Fall 2013

Iterative Methods for Systems of Equations

CSE 6644
MATH 6644

Lectures: TR 3:05-4:25 pm
Location: Instr Center 215

Instructor: Edmond Chow
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Office Hours: TBD in KACB 1332

Course Description

Introduction to the state-of-the-art iterative methods for solving linear and nonlinear systems of equations. This will be a very practical course, involving Matlab programming and a student-defined project.

Prerequisites

Numerical Linear Algebra (CSE/MATH 6643) or equivalent. The assignments will require Matlab programming (at least at the level of CS 1371).

Topics

- Sparse matrices and discretizations of PDEs
- Basic iterative methods (Jacobi, Gauss-Seidel, SOR)
- Krylov subspace methods (conjugate gradient method, GMRES, etc.)
- Preconditioning
- Multigrid methods
- Domain decomposition
- Nonlinear systems of equations (fixed point, Newton, and quasi-Newton methods)

Grading

40% Matlab mini-explorations of concepts covered in class (5 or 6)

30% In-class tests (2 or 3)

30% Student-defined project and presentation

Required Textbook

- Iterative Methods for Sparse Linear Systems, 2nd edition, by Yousef Saad, SIAM, 2003. You can order this book from SIAM here. You can get a 30 percent discount if you are a SIAM member. As a student, you can join SIAM for free, since Georgia Tech is an Academic Member. Check it out here!