

Re: More Space Elevator news

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From: John Schilling (schillin_at_spock.usc.edu)

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"Pete Lynn" <pete@peterlynnkites.com> writes:

> "John Schilling" <schillin@spock.usc.edu> wrote in message

> news:cchjvi\$mtel@spock.usc.edu...

>>

>> Are you seriously claiming that transportation to LEO by rocket is
>> likely to be **an order of magnitude cheaper** than transportation to
>> GEO by beanstalk, presuming the existence of a practical
>> beanstalk?

> Yes. If you do not believe me, just work out the comparative energy
> costs and drymass fractions, with the emphasis on the latter. A mature
> rocket launch industry will quickly approach around \$20/kg to LEO,
> (based on fuel cost and aircraft type operation).

Did you really just use "mature industry" and "quickly approach" in
the same sentence? Try again.

Or not, but **do** recognize that however popular the whole, "three times
fuel cost", mantra is here, it is an **extremely** crude and simplistic
sort of analysis, that is really only relevant on a generational timescale
and bound to disappoint anyone here expecting to see such costs in their
own natural lifetime. For that, you add another zero or so.

>> Because that is the core assumption of the discussion, that a space
>> elevator does exist and does provide low-cost transportation
>> service to GEO and only to GEO. It's not an assumption I would
>> bet on in the near term, for several reasons, but if it does come to
>> pass it is likely to be the biggest, cheapest game in town and to
>> displace most of the alternatives.

> That sounds very much like what the shuttle was going to be. Biggest
> yes, but cheapest? Do you think Beanstalk CNT will be orders of
> magnitude cheaper than rocket drymass?

Yes, in the same way and for the same reason that cable dry mass is
orders of magnitude cheaper than airplane dry mass even when they

are made of the same basic materials.

But why are we talking about dry mass? Your formula for cost analysis is based on energy cost and a concept-of-operations multiplier. Which, as I have said, is crude and simplistic but perhaps reasonable in the long run.

>> *The assumption that a space elevator will exist, and provide commercial transportation services to GEO, but that rockets will be providing *cheaper* transportation to LEO, that I'd bet seriously against, ever.*

> *Work the numbers.*

OK. The energy requirement to lift a kilogram to GEO along a beanstalk is a hair over 48 megajoules/kilogram. Assuming 50% efficiency in the power beaming and 50% efficiency in the drive system, that's 53 kW-h/kg at the wall plug.

Wholesale price of electricity in Brazil, one reasonable location for a beanstalk terminus, is \$0.024/kW=h.

A mature beanstalk launch industry will eventually approach $53 * 0.024 * 3$ or \$3.82/kg to GEO (based on energy cost and railroad type operation).

If GEO is accessible at \$3.82/kg by beanstalk and LEO costs \$20/kg by rocket, or for systems you and I might live to see \$38.20/kg to GEO and \$200/kg to LEO, who on Earth do you think is going to be paying the extra 423% for the LEO service and why?

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*John Schilling	* "Anything worth doing,	*
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