Analysis of the deformation of an inflatable heatshield as a consequence of the aerodynamic loads during atmospheric re-entry of a CubeSat

We are looking for two motivated Elektromechanical or Mechanical master students.

Project description

The Aether Student CubeSat team brings together young Belgian engineers who are passionate about space technology. We are designing a CubeSat: a nano-satellite small enough to hold in your hand. In the past decade, the CubeSat standard has enabled countless new innovations in the space industry, and we are determined to uphold this tradition!

Aether is focusing on the area of re-entry: creating the technology that will allow future CubeSats to safely re-enter the atmosphere and land on Earth after carrying out their experiments in orbit. This will allow scientists to analyze samples and get even more results out of their experiments, and all this with the affordability and accessibility that come with the CubeSat platform!

Thesis description

Aether is currently designing an inflatable heatshield that will protect the satellite during atmospheric re-entry. This flexible construction is expected to deform as a consequence of the aerodynamic loads that act on the heatshield during re-entry. These deformations will lead to changes of the aerodynamic behaviour of the re-entering CubeSat.

Thesis objective

The goal of this thesis is to perform a preliminary analysis of the static deformation on a simplified heatshield model during a critical phase of the re-entry. Due to the non-linear nature of the coupling between the deformation and the aerodynamic behaviour of the heatshield, this analysis will be divided into the following steps:

1. Calculation and analysis of the aerodynamic loads on the heatshield.
2. Calculation and analysis of the deformation of the heatshield using the aerodynamic loads obtained from step 1.
3. Recalculation and analysis of the aerodynamic loads and the resulting deformation of the deformed geometry obtained in step 2.
4. Final recalculation and analysis of the aerodynamic loads on the deformed geometry from step 3 to determine the importance of the 2nd order effects.

Profile

- Aerodynamics
- Structural analysis
- Experience with / interest in modelling and simulation

What do you gain?

- A unique engineering experience within an exciting space mission.
- Create added value for your CV and the team.
- A team of students willing to help in any way possible.
- Be part of the team that will revolutionize the CubeSat platform.
- Connection to a wide network of aerospace companies

If you are interested? Please contact us at recruitment@aetherspace.be .
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