Payload Isolation From Launcher's Disturbances

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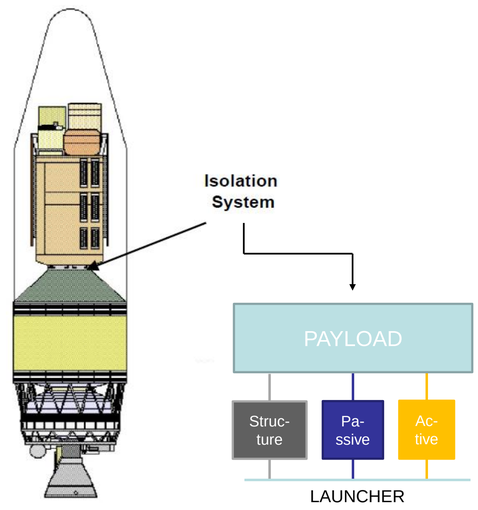
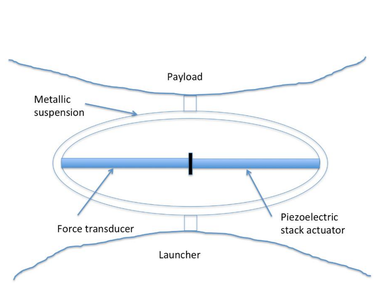
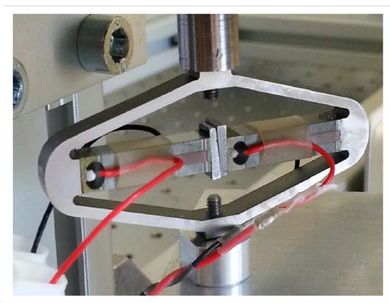
Motivation

Creating a hybrid isolation system capable of achieving the required isolation levels at high and low frequencies



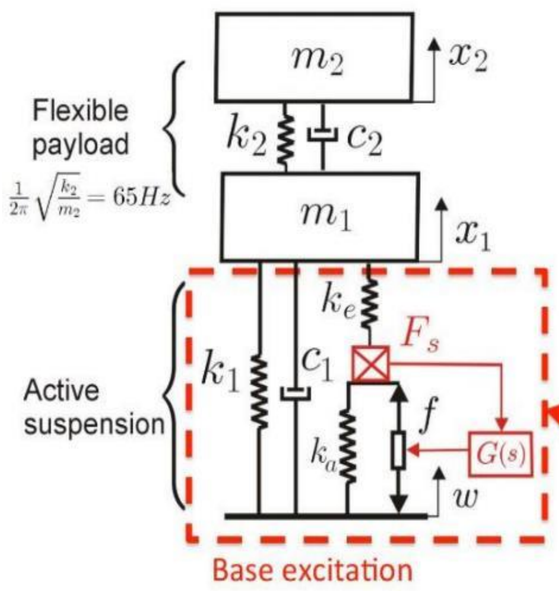
Proposed Concept

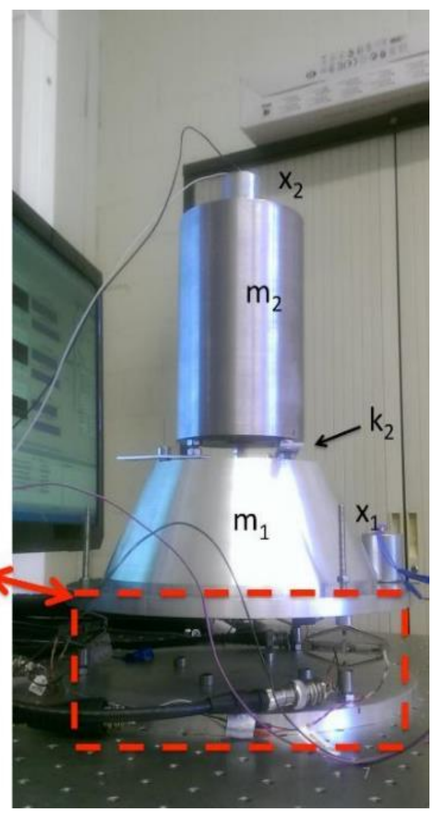




Steel mount containing two piezoelectric stacks which act as a collocated pair of sensor and actuator. Each mount is independent from the rest, enabling the scalability of the isolator to adapt to any dimensions of launcher and payload.

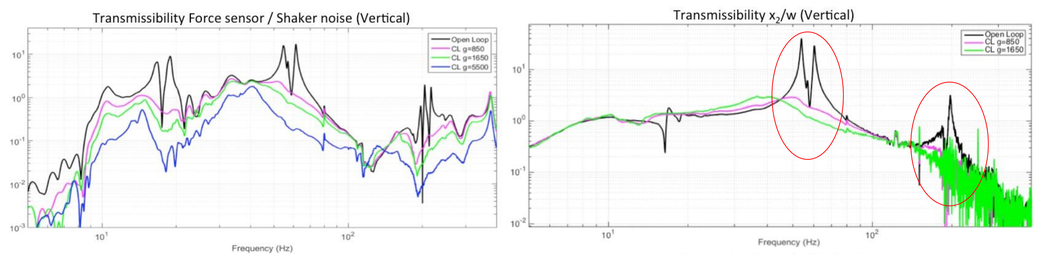
Active Isolator: Experimental Set-up





Active Isolator: Experimental Results

Left: Force transmitted to payload; Right: Relative displacement of payload with respect to launcher



The force seen by the payload is reduced by up to a factor of 5. This effect is broadband, not only at the resonance frequencies

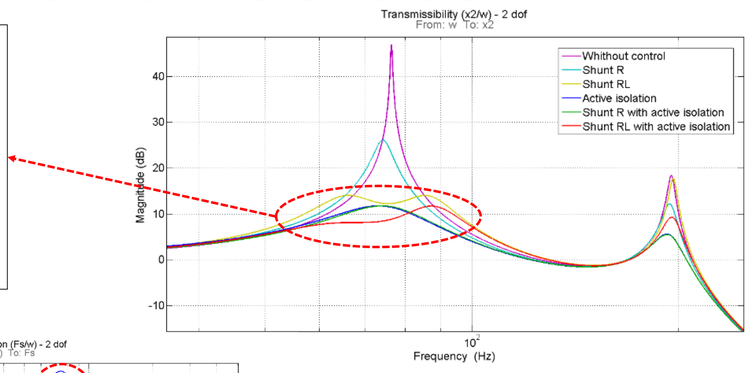
The resonances of the payload have been effectively damped, reducing the transmission of disturbances

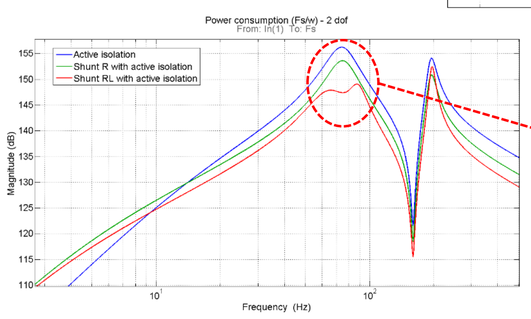
Future Actions

- Experimental validation of the hybrid isolator's numerical simulations
- Design of isolator according to actual operating conditions
- Manufacturing of demonstrator
- Testing and evaluation of demonstrator

Hybrid Isolator

All active strategies set to equal performance levels at the first mode to evaluate the power consumption of each strategy





Both hybrid strategies show a reduction in the power consumption with respect to the stand-alone active strategy

Currently in simulation stage

Bibliography

Results presented in: Souleille A., Lampert T., Lafarga V., Hellegouarch S., Rondineau A., Rogrigues G. and Collette C.: A concept of active mount for space applications, CEAS Space Journal (submitted 2017)