

21st IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Small Spacecraft for Deep-Space Exploration (8)

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ENABLING PROPULSION TECHNOLOGIES FOR COMPLEX SCIENCE MISSIONS

Abstract

In the last several years, nanosatellites are being used as platforms for technology demonstration. Complex on-orbit science missions require precision orbit control and 3-axis attitude control. On-board processing, power and communication systems, have been successfully miniaturized. However, conventional propulsion systems that require ancillary components like reservoir tanks, pressure valves, etc. do not scale linearly. TSat is a 1U CubeSat that will demonstrate the ion-electrospray Propulsion System (iEPS) as the primary attitude control system. TSat aims to address this challenge by using the micro-electrospray thrusters as they use propellant fed by capillarity through the porous substrate. TSat-Constellation (TSat-C) is the next logical step in developing this technology for formation flight applications. TSat-C has two 1.5U CubeSats with microelectrospray thrusters providing precision orbit control and 3-axis attitude control. Research is underway to understand the scaling of the microelectrospray thrusters from 1U to 1.5U units and enable formation flying capability.

This paper will discuss the TSat and the TSat-C missions which will use the microelectrospray thrusters. Other key propulsion systems and application missions of science value will also be discussed.