

The Physics and Dimensions of the Whorl

The Whorl list — 2 messages, 2 voices, 07 Oct 1997

<https://urth.darkrealm.vip/thread/whorl/449>

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John Eric Ivancich — 07 Oct 1997, 13:03

Hi Everyone,

I'm going to try to pin down the radius and the circumference of the Whorl with some physics calculations. Now it's been more than a decade since I've had a physics course, so I hope someone will check my work.

Before I start, I would like to point out two things. GW was a mechanical engineer, so he could have done the same calculations, and probably armed with nothing but a slide rule. Second, GW, in his answers to the WHORL, said he didn't know what the dimensions of the Whorl were.

Assumption #1

Gravity in the Whorl is about the same as that on Earth/Urth. Gravity is measured by the acceleration rate towards the ground. On Earth (at sea level, at 45 degrees latitude) it is 9.80616 meters per second per second. Since most of us are probably more comfortable thinking in terms of miles per hour, that would be 78986 miles per hour per hour.

Basic Relationships

From the rate of acceleration we can determine the relationship between the velocity at the inner surface of the Whorl and the radius of the inner space of the Whorl.

v^2

$r = \frac{v^2}{a}$; "radius equals velocity-squared over acceleration"

a

Since we know "a", all we need is a good estimate of "v", and then we have "r".

Also recall the basic relationship between circumference and radius.

$c = 2 * \pi * r$

Assumption #2

We have some clues about the velocity of the inner surface of the Whorl due to information we have about the floaters.

In Nightside, pp. 196-7 (mass paperback version used for all page references) Silk, while returning to the city in Blood's floater mentions the trip had taken hours on donkeys. On p. 204,

while in the city, Silk says it had been less than a half an hour since he'd left Blood's compound.

If a donkey travels at 5 mph (guess), and it took them 3 hours (guess) to get to Blood's estate, then it's a distance of 15 miles. When returning in the floater it took them 30 minutes, so the floater was traveling at 30 miles per hour. If the donkey travels faster, or the donkey-time were longer, or they spent some time in the city before Silk mentioned the half an hour, then the floater traveled faster. I think it's safe to say, though, that the floater wasn't going any faster than 60 mph.

Furthermore, that speed is safe, as there were no warnings of "vector unacceptable".

Assumption #3

In Calde, pp. 303-6, they (Silk, Hyacinth, Oosik, Quetzal, Xiphias, the surgeon, and a driver) try to speed away in the floater as the pterotroopers are attacking. They achieve an unacceptable vector, and they, along with objects within the floater, start to float. This can only mean that they completely counter-acted the velocity of the Whorl, negating its gravity effects.

If we can figure out how fast they were going (and assuming a strictly southerly direction, p. 306) we know the velocity of the inner surface of the Whorl.

They're in a city street filled with people. That would seem to put an upper-limit on their speed. But the speed must also be significantly greater than the typical speed the floater travels at, since apparently they experience no significant altered-gravity effects at the typical speed.

It thus seems to me, then, that the floater was traveling maybe in the range of 150 to 200 mph, when they lost the effect of gravity. Let's assume the larger.

Calculation #1

OK folks, here we go. Are you sitting down???

200 * 200

r = ----- = 0.5 miles ; diameter = 1 mile ; circumference = 3.14 miles
78986

Seems we have a problem, huh?

What if the velocity is 400 mph -- which seems beyond reasonableness.

400 * 400

r = ----- = 2 miles ; diameter = 4 miles ; circumference = 12.5 miles
78986

And we still have problems.

Calculation #2

Let's try it the other way. Let's go from radius to velocity:

$$v = \sqrt{r * 78986}$$

On May 5, 1997, mantis posted to the WHORL estimating the radius of the Whorl as being between 72 miles and 344 miles (I took the liberty of converting from leagues to miles).

At 72 miles, the velocity at the inner surface would be 2400 mph.

At 344 miles, the velocity would be 5200 mph.

While these figures seem more reasonable for the dimensions of the Whorl, the floater could never approach these speeds, particularly in city streets, and thus they could never have significantly counter-acted the gravity effect.

Conclusion

GW took significant artistic license. Although maybe he'd blame it on Horn and Nettle...

Eric

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Michael Straight — 07 Oct 1997, 14:54 · follows John Eric Ivancich

On Tue, 7 Oct 1997, John Eric Ivancich wrote:

Calculation #1

OK folks, here we go. Are you sitting down???

200 * 200

r = ----- = 0.5 miles ; diameter = 1 mile ; circumference = 3.14 miles

78986

Seems we have a problem, huh?

"THE RINGWORLD IS UNSTAAABLE! THE RINGWORLD IS UNSTAAAABLE!"

-Rostrum