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UKUBE-1: A MULTI-PAYLOAD TECHNOLOGY DEMONSTRATION PLATFORM

Abstract

The development cycles of taking new technologies through to a space proven status have historically been lengthy, expensive and fraught with challenges (including convincing new customers to allow the use of the new technologies). The advent of fast response, small satellite missions, such as CubeSats, herald the opportunity to quickly and inexpensively demonstrate new technologies on-orbit, allowing developers to obtain invaluable data on the operation of the technology in the actual environment it is intended for. Once this process is developed further, there is also the opportunity to circumvent conventional development processes by proving technologies on-orbit at an earlier stage of technology readiness.

UKube-1 is a CubeSat mission commissioned by the UK Space Agency. It is a 3U CubeSat, whose mission is to fly a number of payloads of varying levels of TRL and sources with the intention of proving novel technologies in space. The development cycle of the mission is short, at 12 months, and the launch is planned for late 2011.

This paper will provide an overview of the technologies being flown on UKube-1, both the payloads and the platform systems. In particular, the paper will discuss the ability of UKube-1 to act as a flight verification platform for new technologies and how this service is handled on a multi-payload nanosatellite whilst still remaining low-cost and quick. Techniques used on UKube-1 to achieve this include the use of hardware and software platform emulators to speed up the payload development cycle and to ensure that spacecraft to payload integration times are kept to a minimum.

In summary, the paper will discuss the virtues of CubeSats as a future technology verification platform for multiple payloads and present a cost model for the implementation of a service of this type as a commercial venture. This approach will allow spacecraft technology developers to focus on the technology for development rather than the vehicle to prove the technology.