Math 504 Fall 2010

Numerical Methods for PDEs, 39705

Instructor: Dr. W. Proskurowski
http://almaak.usc.edu/~proskuro/teaching/math504

Lecture: MWF, 12-1 pm, HED 103
Office: KAP 120 E, Hours: MWF 2:30-3:30

This is a course devoted to computationally efficient numerical schemes (and their analysis) for solving steady state and time dependent Partial Differential Equations (PDEs).

Course Outline

(a subset of the following, for discussion with students)

1. Introduction to finite difference and finite element methods.
2. Discretization of the Laplacian in 2D and 3D (a model problem).
3. Fast Poisson solvers based on FFT (optional).
4. Solving sparse (and large) problems in Matlab.
5. Review of iterative methods.
7. Preconditioned conjugate gradient (PCG) iterations.
8. Heat equation, a model problem for time dependent problems.
10. Solving 2-D and 3D parabolic problems: ADI and operator splitting methods, PCG iterations.
11. Introduction to hyperbolic problems.


There will be several computational term projects, homework, and no exam.