

Re: Naive questions about a space elevator

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- *From:* "Martha Adams" <mhada@xxxxxxxxxxx>
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I like the space elevator a whole lot. Imagine practically no throw-away mass vs when you do it with rockets, you're doing fine if you wind up with 1% of the mass you started with. Further, if a booster fails, the whole thing comes crashing down; vs, using an elevator, it simply stops. Inconvenient, maybe, but I know which transportation method I'd prefer for getting out of this Terran gravity well.

I've been to some talks about space elevators. The platform can sit on some large ships, like oil tankers; when one of the ships needs overhaul you pull it out and slip in the replacement standing by. One of the ship's engines could provide the power. My imagination runs like this:

- 1) Goggles, everyone!
- 2) A great big engine cranks up somewhere nearby.
- 3) Nobody looks at the elevator, which starts rising quietly. (Beware reflected laser light!)
- 4) Maybe not impressive, but deeply satisfying from my point of view.

If an airplane flies into the elevator cable, the most expectable result is two pieces of airplane falling from the sky.

A ribbon cable can be renewed by continually adding on one side, and removing on the other.

The problem I do not hear anyone talking about is, how do you consistently and efficiently grow nanotubes up to a few cm long? If we can learn to do that, seems to me, the rest of it is (relatively) easy. My guess for the #2 major problem: achieving an adequate energy density of the laser light that powers the elevator's motors, without melting the hardware.

Re airplanes again, have you thought what you might do with such a laser if you spotted a known hostile airplane coming up over the horizon? The laser will have to be gimbaled in any case, to track

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the elevator through the cable's swinging across some of the sky.
Just make the gimbals with a wider range.

My guess for the #3 major problem: destructive people who have no contributions to society but they will run around breaking things.

I've seen a book around, and I had a peek into it. Space elevator theory (i.e., mathematical). It outlines where the physics pinches if you want to do a space elevator. I think one of the Liftport principals wrote it.

Cheers -- Martha Adams

"sal" <pragmatist@xxxxxxxxxxx> wrote in message
news:pan.2006.11.06.03.08.42.937059@xxxxxxxxxxxxxxxx

I have two naive questions about a space elevator to which I haven't seen clear answers. Both have to do with the bottom 0.5% of the cable:
the part in the atmosphere. (I hope this isn't too off-topic for a _policy_ newsgroup...)

1) How is the cable expected to handle tropical storms? Is it believed that such a structure could ride out hurricane force winds without turning into Galloping Gertie? Or is it assumed that, since the elevator will touch down either on the equator or very near to it, hurricanes won't be an issue, since they normally don't form closer than about +/- 300 miles from the equator (due to lack of Coriolis effect)?

The 300 mile "restricted zone" for hurricanes sounded good until I realized massive storms can migrate to the equator, even if they can't form there, and even if they're doomed by crossing the equator they still might be able to cause significant havoc to a ground station on the equator.

One issue with riding out strong winds, of course, is that the tension vector is almost straight up, even if the the cable has been pulled far off to one side: at the top of the atmosphere we're already more than 99 percent of the way down. This would seem to suggest that the cable will not be very "stiff" in response to horizontal wind loading.

2) What's the current story on the atmospheric E and B fields? I seem to recall a shuttle experiment with a tethered satellite failed due to high electrical tension along the cable. Now, as I understand it, that was most likely due to the earth's B field (which the shuttle cuts across at high speed), which would presumably not be an issue for something stationary WRT the Earth's surface. But the atmosphere

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also has a significant (vertical) E field. I've seen speculation (elsewhere) that this would be a problem for an elevator; I've speculated privately that this could be a great resource for an elevator to tap (if the voltage isn't too impossibly high). Does anyone here know the correct story on this? Is it even an issue?

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Nospam becomes physicsinsights to fix the email
I can be also contacted through <http://www.physicsinsights.org>