

IAF SPACE PROPULSION SYMPOSIUM (C4)
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COMBUSTION AND PROPULSIVE CHARACTERISTICS OF POTENTIAL HYBRID ROCKET
PROPELLANT

Abstract

In today's modern world the application of rockets has varied to a great extent. The advancements in the field of rockets and rocket propulsion has been done where the mission success rate is more than the failure. Further the applications of rockets range from missiles systems to sending probes for deep space exploration. This wide range of applications requires varying performance ranges. The project deals with the combustion and performance characteristics of potential hybrid propellant. High energy materials are added to the propellant to determine what type of material it is, that is if the material added is either an energizer, inhibitor or a neutralizer. The project is conducted in two phases. In the combustion part, the experimentation will be conducted by adding different materials on the candle that represents the main rocket engine. The key controlling parameters is the concentration of the material added to the candle as well as the type of material used. In the propulsion part we deal with the simulations carried out on the NASA CEA software, in which the base composition (Al/HTPB/AP) is present along with the highly energetic materials. They will be added into the fuel, binder and the oxidizer to study the variation in specific impulse and the characteristic velocity. The key parameters here are the temperature, pressure, nozzle area ratio, O/F ratio mix and the composition of the material. The scope of the project is to optimize the performance of the hybrid rocket by improving the specific impulse thereby helping to change the overall efficiency and in process studying the behavior of hybrid rocket propellant.