General mechanics of class. Discuss syllabus, grading, books, notes, etc.
Outline of the mathematical topics to be covered:
- Modeling in continuum physics.
- Examples from traffic flow, river and channel flows, etc.
- Mathematical properties of the pde involved. Method of characteristics, shocks, etc.
- Numerical solution of pde by Finite Differences.
- Basic theory: stability analysis and convergence.
- From stability analysis to the Discrete Fourier Transforms to Fourier Series.
- FFT and spectral methods.
- Fourier and Laplace Transforms.
- Other topics, maybe. See syllabus.

Physical phenomena that motivate the material:
- Hydraulic Jumps [kitchen; river floods; flash floods; dams; etc].
- Shock waves [sonic boom, explosions, super-novas and crab nebula].
- Traffic flow waves.

Others:
- Solitary waves [say, in lakes].
- Diffusion.

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