

GES 554 Partial Differential Equations

Project 3: [100 pts]

Due: 30th March 2016 by 5:00pm

Shaken, not stirred. –Cdr. Bond

Prepare an engineering memo solving the following BVP with a Monte Carlo / Brownian motion simulation. This project is computationally expensive; a visibly “smooth” solution will be expensive.

$$\begin{aligned}\nabla^2 u &= 0 & 0 < x < 1 & \quad 0 < y < 1 \\ u_{north}(x, 1) &= u_{east}(1, y) = u_{south}(x, 0) = 0 \\ u_{west}(0, y) &= \sin(\pi y)\end{aligned}$$

- Plot your solution within the domain.
- Verify that the standard deviation of error at $(x, y) = (0.5, 0.5)$ decreases with \sqrt{N} .
- Make a set of engineering recommendation regarding Monte Carlo simulations for BVPs.