18.306 Advanced Partial Differential Equations with Applications
Fall 2009

Lecture 19 2009 11 16 MON

TOPICS: First order 1-D systems of equations. Classification.
        Hyperbolic systems and characteristics. Domains
        of dependence and influence. Examples.

First order systems of equations  $u\_t + A*u\_x = F(x, t, u)$.
where $A = A(u, x, t)$.
Characteristics as singularity lines.
Characteristic form of the equations.
Example: linear, constant coefficients, no sources, case.

Hyperbolic if A is real diagonalizable.
Example: general solution for a hyperbolic system where A is constant
and F = 0.
In general, characteristics couple.

Domains of dependence and influence.
Examples:
   Linear Gas Dynamics (acoustics). Sound waves, general solution.
   Wave equation. Reduce to form above.
   Klein Gordon equation. Characteristic form. Domains of dependece
  and influence.