

Computing Project 3 (50 points)

Due date: Tuesday 1 July

Consider the problem

$$\begin{aligned}u_t &= \alpha(u_{xx} + u_{yy}) + Cu + S(x, y, t) & 0 < x < 1, 0 < y < 2, t > 0 \\u(x, 0, t) &= Q(x, t) = x + \sin(t)/10 \\u(x, 2, t) &= G(x, t) = x + \sin(t)/10 \\u(0, y, t) &= \sin(t)/10 \\u(1, y, t) &= H(y, t) = 1 - y(2 - y) + \sin(t)/10 \\u(x, y, 0) &= 0\end{aligned}$$

Let's solve this using the Peaceman-Rachford ADI scheme with the following parameters:

$$\alpha = 5, C = -3, imax = 61, jmax = 151, S(x, y, t) = xy \exp(-t).$$

We'll use  $dt = .001$  and compute up to  $nmax = 1000$  ( $t_0 = 0, t_{nmax} = 1$ ). Write the values of  $u_{i,j}^{nmax}$  to a file and generate a 3D plot using gnuplot or the graphing package of your choice. The code took about 10 seconds on my 3.4GHz desktop. Turn in a code listing and your plot.

Correct code is 40 points, style and presentation of code and results is 10 points.