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Electric Ignited Solid Rocket with Satellite Dropping Mechanism for Live Data Transmission

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ABSTRACT: The whole concept behind this idea is using aerodynamic property of propelling rockets to transfer live data and predict weather conditions. These small scaled rockets are made up of PVC material and other stuffs which are easily available as well as cheap. Electric ignition system is used for ignition which initiate it to certain height (approx. 1000fts) and then tilt it to small angle and release the parachute which transmit live weather data.

KEYWORDS: Aerodynamic, Electric Ignition, Propellant.

I. INTRODUCTION

Rockets have a major application in launch vehicles for artificial satellites, human spaceflight and space exploration. But these are launch vehicles on large scales; now-a-days miniature rockets i.e. which are launched within the earth's gravitational field and upto desired altitude (about 1000fts) are dragging more attention. The reason behind this is their applications. This small-scale rocket can be used for transmitting live data on the go which predict the weather conditions at desired location points in the atmosphere. There are various types of rocket motors utilizing many types of propellants and varying in complexity. The rockets presented in this book are of the simplest and use a solid fuel propellant. By solid fuel I mean that the propellant in the rocket engines is in a solid state such as a powder. The propellant is a mixture of a fuel and an oxidizer. The fuel in these rocket motors is carbon, Sulphur and the oxidizer is the potassium nitrate. Potassium nitrate will not burn at all on its own unless it is presented with a fuel source and carbon, Sulphur burns mildly because it does have an oxygen source that it needs to burn mildly and that is the oxygen in the air. The potassium nitrate can't burn because there is no fuel source in the air for it to provide its oxygen's to. But when these two components are mix together, they will burn violently and very rapidly. This is because the potassium nitrate is providing its oxygens to the fuel that is the carbon, Sulphur and this all becomes a chemical equilibrium. The closer to this equilibrium the faster the propellant will burn. The potassium nitrate and the carbon, sulphur is in a stable state until you add an energy source to them to give them the required energy to convert over to gaseous products. The required energy breaks the molecular bonds and they recombine to form various products most of which are gases. This required energy is simply a flame or heat energy.

II. RELATED WORK

Mechanical properties and the design of solid propellant motors by M. L Williams California institute of technology; it explains that for design purposes, rocket Engineer wishes to know the primary effects which mechanical properties have upon the overall performance of solid propellant motors.

A method of strength analysis of solid propellant rocket grains by N. N AU Hughes aircraft company, Calif. It explains steady state stress and strain distributions in long cylindrical case bonded propellant grains are developed on the basis of the propellant.

III. METHODOLOGY

This main idea behind this project is to construct an electric ignited rocket which will predict weather conditions. It includes the following criterion which is mentioned below:

1. Materials used
2. Propellant system
3. Type of ignition system used
4. Location of C.G and C.P
5. Stability Sensors and data transmissions

The material used here is PVC pipes and cardboard for the main rocket body. For nose or tip which is cone shape cardboard is used. Rocket motors we need potassium nitrate, sulphur and carbon. A couple of batteries, wires, for fins we used cardboard parachutes are also installed. The whole length of pipe: 470 mm

IV. EXPERIMENTAL RESULTS



Figure 1: KNO₃

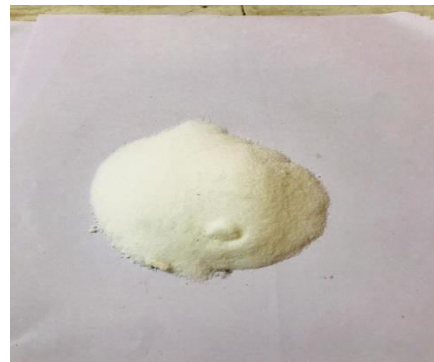


Figure 2: Sulphur



Figure 3: Carbon

Figures shows the propellant contents such as potassium nitrate KNO_3 (Fig 1) , Sulphur S (Fig 2) and Carbon C (Fig 3) respectively.



Figure 4 Steel Pipe

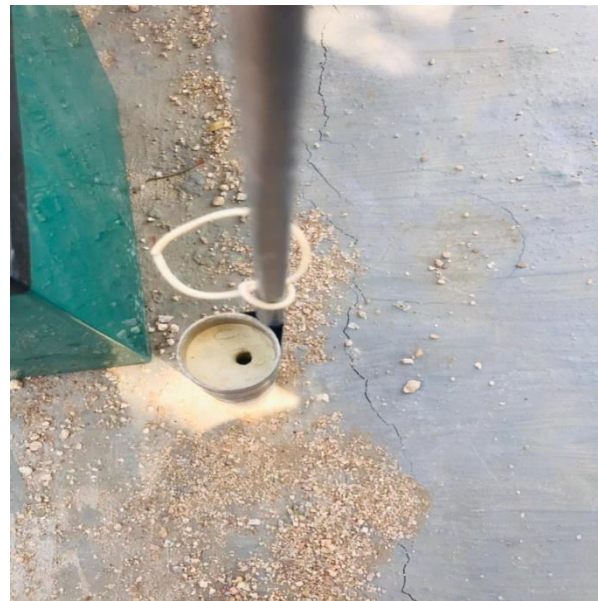


Figure 5 Top view



Figure 6: Rocket model



Figure 7: Battery

Figure 4, 5, 6, 7 shows first testing of solid rocket motor using Steel pipe and Potassium Nitrate KNO_3 , Sugar



Figure 8 Testing of Motor



Figure 9 Solid motor with PVC pipe

Figure 8 and 9 shows second attempt of solid rocket motor with PVC pipe and Potassium nitrate (KNO_3), Sulphur



(S) and Coal (C) as propellant.

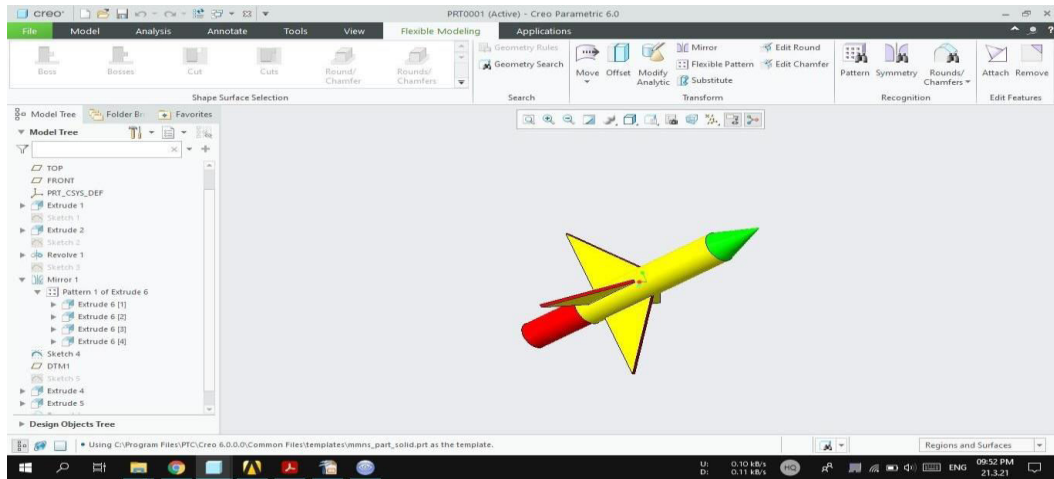


Figure. 10- Ansys Analysis of Rocket Model

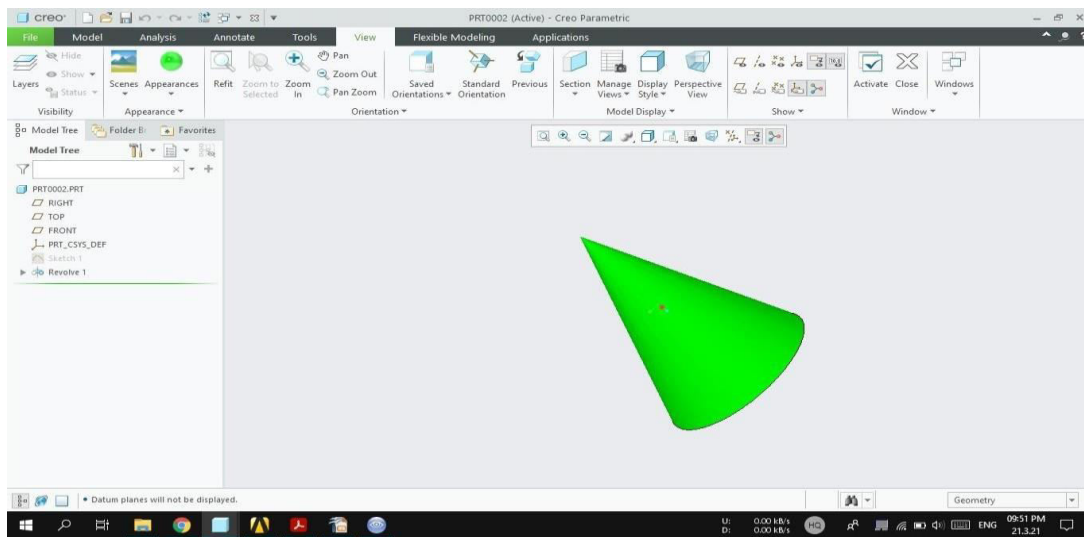


Figure. 11- Ansys Analysis of Nose

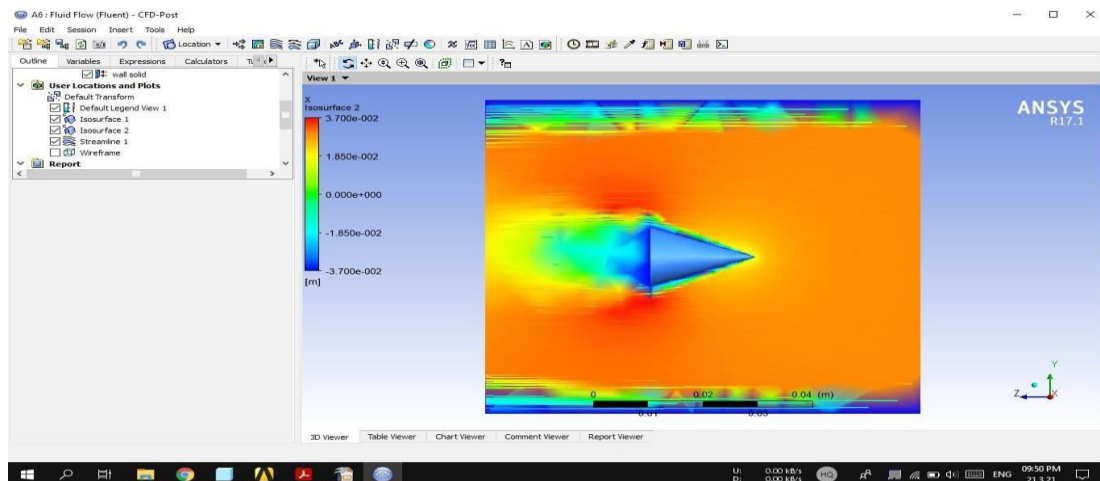


Figure. 12- Flow Analysis of Nose Model



V. CONCLUSION

We have successfully completed testing of our rocket motor with propellant of Sulphur (S), Potassium Nitrate (KNO₃), Charcoal (C). The thrust produced is progressive and the propellant is a good combination. We have also completed testing successfully and it attained height in atmosphere and also designed grain of propellant. We have also compared the thrust of Potassium Nitrate (KNO₃) and Sugar combination with Sulphur (S), Potassium Nitrate (KNO₃) and Carbon (C) combination so it resulted in more thrust in sulphur combination.

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