Paper ID: 29904

66th International Astronautical Congress 2015

SPACE PROPULSION SYMPOSIUM (C4)
Propulsion Technology (1) (3)

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PRELIMINARILY MICROEXPLOSION MODEL OF ORGANIC-GELLANT GEL FUEL DROPLETS

Abstract

As a new kind of special propellant, gel propellants is state between the liquid propellants and the solid propellants, which combine the advantages of liquid-propellant like wide range thrust control and re-ignitability with that of solid-propellant like high safety aspects, long storage and good leakage behaviour, and have the potential to being considered for certain future rocket engines and atmospheric propulsion applications such as tactical missiles, ramjets, etc. Analyzing a single droplet burning process for a gelled propellant is important for the overall modeling of spray combustion of rocket engines and to gain insight into the mechanisms of combustion. A new theoretical model was proposed to predict a microexplosion time, and a definition of microexplosion strength was given. The effects of various parameters on microexplosion time and strength were also discussed. The results showed that microexplosion time of droplet was dominated by the temperature at the position r=0.8Rs. Increasing ambient pressure, microexplosion time can get increasing. With increasing of ambient temperature, oxidant fraction and gellant fraction microexplosion time gets decreasing. The microexplosion strength was dominated by thickness of gellant layer.