

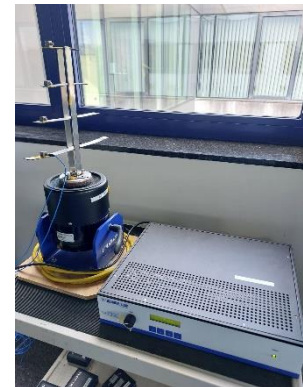
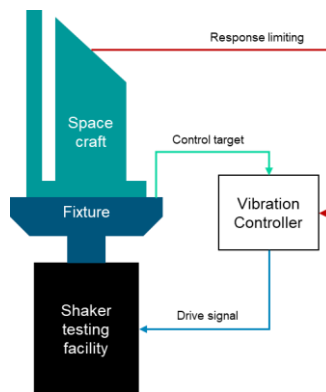
Internship / Master thesis proposal

Virtual shaker testing by combining system sub-structures

Start: October 2024 / flexible
 Duration: 6 months

Topic

Vibration testing is a crucial step in the development of spacecraft as it is used for verifying the reliability of the spacecraft components to the dynamical launch environment. The spacecraft are positioned on a large-scale shaker testing facility, which provides a controlled excitation with the purpose of replicating the in-service structural response. To do so, the shaker is driven by a controller that follows a prescribed profile. Due to the complexity these systems, several issues may arise during the test. Digitalization offers powerful tools to predict the dynamic behaviour ahead of its physical execution. The so-called Virtual Shaker Testing (VST) environment can be built by coupling the controller with a time-domain dynamic model of the system under test (shaker + spacecraft) and it can be run to predict the results of the real test.



Research Activity

- Literature review + tutorials, demos and exercises to get up to speed with the state-of-the-art of satellite vibration control tests, virtual shaker tests and the hardware / software tools (Simcenter Testlab).
- Derive experimental as well as numerical models (FRFs) of a single-axis electromechanical shaker and a device under test (aluminium structure) when they are de-coupled.
- Combine the 2 models (all combinations of experimental and numerical models) via a sub-structuring approach, such as frequency based sub-structuring (FBS). Then convert the model to state-space.
- Compare the results with the system identification of the assembled system.
- Perform a virtual shaker test and compare with a physical shaker test using in-house tools.
- (Optional: generalise the methodology either to a multi axis-system or by adding a fixture element between the shaker and the device under test).

Profile

- MSc student in Engineering (Aerospace, Mechanical, Mechatronics, or similar).
- Strong interest in satellite vibration testing, numerical and experimental investigations for structural dynamics.
- Good knowledge of modal analysis, fundamentals of vibration and signal processing (MATLAB/Simulink environment, Python, ...).
- Fluent communication skills in English, present the results in a clear, technical and understandable way.
- Combine analytical thinking with a result-oriented approach. Strong team spirit + collaboration with other students / colleagues. Ability to prioritise the tasks and to independently steer the research focus based on the issues / questions that are encountered.

Additional information

Siemens Industry Software offers accommodation for the agreed period, company desktop/laptop, and required software. Does the proposal fit your objectives and profile? If yes, we would welcome your application. To apply for this position, please get in touch with Mattia Dal Borgo (mattia.dal_borgo@siemens.com) including your cover letter and CV.

<https://plm.sw.siemens.com/en-US/simcenter>