MA 798Z
Project
Due

1. Implement IB method with different discrete Delta functions for 1D interface problems with a true solution. Do the grid refinement analysis for the following.

   (a) Check the local truncation error. Find the order of discretization at regular grid points and irregular grid points.

   (b) Check the global error. Find the order of convergence.

   (c) Plot the true and finite difference solution in one plot for $n = 40$ and $n = 80$ and the error plot as well.

   (d) Plot the error versus the step size h using the $\log - \log$ plot.

   (e) Numerically check the moment equations for different discrete Delta functions.

   (f) Let the interval be $[0,\ 1]$ and $f(x,t) = \delta(x - 1/3) * exp(-t)$, and $\alpha(0) = 1/3$, and $d\alpha/dt = u(\alpha)$, numerically tracking the interface α and the solution.