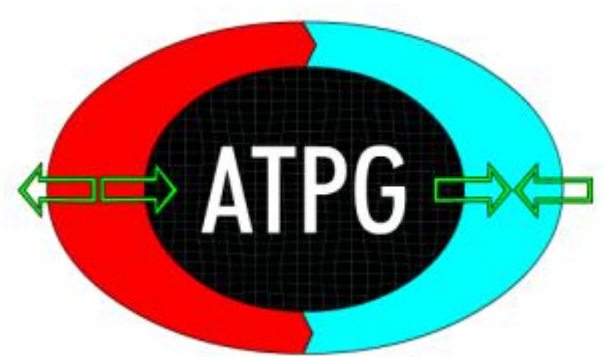


Advanced Theoretical Propulsion Group

The official newsletter of the Alcubierre Warp Drive Discussion Forum

Issue 4

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Group Motto: *“E Somnio Ad Astra ”*¹

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¹motto established by Simon Jenks; error in translation reported so motto modified

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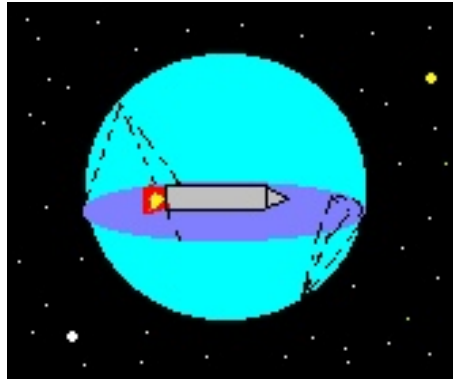
Editorial

I am plenty busy and well the group doesn't always have topics which can be easily translated into separate sub articles. It however may be possible for group members to send brief reports to be, so that I may include them in the newsletter as this would be a big help to me. –Yes that was in the last posting, I have other things to worry about and this will likely be the last posting unless I get help!

-eh

Warp Drives Attacked Yet Again

Contributor: Group, mostly editor



“Those Klingon bastards murdered my son.” -James T. Kirk (From Star Trek III)

In the second issue of the ATPG a short review was made of the Nartatio Warp Drive [1], the warp drive was of little interest to the group because it used outdated techniques to review the warp drive. The article would have been fine if was well established in the frame work of general relativity and if it would have been printed soon after the Alcubierre paper. Further Natario makes the all out claim that “warp drives are impossible,” its one thing to say improbable, or very unlikely, but to say impossible requires strong technical evidence. Its observably impossible for the earth to be flat, but making a claim like black holes are impossible, because we have not observed them is bad science. No one has seen a neutrino, or been able to observe a virtual particle, but that doesn’t make them any less real. I will not comment to much more on this as it has all ready been done so, I think anyone who address this article will see that it is plagued with problems. Its just that Natario chose to take the safe road and stay with conventional wisdom, and we all know how history treats those who play it safe, they’re forgot.

I do not want to sound like a person who is against people who write papers against warp drive, in fact I find them very valuable. For example The Unphysical nature of Warp Drive [2] by Pffening and Ford is a very good article, it helps us who study warp drives to realize what there short comings are, which is very valuable. But mixing apples and oranges is very bad thing, for example allowing for FTL travel within SR leads to time paradoxes. While in general relativity they just lead to new constructions of the very fabric of space and time.

Support, we are of course welcomed to other opinions an expert in the field who shall rename nameless for privacy reasons stated that. “I have seen the paper by Jose Natario. Very nice. I do not see why you say he uses almost no GR. You are wrong, he uses full GR all the time. [...] He uses a more mathematical formulation that I do, but it is full GR (in fact, a very elegant form of it).”

Here is where the difference in opinion lies, you can set up general relativity without curvature, then you have special relativity. General relativity is also based on Riemannian manifolds, that does not mescal mean an object in Reimanin space requires general relativity. In the introduction Natraio clearly states that he is using Euclidean 3 geometry, we also see that he uses a classical rate of strain tensor to calculate an energy density tensor in general relativity, so in the later sections he just flings classical physics into general relativity. Now it is common to write general relativity into a 3+1 field for numerical calculations and visualization purposes. And in GR there is no difference between classical rest masses and relativistic rest masses, so you obtain the same gravitational field. However if there is rotation and relativistic velocities there is something quite different going one here. Since Nartario paper is “spherically symmetric,” its affects agree with GR until relativistic velocities are approached. The big problem is that he considers a warp drive with zero expansion, and zero expansion implies flat spacetime (he even states this earlier in the work), this

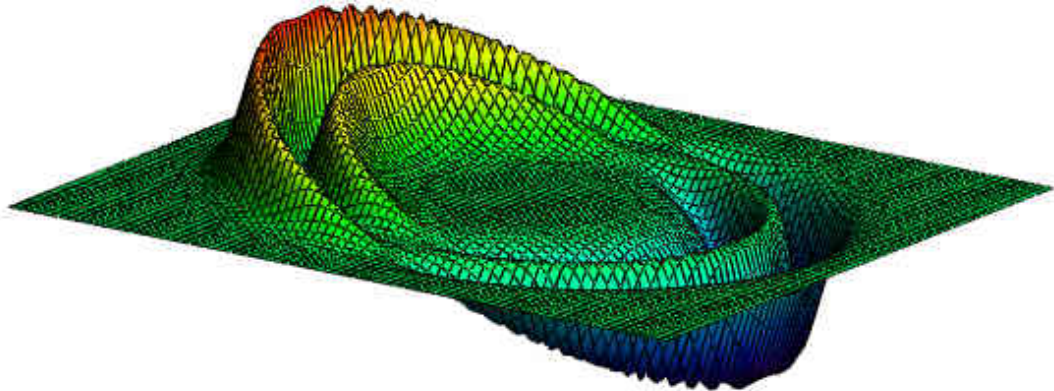
implies also no hypersurface and no warp drive. His paper thus only makes sense in GR if it is moving at a velocity $c\sqrt{1-v^2/c^2}$, and for a single cross section (purple region of the above region) of warp drive spacetime (and his warp drive is spherically symmetric [the blue region], see the problem?) and this is why we say there is a lack of GR (although technically it can be imposed on GR)! From this rather laborious discursion you can see how you can force this bastard geometry into the frame work of general relativity, however from this discussion you can see that this is not very practical.

references

- [1] Natario J. Warp Drive with Zero Expansion gr-qc/0110086
- [2] Pfenning M. and Ford L. The unphysical nature of “Warp Drive” gr-qc/9702026

ATPG-ESAA Superluminal Warp Drive raises eyebrows

Contributor: The Club, General



Build it and they will come, if you build they do come, recently the ATPG created a new warp drive geometry which has amazingly received a lot of attention. Well I feel I can do very little justice to paper in this summary but the ATPG allowed for the first time a method for a superluminal warp drive to be constructed. In short this means it would mean that it wouldn't be anymore difficult to control a superluminal warp drive from a subluminal warp drive. The original Alcubierre geometry was only capable of moving a material body at sublight speeds without the worry of encountering relativistic distortions. The recent work by ATPG is the first theoretical model of a warp drive that behaves much as the celebrated Star Trek Warp Drive, being that it can actually travel faster than light. Since the work was small and made not other advances or much allusions to the real physical world we were not accepting much attention from it. But poof, there has been interest from a small number of physicists, people in the aerospace industry as well as a popular science magazine. I would comment more I'm sure they would like to enjoy there privacy on the manner and intend to respect that. Of course the afore mentioned Natrio brings up at least one valid point, there is still the blue shift problem associated with warp drives. If a warp drive were to travel at near the speed of light, the spaceship will be radiated with intense gamma rays. Although the frame work of our warp drive would prevent this depending on how it is engineered, such that it may be possible to go slightly above c before encountering this problem.

More comments, again the same physicist who commented on the Natrio article made a comment on this new warp drive. "I am sorry I have not convinced you that horizons are unavoidable. You can't eliminate them, nor improve their behavior as you say." I would have to say there is a small difference in opinion here, yes we very much agree that horizons are unavoidable. No matter what the interior size of a black hole you will ultimately end up with an event horizon. However since the warp drive uses space as propulsion if you infold space much as Broeck has done in the past where the horizon forms chances. So if a horizon normal formed when $v=c$, if you modify the geometry with an x -term then a horizon would form at $v=c+x$, thus at least you have partial control. However is you travel at $c+x$ and not just under it, you will once again run into the horizon formation problem. Again the warp drive has several problems that make it very difficult to work with or accept, however we are just taking baby steps here.

Macroscopic Quantum Tunneling an Aerospace design

Contributor: Group

A brave new concept from Unitel Aerospace embraces interstellar travel and uses a full out quantum theory. The main focus of ATPG is to study the dynamics of geometrodynamics to study the possibility of interstellar travel as such concepts are comprehensible, albeit difficult. The concept is interesting but difficult, the warp drive spacetime runs into difficulty of exotic energy requirements. The MQT runs into probabilistic problems of the Heisenberg Uncertainty Principle. The claim they make is if a spin particle can be entangled with another spin particle that the two could exchange place at intergalactic distances. They believe that if they can get a hull of spacecraft to mimic a wave function of a single particle that craft could be capable of traveling anywhere in the universe. This is an extraordinary claim and extraordinarily ambitious current technology rests on classical mechanics and they will shoot starlight forward to quantum theory. Although probabilistic sound it is not very physically sound, you have to hope that the odds are in your favor. Actually I believe there is a sci-fi equivalent something called a "slip-stream," which is portrayed in the sci-fi series *Andromeda*. However any such attempt would be very technical and require lots of tedious calculations, this is just a short report of another FTL vessel concept.

Negative Energy amplifications

Contributor: The Club, General

Paul Holliad a recent newcomer to ATPG will have an article published in the April-May issue of the Journal of Theoretics. The article raises the short comings of the negative energy requirement of some of the more exotic spacetimes known to modern science. In the field of quantum optics it has been suggested that one may not need to generate large fluxes of negative energy. It may simply be possible to create an artificial lens and amplify pre existing negative energy densities. One of the proposed methods to do this is quite striking, just turn up the heat, it is likely if this concept is to catch on the structure of the early Universe may give us a clue how to generate large fluxes of negative energy.

Top Hat: The Next Generation

Contributor: Shore, Held, Hart

This is a short report on the groups persistent studies on the warp drive top hat function $f(r_s)$. I however have been unable to be caught up on every little aspect that has been going on, but here is a brief summary. There is the Shore top-hat which combines the original Alcubierre top hat with the new top hat created in the Group's second work. This does very little in the energy conditions as I understand but smooths out the piecewise functions so that they eventually drop down to zero outside the warped regions. There is also the possibility of considering the implication of a top-hat function which oscillates perhaps via $df(r_s)/dr_s = \cos(r_s)$, this will give the warp drive dynamical capabilities which may have consequences for energy conditions, of course much work is yet to be done.

New geocities polices and ATPG future

Contributor: The Club, General

Geociteis the current server for ATPG has announced some changes in their policy and that will likely prevent me from making further updates, or at least massive ones. Also this newsletter was made to cover topics discussed at the yahoo forum, however I am no longer able to keep up with everything. Also some of the more scientific details have been categorized for more easy access removing the need for this newsletter. I will only post more if there is a cry for it and if I have the time, I think the time problem is the most serious. However, if others write up short responses it should not be to difficult for me to cut and paste eliminating the time problem. So this will likely be the last newsletter unless there are others willing to help me out or take over the process for me.