Stefany Final Project Assessment

Report [43/55]:

1) Your report must be typeset in LaTeX, use the RevTeX style manuals used by Physical Review Journals.

4 – yes, but some typos.

2) Figures should have clear labels and captions. All figures should be referred to in the text and tell part of the narrative.

4 – generally yes, but why so much dynamic range in plots, and what do the colors mean.

3) Your paper should have a clear abstract, no more than a paragraph, that highlights what you have done.

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4) You should explain the context and motivation of the physics problem you are solving.

4—good job, but more on energy conservation or not and exotic forms of matter

5) You should write-down all equations solved by your code in the report.

4—yes, well done, but mathematica notebook needed.

6) You should explain the computational methods used to solve these equations – if they are methods that were discussed in class, say so! You are welcome to use libraries (e.g. scipy) instead of writing things from scratch, but be sure to acknowledge all libraries used.

4 – good job, but say more about adapative solver.

7) Have a discussion or figure showing that your code can reproduce a classic test case or known solution If you failed to reproduce published results or classic test cases, please hypothesize why.

3—there are published graphs in Alcubierre -- compare

8) You should have a clear reference list, typeset using BibTeX, citing all methods/outside software packages used.

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9) You must read and draw on 2 primary physics literature references (if you are doing a topic I suggested, these must go beyond the suggested reading), and as many pedagogical/textbook references as you like.

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10) If your code takes more than a few minutes to run, explain the computational challenges of your project in the report.

0 – should say more, and discuss convergence tests, if any. Why not adaptive step size? How did you choose the step size? One should always explain such things.

11) Make sure to acknowledge your team and collaborators (and anyone you sought advice from) in your report.

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Code [17/25]:

1) Does the code run?

2—not clear – freezes my computer!

2) Is the code well structured?

4 – would be better if different warp functions were implemented in a modular way

3) Is the code well documented?

3 – reasonable documentation, but no guidance given for stepsize, etc….

Or – could have had a less verbose version of the code that dumps output to a file instead of screen so user can get useable output without seeing all the inner workings of the code in real time.

4) Is the code self-sufficient?

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5) If the code takes a long-time to run, is an explanation of requisite resources/libraries provided?

3 -need more detail on how to run, given that it takes a very long time.

Presentation [17/20]:

You should prepare a keynote/Powerpoint style presentation on your work. This presentation should

1) Lay out the motivation for the physics problem to be solved.

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2) Lay out the equations to be solved.

4--- good job, but confusion between length and curvature

3) Have helpful schematics to explain the problem.

3—somewhat cartoony diagram, could have used something from the papers, should cite where schematics come from

4) Name the computational methods used or to be used – if they were covered in class, review them. If not, briefly explain them.

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Start with a description of length contraction or time dilation and a link to GR. SR is fundamental but modified in GR. Extensive qualitative discussion of GR. Warp Drive → Warp Bubble. Should cite where figures come from unless you drop them.

Without breaking laws of physics. Energy density and pressure of exotic matter. Good job describing that you'd have FTL while being locally in free fall but downplays in exotic matter.

Exotic matter.

Metric actually tells you length, not curvature, but you got the right idea – key equations shown (for metric geodesic). Row and column correspond to any dimension *not just spatial.*

Citation. Line element/metric. Good birdseye view of analytic part of project and what numerical method will be required, no initial results but good plan.

Maddie – is there a specific mass you're calculating this for? Mass source mass. Mass of the spaceship encoded in the metric.

Overall individual score- [77/100]

IF YOU WORK IN A GROUP – 20% of your project score will (on top of the above) be based on how well you meet the good citizenship criteria below.

PACKAGES/LIBRARIES – quite a few of these problems already have good libraries ready to solve them! If you wish, you can use these, but then compensate for the time savings by doing interesting things with the software. Remember, when you submit code, you must submit everything needed to reproduce your results (if I need to install a python package to run your code, you need to give me a shell script with a pip install and very clear instructions). If you go this route, remember I have in mind that this project is 4-5 homework sets worth of coding, plus the writeup.

<u>Group Work [88.9%]</u>

You are welcome (but certainly not required to) to work on your own, or in groups of 2 or 4. To ensure fair grading, group members will have to assess all their peers on the following criteria with a yes, no or sometimes. Team Member Z:

a) Contributed to their agreed-upon code component of the project.
   yes
b) Responded to communications in a timely manner and attended mutually agreed-upon meeting times.
   sometimes
c) Contributed to preparation of their agreed-upon component of the oral presentation.
   yes

Each group member must submit their own report. Of course you may discuss and exchange ideas, but the final words must be your own. You may use/share figures (but cite their creator(s)), but you may choose to focus on different aspects of the techniques and/or results.

The above group "citizenship" grade will be folded in as 20% of your project grade, if you decide to work in a group.

Overall grade=0.8*0.77+0.2*0.889=0.794