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18.306 Advanced Partial Differential Equations with Applications
Fall 2009

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Lecture 02 2009 09 14 MON

TOPICS: Conservation laws and pde.
Integral and differential forms.
Closure strategies. Quasi-equillibrium.

Derivation of pde by conservation laws. Integral and differential forms.
--- The pde given by a conserved density and the corresponding flux in 1-D and in multi-D.
--- Systems of conservation laws.
The problem of closure.
Example: Euler equations of gas dynamics (1-D) and closure via equilibrium
thermodynamics.

Adding sources.

General closure strategy; quasi-equilibrium. Equations of state.
Examples: traffic flow and river flow.
--- Examine the properties of the flow equations of state for these two cases.
Equations of type rho_t + c(rho)*rho_x = 0.
c has dimensions of velocity ... what is it? It is NOT the flow velocity,
which is defined by q = flow rate = u*rho, where rho = conserved density.