Preliminary schedule CME326

(Section numbers refers to the course reader)

I. Wellposedness and stability for initial value problems

Lecture 1: Introduction. Well posed problems.

Lecture 2-3: Periodic solutions and Fourier analysis. The Petrovski condition for PDE and the von Neumann condition for difference schemes. (Sec. 2.1-2.2)

II. Wellposedness and stability for initial-boundary value problems

Lecture 4-6: The energy method. Semibounded differential and difference operators. (Sec. 2.3)

Lecture 7-10: Normal mode analysis. The Kreiss condition. (Sec. 2.4)

III. Order of accuracy and and the convergence rate

Lecture 11: Accuracy of main approximation, initial conditions and boundary conditions. (Sec. 3.1-3.2)

IV. High order difference approximations

Lecture 12: Effectiveness of high order schemes. (Sec. 1.1-1.2)

Lecture 13: Standard and staggered grids. Padé type difference operators. (Sec. 4.1-4.3)

Lecture 14-15: The test equation. Runge-Kutta and linear multistep methods. Taylor expansions and the Lax-Wendroff principle.(Sec 5.1-5.3, 6.1)

Lecture 16-17: Boundary treatment. Summation by parts (SBP) operators. Projection methods and simultaneous approximation (SAT) methods. (Sec. 7.1-7.4)