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FEASIBILITY STUDY OF THE MULTIPURPOSE ORBITALLY DEPLOYED UPPER STAGE
(MODUS) PLATFORM

Abstract

This paper investigates the design of the Multipurpose Orbitally Deployed Upper Stage (MODUS) platform. MODUS is a small multipurpose modular spacecraft which can accommodate a variety of mission scenarios from Low Earth Orbit (LEO) to beyond Geosynchronous Earth Orbit (GEO) to L1, the Moon and as far as Mars. MODUS can be used as a platform to support Earth Observation (EO), communications, science, interplanetary and other missions.

MODUS comprises of three attachable modules; a propulsion module, a bus module and the payload. A payload with mass up to 90 kg, on-orbit average power up to 400 W and volume of 0.62 m³ can be supported. This feasibility study presents a baseline design of MODUS, exploring particular design aspects including the use of standard interfaces, various propulsion systems and key decisions required for various spacecraft subsystems.

The MODUS concept appears feasible, particularly if split into two variants – one for LEO/Medium Earth Orbit (MEO) and the other for GEO/Interplanetary(IP) based missions. The LEO/MEO variant has a wet mass under 500 kg and the GEO/IP has a wet mass under 750 kg.