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BARTOLOMEO MICRO-G DISTURBANCE CONTROL AT PAYLOADS

Abstract

The European external platform "Bartolomeo" is an enhancement of the European International Space Station (ISS) module "Columbus" and its infrastructure motivated by the shortage in availability of ISS external sites and the need to improve capabilities to keep the station attractive for new upcoming space missions. Designed to user requirements from the commercial and institutional sector Bartolomeo is a new external payload hosting facility on the ram side of Columbus which is mechanically attached to the ram-facing primary and secondary trunnions. Thermal and dynamic stability of the payloads are the primary missions of Bartolomeo environment. Micro-g disturbances control is vital for the operation of the payloads outside the International Space Station, therefore Bartolomeo is designed to provide a smooth dynamic environment towards on-orbit random vibration levels from low to high frequency. For each Payload an isolation device will be developed by Airbus Defence and Space in Bremen in order to provide a guaranteed Payload comfort. To determine the efficiency of isolation a preliminary analysis is necessary to investigate the sensitivity of payloads towards their position, mass, Center of Gravity (CoG) towards frequency range. The isolation device shall reduce the resonance of the amplification for certain frequency without shifting the effect to other frequency range. The coupling behavior of Bartolomeo payloads to each other and Bartolomeo itself to the Columbus Module is also investigated in this paper. The effect of soft-mounted attachment between Bartolomeo and Columbus is included in this investigation. A modal survey test and random vibration tests will be used for the final correlation of mathematical model of Bartolomeo and will support this analysis in addition. Existing spectra for other payloads platform mounted on the ISS (ELC, ExPress Logistic Carrier) are taken as reference, modifying the excitation to start from a lower frequency to high frequency range. This paper describes the dynamic approach for payload comfort on Bartolomeo in detail.