

Active isolation

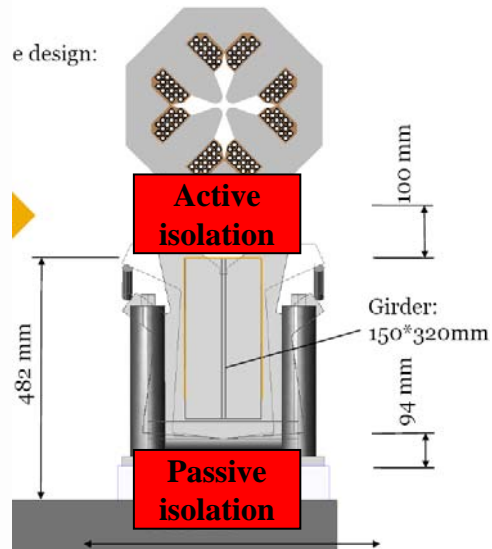
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LAViSta Team

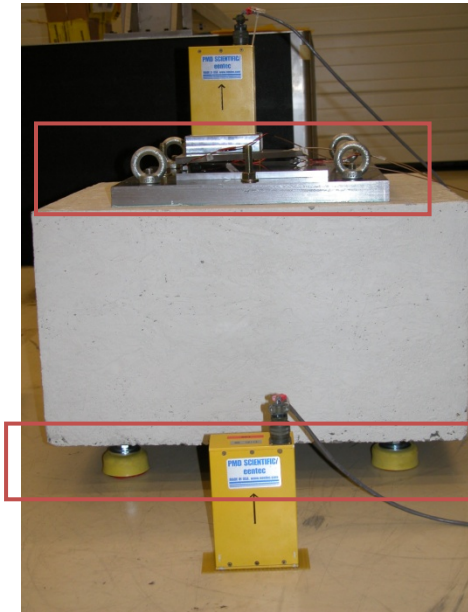
LAPP-IN2P3-CNRS, Université de Savoie, Annecy, France
&
SYMME-POLYTECH'SAVOIE, Université de Savoie, Annecy, France



The prototype

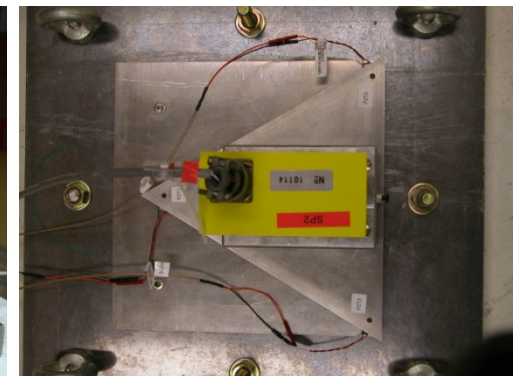
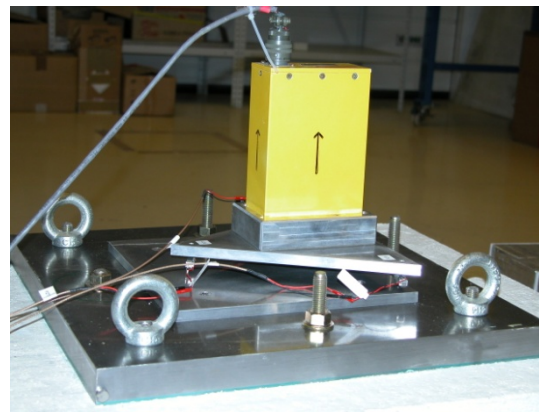


Linac configuration



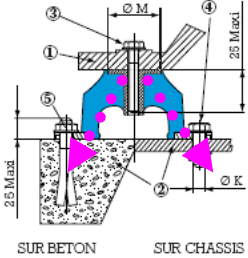
LAPP prototype

- 3 actuators, so an ISO positioning.
- The actuators can be managed simultaneously (1 sensor) or independently (3 sensors).
- A mass or a small magnet prototype can be placed on the table.
- A second system can be developed in order to use a bigger magnet prototype.

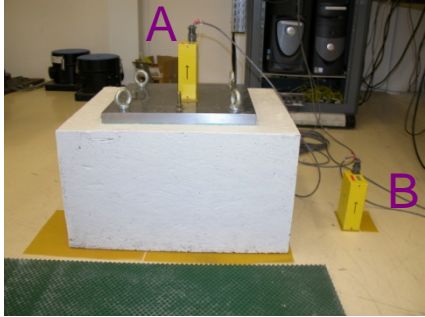


The passive isolation

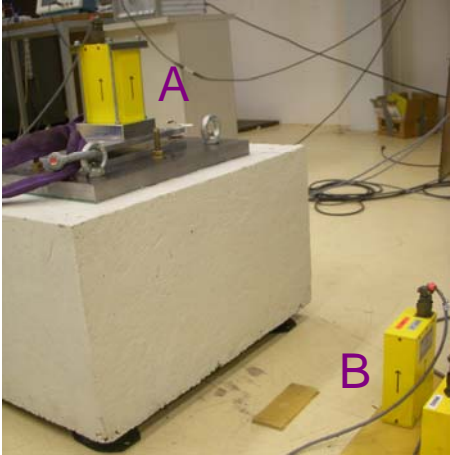
- Selected solution : feet from the society Paulstra



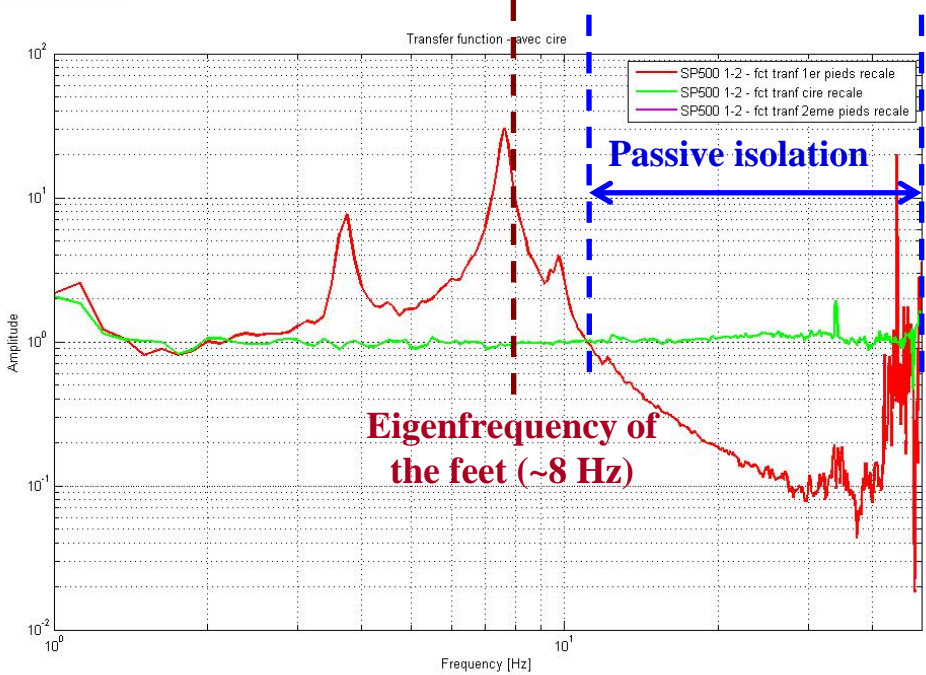
- A Paulstra foot -



- No feet (concrete block placed directly on the floor with beeswax) -



- With passive feet -



- Transfer function between the top of the table (A) and the ground (B).

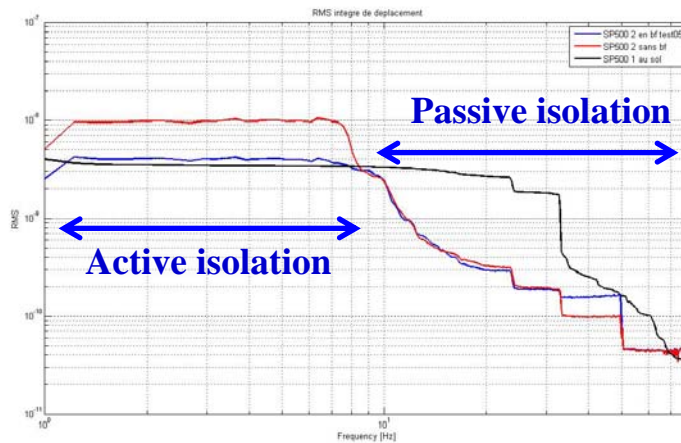
- No feet (concrete block placed directly on the floor with beeswax)
- With passive feet

The active isolation

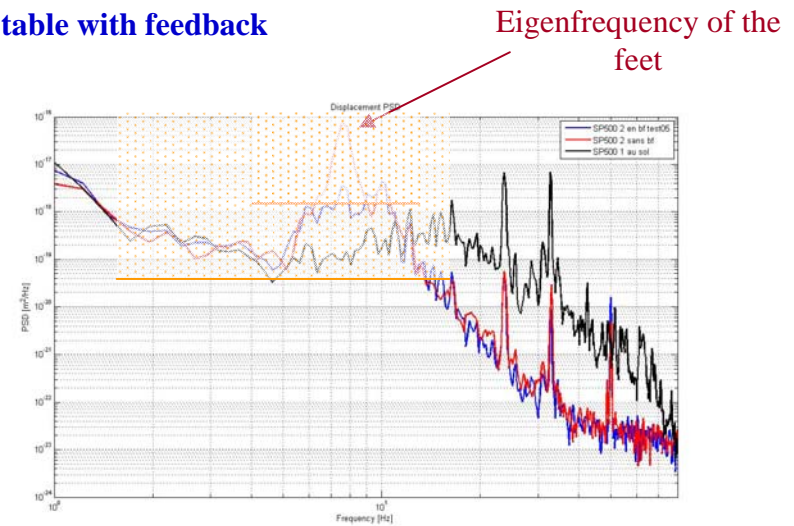
- A preliminary test : Test of a developed method dedicated to the lumped disturbances

- No model : only a knowledge of the amplification and the phase difference at the selected frequency.

- Ground motion displacement.
- Displacement on the table without feedback
- Displacement on the table with feedback



PSD

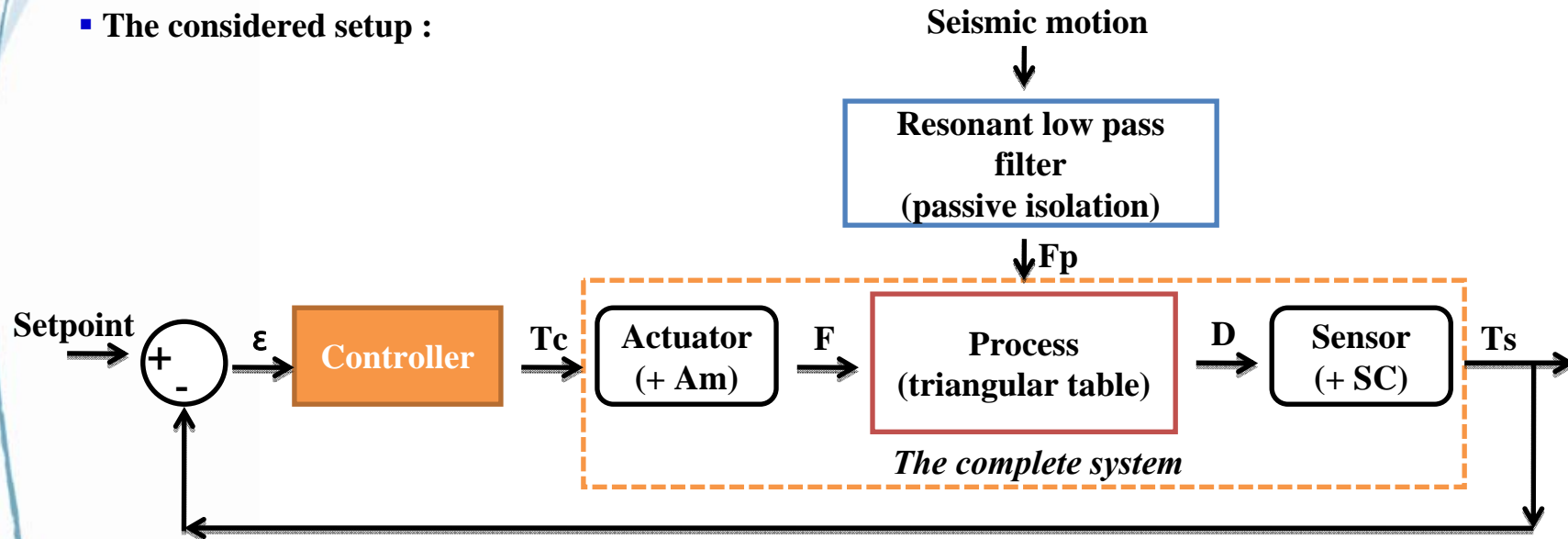


RMS

- ✓ The sensitivity of the sensors has to be evaluated, so only the damping ratio has to be considered.
- To improve the performances, all the bandwidth has to be treated...

The Process

- The considered setup :



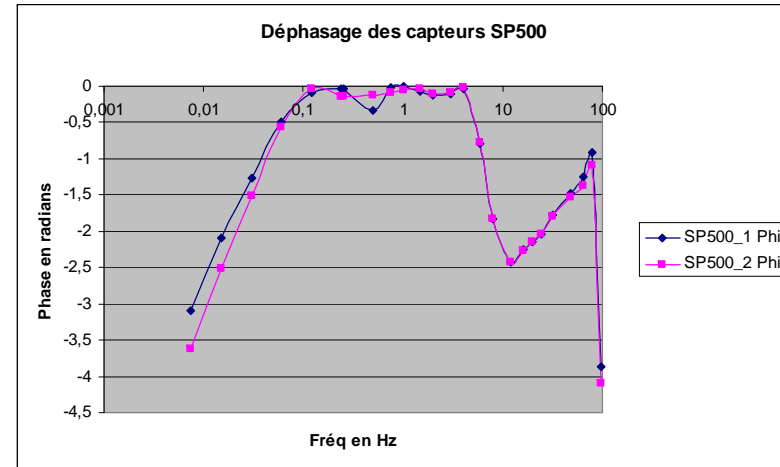
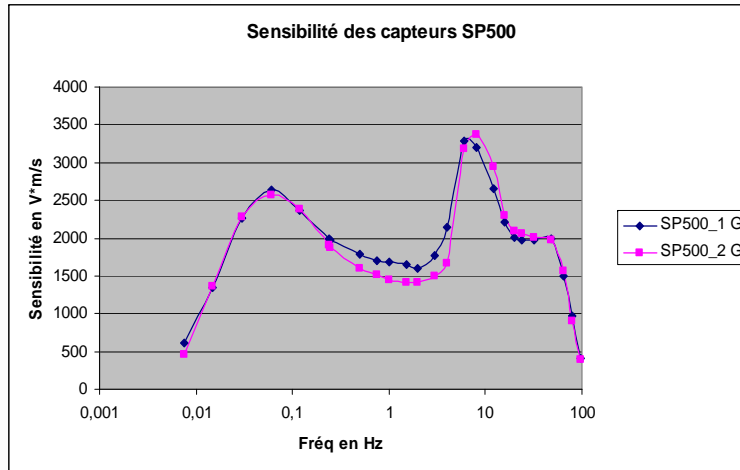
Controller = fct (Complete system)

$$= \frac{a_i \cdot s^n + \dots + a_0 \cdot s^0}{b_j \cdot s^m + \dots + b_j \cdot s^0}$$

- It require a good knowledge of the whole system, mainly of the sensors and actuators.

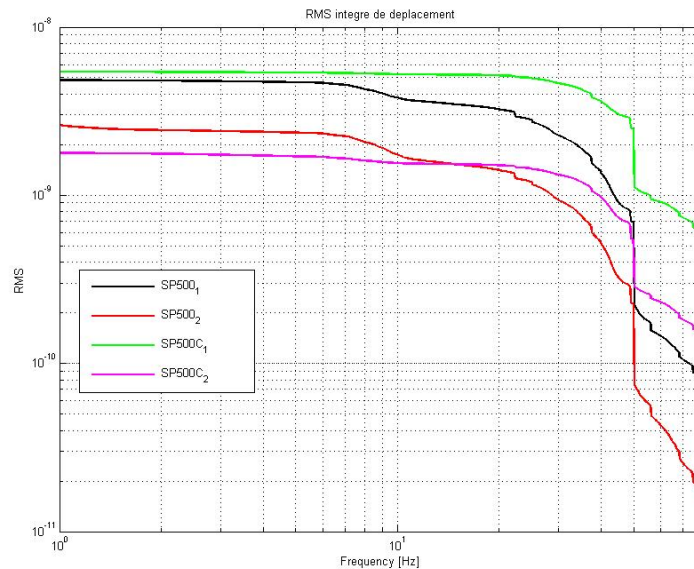
The SP500 sensors

- The given sensitivities of the sensors :



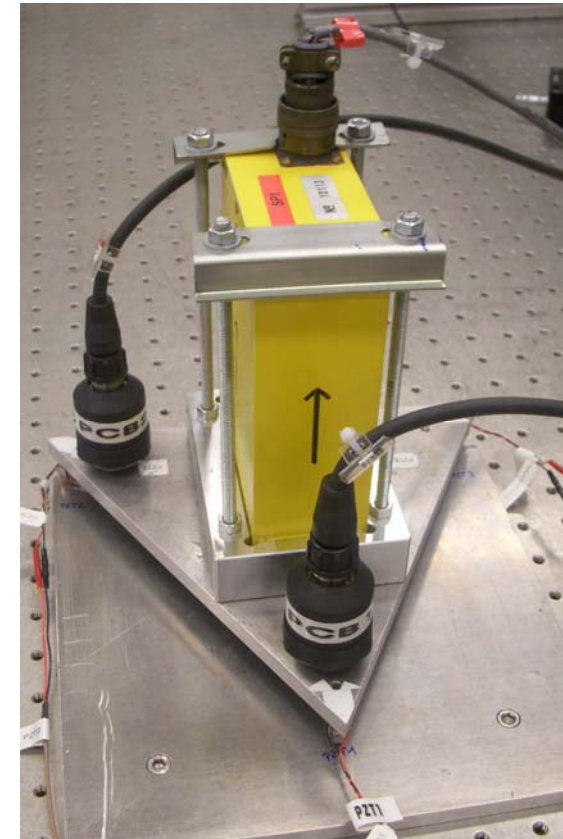
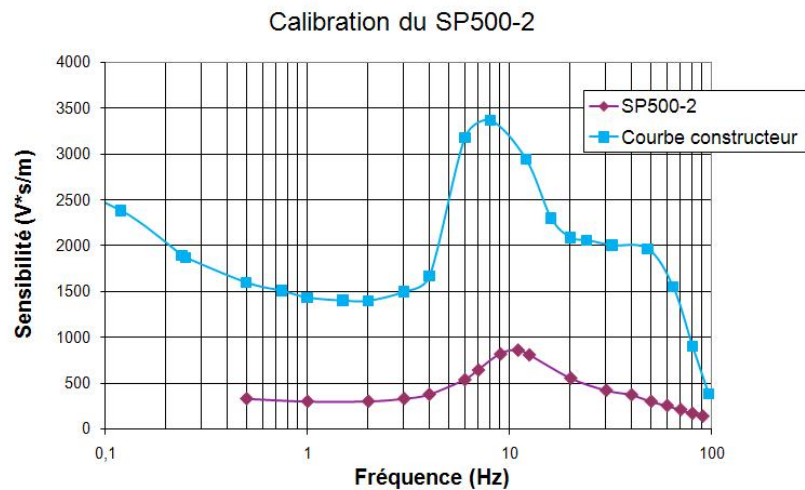
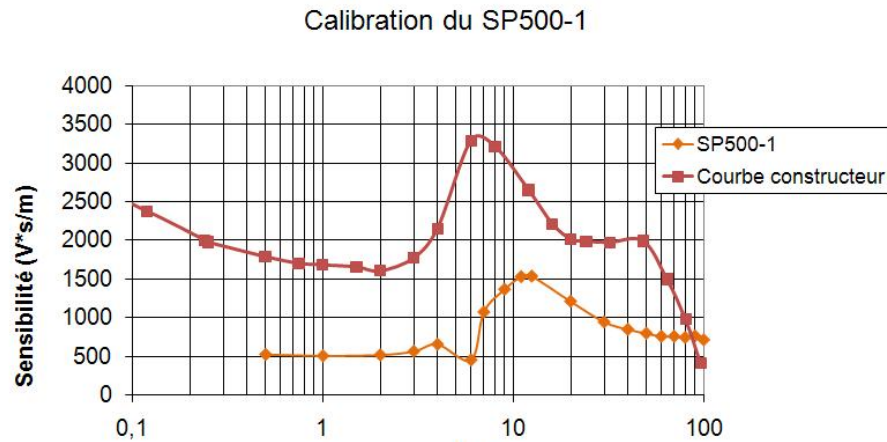
- The measured coherence at the beginning of the tests...

(with a tuned sensitivity of 2 000 V / m/s (SP500) and 20 000 V / m/s (new SP500C))



The Calibration results

■ SP500 :



➤ The sensitivity of the SP500 sensors seems to have considerably decreased during the last 2 years...

Conclusion

✓ Instrumentation :

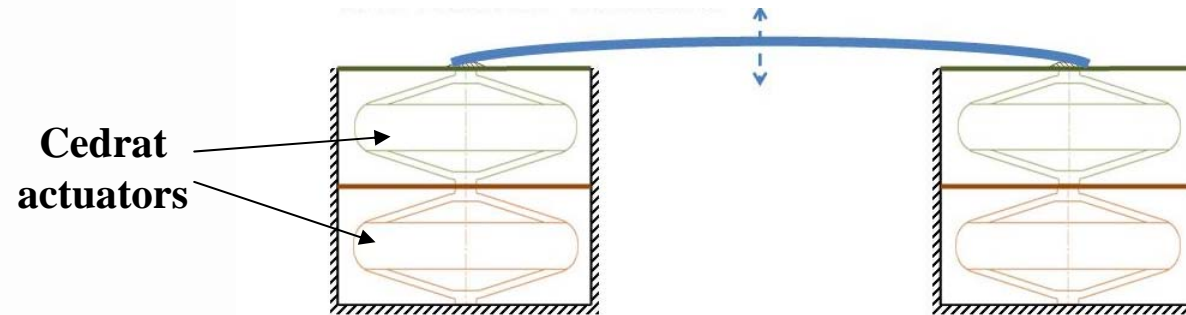
- To finish the current measurements.
- An update (recalibration) will be ask to the society PMD.
- It would be interesting to fit these results with the CERN bench test.
- The acquisition of 2 new Endevco accelerometers will be considered...

✓ Control :

- Considering this system evaluation, a new algorithm will be tested.
- In order to be independent of these instrumentation constrains, another prototype was defined and will be soon realised at Symme.

SYMME prototype (thesis of R. LeBreton)

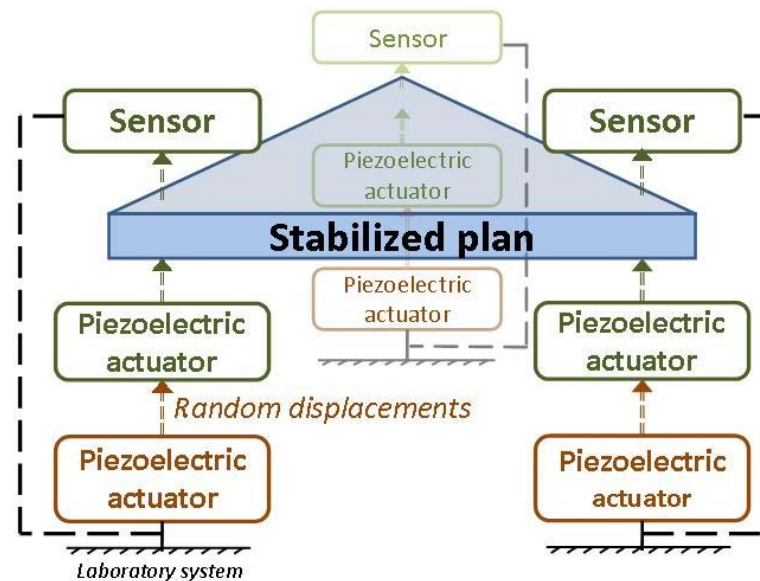
- **First step** : To control a selected point (collocation mode), Frequencies : 0-100Hz
- **Second step** : To control a beam



Control

Disturbances

- **Third step** : a plan



Status :

- The instrumentation is defined.
- The model of the structure is done.
- The prototype will be built as soon as possible.