18.306 Advanced Partial Differential Equations with Applications
Fall 2009

Lecture 20 2009 11 18 WED

TOPICS: Examples of first order 1-D hypebolic systems. Linear
        acoustics. Wave equation. D'Alembert solution. Simple waves.
        Wave breaking. Shocks and shock conditions. Examples.

Continue with Lecture 19

Example: Linear acoustics in 1-D.
          Exact solution by characteristics.
          System equivalent to wave equation.
Example: Wave equation. Solution of the initial value problem.
          D'Alembert solution.
          Domains of dependence and influence.
          Note: full wedge for data u and u_t

Simple waves.
As in the scalar case, characteristics cross. Solution breaks down.

Breakdown of solutions: need to input appropriate physics. An example
is when shocks apply.

Shocks for systems of conservation laws.
Rankine Hugoniot conditions.
Derivation of the Lax entropy conditions as needed for causality.
Example: Gas Dynamics and Shallow Water.