# Test / Research Engineer – Structural Dynamics

PARTENAIRES

École de l'air et de l'espace

**Key words: :** Structural dynamics, active structural control, experimental dynamics, vibrations, satellite structures.

**Department**: Department of Structural Mechanics and Materials (DMSM)

## JOB DESCRIPTION:

Modern satellites incorporate large deployable structures (antennas, solar panels, masts), the deployment of which in orbit is a critical phase. During this phase, pyrotechnic or mechanical devices generate impulse excitations (shocks) that activate the structure's flexible natural modes. In the absence of an atmosphere, natural damping is non-existent, leading to persistent oscillations that may disrupt the satellite's attitude, impair the pointing accuracy of its instruments or result in partial deorbiting.

The CRÉSAT project (**C**ontrol of **Res**onances to prevent the risk of deorbiting of **SAT**ellite Infrastructure) is funded by the Defence Innovation Agency (AID). It is jointly led by ISAE-SUPAERO and the Research Centre of the École de l'Air et de l'Espace (CREA, EAE). This project aims to design, model and test an innovative hybrid vibration control system for truss-type satellite structures. The approach is based on an exact wave-based method [1] combined with hybrid control (active + passive) [2], aimed at implementing the concept of anechoic termination [3].

## MISSIONS:

The engineer will contribute to all work packages within the CRÉSAT project, playing a central role in experimental developments. Their work will be carried out in close collaboration with a postdoctoral researcher recruited for the project at the École de l'Air et de l'Espace (EAE).

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Their tasks will focus primarily on the preliminary design and development of several deployable-structure prototypes, with increasing fidelity, ranging from beam-type structures to truss-type architectures. Particular attention will be paid to replicating operational conditions, notably in microgravity environments and under shock-type loads. The dynamic characterisation of the various systems will provide input for the project's numerical models.

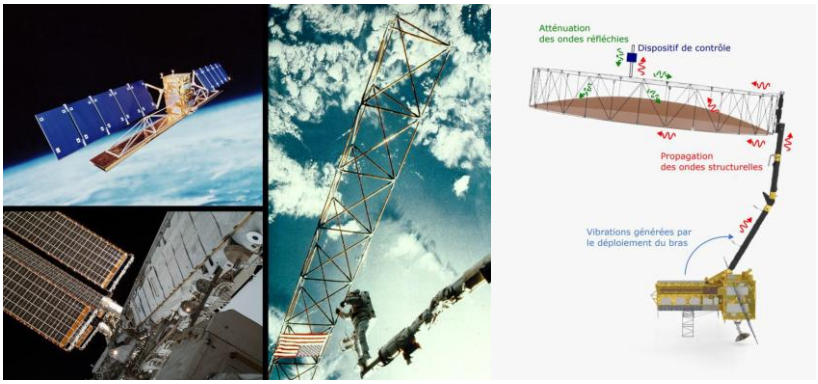



*Figure 1 - Lattice structures in space infrastructure (left), Wave modelling and wave capture (right)*

The project is based on an innovative approach combining hybrid control and a wave-based representation of structural behaviour. Based on the phenomena of wave propagation, reflection and absorption, this approach notably introduces the concept of anechoic termination, which aims to limit unwanted reflections and confine vibrational energy. The hybrid control system will therefore aim to implement this type of termination experimentally. In this context, the engineer will play a key role in the experimental validation and development of the control strategy, initially passive and subsequently hybrid. In particular, he or she will be involved in the design of control laws and their real-time implementation using data acquisition systems (such as dSPACE).
Finally, particular attention will be paid to identifying and accounting for any non-linear phenomena, notably those induced by the junctions between the various structural elements.

**REQUIRED PROFILE:**

Engineering degree or PhD in mechanics, vibrations or electronics, with a good knowledge of dynamics and structural dynamics. Skills in control and active systems, as well as an interest in experimentation, are desirable.

**DURATION:** 24 Months

**RYTHM:** Full time

**LOCATION:** TOULOUSE

**RESPONSIBLE OF THE SUBJECT:**

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**APPLICATION PROCESS:**

To apply for this position in a research laboratory, please send:

- An up-to-date CV;
- A covering letter highlighting your suitability for the research project;

**APPLICATION DEADLINE: 31 December 2026**

**REFERENCES:**

[1] Chouvion, B. et al. (2011). Vibration modelling of complex waveguide structures. Computers & Structures, 89(11), 1253–1263.
[2] Mesny, L. et al. (2026). Hybrid nonlinear energy sink, a tunable device for vibration mitigation. Journal of Sound and Vibration, 625, 119577.
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[4] Sauder, J. et al. (2024). A framework for small satellite deployable structures and how to deploy them reliably. Communications Engineering, 3(1), 72.
[5] Yang, Z. et al. (2025). Active vibration control of beam-pointing-sensitive modes in large space deployable antennas. Advances in Astronautics, 8(1), 1–16.

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