The Pyramid, a TRPT Rethink

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Reimagining the TRPT [Tensile Rotary Power Transfer] concept, we combine a tensile rotary shaft with three rigid steerable kites all with a single tether attachment point. The design promises: Continuous power output, a plausible launch and land mechanism and unparalleled scaling due to not being affected much by gravity slow-down.

We look at the building blocks of the design; a soft shaft, a motorized triangular bridle between the kites, an algorithm to control average vertical and horizontal force and provide constant tension on each tether, and more.

We introduce the Λ factor describing the soft shaft's ability to transfer power. This scale independent factor is used to show that the shaft's power transferring ability scales equal to the power generating ability of the kites.

We see that the three tethers without further shaft expansion support provides sufficient power transferring capabilities at practical elevation angle and altitude. We look at how tether drag limits the length of the shaft. The shaft needs a high glide ratio, but longer tethers defeat this requirement.

We present a detailed simulation providing a power curve.

Open source simulator and further documentation may be found at https://github.com/tallakt/TRPTSim

The Pyramid Illustration