

A solar powered reusable booster rocket

Mikkel H. Jensen

DTU Mechanical Engineering, Technical University of Denmark
m@ylle.eu

To decrease harmful emissions from rocket launches and create a genuine low cost launch-on-demand space infrastructure, I propose using beamed solar power energy from Concentrated Solar Power (CSP) plants to power the first stage of a reusable Launch Vehicle (LV).

By focusing mirrors from a high capacity CSP plant onto a flight trajectory path, it is possible to create a moving high energy region that can be collected by the LV using a heat exchanger. This eliminates the need for toxic propellants currently in use on other LVs. The concept allows for complex parts to stay on the ground, simplifying the space plane design and increasing the likelihood for greener, cheaper and more space launches.

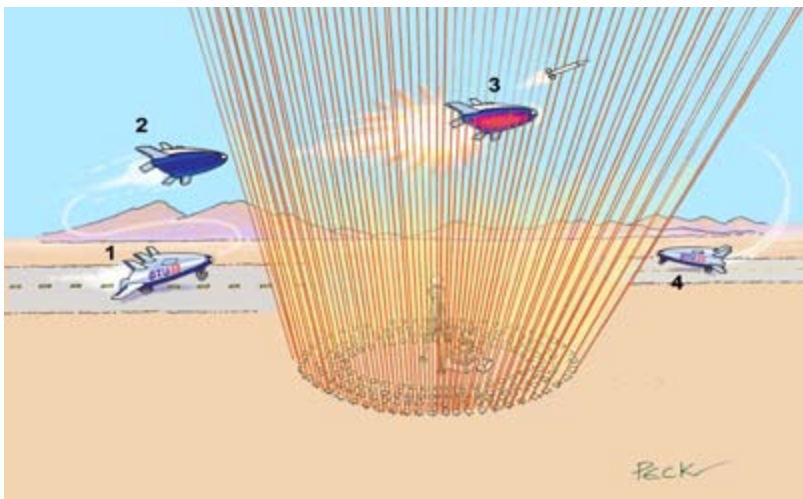


Figure 1: (1-2) LV takes off like a normal airplane and climbs to a fixed initial trajectory point. (2-3) LV collects beam energy and converts thermal energy into thrust, accelerating to a cutoff point. (3-4) LV releases expandable orbital 2nd stage. LV then returns to the airfield like a normal airplane.

The project is a proof of concept, focusing on verifying two crucial elements in the launcher infrastructure;

- Identifying potential sources of energy losses in the system to estimate the efficiency.
- Investigating the total velocity boost capability of the system by performing a multivariable optimization