Paper ID: 31863
oral

SPACE PROPULSION SYMPOSIUM (C4)
Electric Propulsion (4)

Author: Mr. Mario Angel Andrade Gonzalez
Mexico

RESISTOJET DESIGN FOR SOLID IODINE PROPELLANT

Abstract

Lately, in the satellite industry, there has been a tendency of producing better and more efficient systems which have a longer lifespan in operation; having higher velocity budgets for more complex missions and better control. These are the key elements that will dictate if a deployment of a satellite will be profitable, and if so, how fast the investment will return. It is wise to observe that in order to meet these key elements, the most logical option will involve the fact that more propellant has to be brought within the spacecraft, which in turn means more space and money. Nowadays, the propellants used in the propulsion systems for satellites are usually stored in high pressurised tanks that contain the fuel in a gaseous matter phase, so, the question is, is it possible to store propellant as a solid to increase the storage density? And while doing so, is it convenient enough to change its phase into gas in order to be used to generate thrust? This effort looks at the feasibility of using solid Iodine as a propellant for the next generation spacecraft propulsion systems to be developed. In the satellite industry, the available space is one of the most restrained characteristics and nowadays, the propulsion systems are already at their limit of capability, because the tanks are large pieces of equipment which need high precision instruments to measure pressure, temperature and regulate the mass flow, in other words, high quality equipment. What Iodine brings to the table is that it is an element which can be stored as a solid in vacuum, and then by introducing just the right amount of heat, it sublimes at a point before reaching its melting point. Once the gas is produced, it gets transported through an array of pipes downstream into the resistojet chamber, where the temperature of the gas will be drastically increased, and by doing so; the internal energy is increased and then expelled through a convergent-divergent nozzle at a high velocity, producing thrust. The present will also provide a review of the requirements and limitations that such systems have.