

# Preliminary study of a deployable CubeSat

**Name :** Duijsens

**Surname :** Sébastien

**Section :** Faculty of Applied Sciences, Master in aerospace engineering

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**Supervisor :** Olivier Bröls

This master thesis investigates the feasibility study of a deployable Earth observation small satellite. This satellite is a 6U CubeSat carrying two telescopes that have to be deployed with the highest possible accuracy in order to improve the resolution of the images by interferometry. So the objective is to determine the possibility of such a mission and to analyze from a mechanical point of view its feasibility.

The first part provides a review of deployable structures and deployment mechanisms for small and large satellites. Then a preliminary design of the spacecraft is made. After that, the most appropriate technique is selected based on this information. The deployment mechanism has to correspond to the most accurate deployment and the most rigid structure.

Then a modal analysis is carried out with the software *Samcef*. The goal is to compute the first mode shapes of the structure to determine its rigidity. Then the response of the satellite to different accelerations is also studied.

After that, a short thermal analysis of different cases is conducted to determine the temperature of the CubeSat in different orbit configurations

Finally, a budget evaluation of the entire system is done with a calculation of the mass of the spacecraft as well as an evaluation of its center of gravity and its power consumption. It was assessed that the satellite respected the 6U CubeSat requirements.