CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY

Name(s)

Rohil Khare

Project Number

S1015

Project Title

Vacuumed Linear Accelerator Launchers: The Future of Space Launches

Abstract

Objectives

Rockets today are extremely expensive to launch due to the cost of fuel. If we want to get closer to commercial space travel, we must make the cost of launching rockets to space as cheap as possible The way we can achieve this is to reduce the cost of fuel because according to NASA's official website, the cost of fuel is 1.39 million dollars per launch.

Methods

This project aims to reduce the fuel cost for rockets by replacing the initial boosters with a magnetic linear accelerator which is then placed in a vacuum tube to further amplify the speed. The accelerator was first discovered by a man named Rolf Wideroe who was a physics teacher who wanted to show his class the principles of magnets. Over time, this idea was lost to time but the prototype is a much-improved version of the older accelerator first created by Rolf Wideroe. Multiple more magnet chains were added so the accelerator can go faster than what it did during Wideroe s time. Placing the accelerator in the vacuum tube is used to efficiently decrease drag to make the probability of launching rockets with the prototype more likely in a full scaled version. Photogates were used to help get extremely accurate velocities. Each photogate was placed at a varying distance to see if the vacuum tube actually helped.

Results

It was also calculated that the prototype is 1/1000 or 1/10000 of the size compared to this prototype being built at a full scale. With this information and seeing that the escape velocity of earth is 7 miles in a second, it was determined that the prototype must travel 39.6 or 3.96 feet in 1 second. The prototype exceeded this limit and went about 260 feet in 1 second. The vacuum tube helped decrease the drag on the rocket and the data supports this claim because the velocity 12 inches away from the launch gate in the vacuumed tube was 3 meters/ second greater than the launcher without the vacuum.

Conclusions

This means that the idea of a magnet launching a rocket ship in a vacuum tube is completely plausible and can be done on a full scale to successfully launch a rocket. This can be concluded because my project achieved the goal speed I had set. This idea is also applicable to many other things like launching weather balloons and gliders. Imagine instead of using jet fuel, gliders are launched using the prototype and they slowly glide down. It can also be used for train systems such as the Hyperloop.

Summary Statement

The vacuumed linear accelerator launcher is a magnetic powered accelerator, which is placed in a vacuum, to create an ideal prototype which aims to launch rockets to space and its possibilities do not end there

Help Received

My dad helped me buy the materials. My science teacher, Mrs.Brown supplied me with the photogates.