Voyage of the Whorl: Calculations of Thrust, Distance

The Whorl list — 1 messages, 1 voices, 04 Sep 2001

https://urth.darkrealm.vip/thread/whorl/1472

Michael Andre-Driussi — 04 Sep 2001, 09:15

Travel back through time--Today!

> From "Welcome Wombat" 7 Sep 97, I wrote:
> Re: Whorl flight time. It appears to have been 332 years subjective time (III,173) and 1000 years objective time (III,242); which in turn suggests an average speed of around .95 c (95% of light speed). (Time compression, doncha know.)

Note that the compression is based on average speed, not peak speed. This implies, I think, a flight profile Boost/Glide/Boost.

I compared a number of stardrives in "Stardrive" 3 Nov 98. (I'd paste it in right here, but I'm too lazy to strip out the html coding.)

(I also talked about the Whorl calendar somewhere, I think.)

> Talarican wrote:
> Assuming a "Bussard ramjet-style" 1/2 continuous acceleration, 1/2 continuous deceleration flight profile, to calculate the necessary acceleration/deceleration and actual distance covered, the elapsed times were divided in half, as the acceleration and deceleration phases are (ah, so Wolfean!) symmetrical.

Your flight profile is Boost/Boost (acceleration/deceleration).

[equations cut]

> {a'} was found to be equal to about 0.02026 gee, which gets you within about a fortnight of exact. And if _that's_ not close enough, there's no more help, hope, or comfort _I_ can offer you. (especially since {t} and {t'} aren't known to the nearest year anyway).
>
> Therefore, {d}= 2*{x} was 9.54 * 10^18 meters, or 309 parsecs, or 1008 light-years (as we'd expect);
> and {v[peak]} at turnover was 2.99 * 10^8 m/s, or 0.996 c.
>
> by way of comparison, using 2*{t} = 1000yr,
> {a'} ~ .0194 gee, {d} = 277 psc, {v[peak]} = 0.995c.

Hmmm. My guestimate is that with .02 gees constant acceleration it would take about 50 years to reach NAFAL (nearly as fast as light); and the distance covered in this time would be 25 light years.

If there is no Glide phase, therefore, the next boost will bring the ship down to a rest . . . 25 light years further, and 50 years later. Thus the average speed is .5 c, and the total distance is 50 light years in 100 years. The time comression at .5 c is too small for our purposes.

Since you want the objective time to equal 1100 years, we can add a glide period of 1000 years.

Objective
Boost 50 years
Glide 1000 years
Boost 50 years
TOTAL 1100 years

> Talarican wrote:
> The Bussard Ramjet, unfortunately, has one glaring limitation, provided you grant that they and their vast "ramscoops" are even possible. A Bussard ramjet's terminal velocity is said to limited by the resistance of the interstellar gas against the ramscoop to about 0.90 c.

The figures I read in THE STARFLIGHT HANDBOOK (one of my favorite books) give 0.2c as being the top speed for an interstellar ion ramjet (I think I'll call 'em "bramjets," myself). Best models for the Whorl are (still) Hainish drives ala Le Guin, Quantum/Vacuum jets (aka zero point) ala Clarke and Sheffield, possibly wormhole photon output, or maybe even tachyon drive (for that super exhaust velocity!). These systems either "live off the land" or are otherwise magical (Hainish drives having no explanation given, other than being photon).

=mantis=

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*This is WHORL, for discussion of Gene Wolfe's Book of the Long Sun.