ASTR415 Spring 2007 Term Project

Due May 08, 2007

1) For your term project you will install and learn how to use a freely available (open-source) 3D visualization tool based on Open-GL. You will write a short report and present in class the results of your work. Your goal is to produce impressive high quality images and movies of 3D data (volumes) binned in a variety of grid or coordinate systems. I will provide a 3D data sets in netCDF or HDF file format in rectangular and spherical coordinates. You are welcome to download from the web other data sets including adaptive mesh data sets or unstructured grids in addition to my data.

2) As an alternative, if you enjoy programming and learning more about the basics on visualization, you can write your own code which uses calls to Open-GL functions (or more advanced tools such as VTK). If any of you is interested in doing this I can provide some interesting tutorial/starting point to visualize particle data. Clearly your code will not need to compete in complexity the ones available on the web. In particular, it may be a good idea to focus on visualization of volumes in spherical coordinates as this capability is rarely found in freely available codes.

Prepare a 1500-word essay (4 pages double-spaced max, not including figures or bibliography) and a ppt or pdf presentation highlighting the following points:

1. The tool capabilities and basic design concepts
2. The language of the code and the platforms on which runs
3. The libraries needed to compile and ease of installation
4. What are the limitations of the tool (speed, quality, maximum data set size, etc.)?
5. Could you visualize data in cylindrical or spherical coordinates?
6. Could you visualize data on an unstructured mesh (adaptive mesh).
7. Visualization techniques: 3D rendering, isosurface, particle visualization, etc
8. Data formats supported

Each student should pick a different visualization tool so that at the end of the class we will be able to compare many different ones. You are allowed to work in groups of two if you like. In this case you can submit one essay but It will be twice as long and you will share a longer presentation.

An (incomplete) list of visualization tools suitable for this project include: Cassandra, ChomboVis, Visit, OpenDX, Ifrit, Paraview, MayaVi, Visu (Google them or look at the Wiki entry for VTK!). There are also publicly available codes (eg, VTK) which specialize in providing higher level functions useful to build sophisticated visualization codes.

The essay/presentation component is worth 20% of your overall grade for the course. Have fun!