

Interactive Presentations (IP)
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AN EFFICIENT COLD GAS PROPULSION SYSTEM FOR SMALL SATELLITES

Abstract

Cold gas propulsion is a sound choice for space missions that require extreme stabilization, pointing precision and contamination free operation. The use of forces in the Milli-newton range for spacecraft operations has been identified as a mission-critical item in several demanding space systems currently under development. The available volume is often identified as the most severe constraint for a small satellite with power and mass being the other two major constraints. On-board propulsion has traditionally been the realm of large communications and scientific spacecraft. However there is a trend in the industry towards smaller, lower cost spacecraft. A significant advantage of small spacecraft is that they can be launched piggyback with larger spacecraft, or multiple spacecraft can be launched by a single launcher, hence they can be cost effective. The cold gas propulsion system poses itself the optimum choice for such small spacecrafts. This paper describes the work performed at the Liquid Propulsion Systems Centre, ISRO to produce a cold gas propulsion system for small spacecraft with relatively low velocity-change (ΔV) requirements. An efficient cold gas propulsion system is developed after overcoming three major constraints of Volume, Mass and Power. The Cold Gas thruster, presented in this paper, is a highly optimized Attitude Control System, which delivers peak performance with a minimum of mass and power consumption. The compressed Nitrogen gas has been used for the application which exhibits high density with leak proof property at a meagre small cost. The deliberation on the choice of cold gas propellants has also been showcased in the present study. The present venture discuss about the holistic development of a cold gas propulsion system required for a small spacecraft.