14th 2024. Compress it as a zip file and upload to Blackboard. If you cannot get your code to work, or it gives the wrong result, leave comments explaining what went wrong, what the result should be and how you think you could fix it!