

SMALL SATELLITE MISSIONS SYMPOSIUM (B4)
Design and Technology for Nano-Sats and Cube-Sats (6B)

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JAPAN CANADA JOINT COLLABORATION SATELLITES - DESIGN OF INTERSATELLITE
SEPARATION MECHANISM

Abstract

The Japan Canada Joint Collaboration Satellites – Formation Flight (JC2Sat-FF) project is a joint project between the Canadian Space Agency (CSA) and the Japan Aerospace Exploration Agency (JAXA). The main objective of the project is to design, build, launch and operate two 18 kg nearly identical nanosatellites that will be launched together and separated in space to demonstrate the feasibility of Autonomous Formation Flight (AFF) based on aerodynamic differential drag only, as well as the use of commercial off-the-shelf (COTS) dual band GPS receivers to achieve relative navigation. In addition the nanosatellites will serve as a technology demonstration platform for the newly developed Miniature far Infra-Red Radiometer (Mirad) instrument for the purpose of Earth's limb sounding. The project is currently in Phase C and the CDR is planned for May 2010.

Because JC2Sat has no onboard propulsion system, the success of AFF is highly dependent on the initial separation speed between the two satellites. Orbit analysis coupled with high fidelity simulations determines the separation speed must be less than 4 cm/s. This is a stringent requirement that demands a custom made intersatellite separation mechanism (ISM). An ISM based on shape memory alloy type ejector was designed. Extensive laboratory tests were carried out. The results indicate that the existing design can meet the design requirement with no margin. As such, a modification to the release strategy is necessary.

This paper begins with a background on JC2Sat and a derivation of the separation speed requirement. The ISM and the test setups are described. Experimental results are presented and discussed. Finally, modification to the release mechanism is discussed.