

Low Tip-Off CubeSat Dispenser

Small Satellite Ejection Systems for Near Zero Tip-Off
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Problem Statement

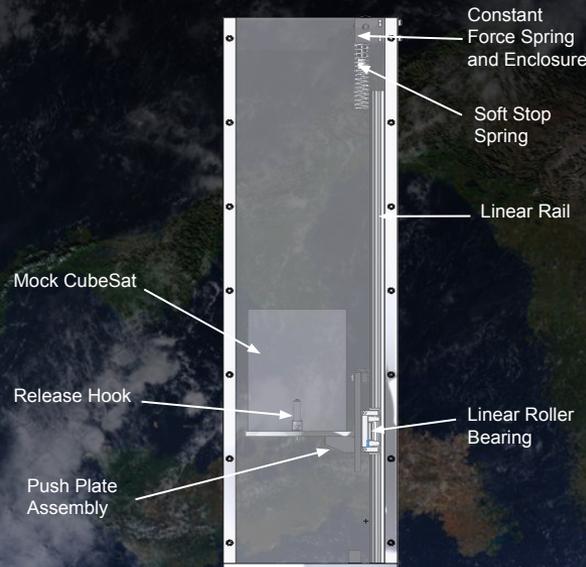
CubeSats are miniature satellites that play a crucial role in space exploration and scientific research. Their compact size allows for rapid development and cost effectiveness but they are prone to spinning due to their small moments of inertia.

Current dispensers offer the capability to eject satellites with a minimum tip off rate of about 5 degrees per second which is too high for satellites lacking active control systems

Objectives

- The dispenser shall be capable of ejecting a 10x10x15 cm (1U) cubesat.
- The dispenser shall be able to survive launch and space environmental conditions.
- The dispenser shall eject the satellite with less than 1 deg/sec tip-off about each axis.

Proposed Design



Testing

To measure the tip off the mock cubesat was equipped with an onboard Arduino nano and IMU to measure the acceleration about each axis.

The cubesat was loaded into the dispenser and released to fall 20 ft.



Conclusion

The results show that the dispenser failed to limit tip off about the x axis. Slow motion video capture showed the dispenser ejecting properly but the entire dispenser swaying back and forth which induced tip off to the satellite. Future work may be focused on a more rigid mounting system to limit this motion.

Results

The dispenser successfully limited tip off about the Y and Z axis of the cubesat but failed to do so about the X axis.

