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SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Small Launchers: Concepts and Operations (7)

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PHOENIX: THE BARRIER SOUND CROSSING EXPERIMENT BY A SOUNDING ROCKET

Abstract

The Phoenix project is conducted by a team of 10 interdisciplinary students. Indeed the group is composed of computer science, electronic and mechanical students from the University of Technology of Compiègne. The project began with a first team in 2013 about the conception and the sizing of the mechanical structure. Currently the mechanical part is finished therefore our team is working on the electrical part. This part is composed of the recovering of the flight data and also the parachute opening. The rocket will be launch in the frame of the C'space student competition organized by Planet Science, which will take place between 18th and 25th July. The aim of our project is to study the effects of crossing the sound barrier by a small rocket.

The parameters studied are: the vibrations, the distortion and also the temperature of the body due to air friction. Moreover, we will collect the speed every 100ms in order to link the collected data to the flight velocity. A prior study about vibrations and distortions is performed using Abaqus with a self-made finite element model. The top part and thruster are modelized by their own weight whereas the middle part will be modelized by a single beam without weight. The warming of the top part of the rocket was found in a study conducted in the Atlante project managed by the Spanish company MAS. During the flight all this information will be collected thanks to sensors and stored in the microcomputer Raspberry Pi. In order to study the stability of the rocket, we have simulated the flight of our CAD model with a software called Rocksim V9. This study showed that the average speed will be of 29.3 m/s at the end of the launch pad which is 30

First we will talk about our working environment and the modeling of the conception of the rocket. Then, the explanation of the experiment will be approached. Finally, the interpretation of the recovered data will be compared to the theoretical data.