

Final Project
NEEP 602
Engineering Problem Solving II
Spring 2005
Due Wednesday May 11, 12:25PM

Here are some examples of projects that would be suitable for this course. I can steer you to some sources that can help you with these problems. You can choose any topic you desire, but you must have your idea approved by me if you do not choose one of these. You should decide on your topic and hand in to me a brief written description of your problem and your approach no later than Tuesday May 3. Most of the last week of class will be devoted to project work.

1. Solve the problem of fluid flow around an obstacle. For instance, flow around a wedge-shaped object placed between two infinite plates. (See Koonin)
2. Develop a rocket trajectory program.
3. Simulate the flight of a reentry vehicle.
4. Determine the maximum burn time for a rocket engine with a graphite throat liner. I have some additional information to aid in formulating a complete problem.
5. Solve a representative hyperbolic PDE.
6. Solve a representative, 2-D, time-dependent problem. An example would be time dependent heat conduction in a rectangle or cylinder.
7. When we studied Runge-Kutta solutions to initial value problems in Excel, we did all the solutions with a fixed step size. For some problems it speeds up the solution if you vary the step size in order to maintain a constant accuracy. This is much faster than fixed step sizes for solutions that vary slowly over wide ranges of the independent variable. Come up with an algorithm to do this.
8. Find the critical reactor dimension for a simple fission fuel geometry. Consider doing multi-group calculations with and without a moderator.
9. Solve for the dynamics of a double pendulum and observe its chaotic behavior.
10. Solve the 3-body problem, that is, 3 objects in space attracted to each other only by gravity.
11. Simulate the flight of a golf ball and assess the importance of spin and of the dimpling on the ball. A book called The Physics of Golf will be useful. I can provide the equations that you would need to do this.
12. Simulate the flight of a curve ball in baseball. A book called The Physics of Baseball has all that you need.
13. Explore the interpretation and utility of phase plots for a given problem.
14. Come up with a problem of your own.

In addition to your script and/or spreadsheet, you are to provide a 3-4 page report detailing your problem, your approach, any problems you encountered, and your final results.