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ARES EVE5 : AN OCTAVE'S EXPERIMENTAL ROCKET FOR PERSEUS PROJECT

Abstract

OCTAVE association was founded in 2009 into the University of Evry. It gathers students, professionals, or people interested in aeronautics and aerospace from Evry to design and experiment in those fields.

In this purpose, OCTAVE takes part of PERSEUS project (initiated by CNES in 2005 at the International Paris Air Show). We have designed rockets, test benches, and a lot of electrical and mechanical stuff. These activities in PERSEUS project must respect CNES and Planete Sciences (French association promoting sciences) specifications.

This document presents our work on our sixth experimental flight demonstrator, called EVE5. Thanks to it, we won the innovation prize from CNES.

EVE5 is a high power rocket demonstrator designed and built by OCTAVE according to the ARES-rocket specifications of PERSEUS project. Meaning the electrical architecture is composed of several electronic modules which are the electronic core of the system. The mechanical structure is made of composite fiber with hybrid foam sandwich tubes, and mechanical rings (between tubes) which are made of aluminum. The nose cone, with a Von Karman geometry, is made of kevlar carbon composite, and was studied for a supersonic flight. The rocket use a double parachutes system for descent and it is propelled with a classical Cesaroni engine Pro75-3G.

Each rocket design in the fame of PERSEUS project, has to be an upgrade of the previous one : more powerful, more sophisticated. In this context, the main objective for EVE5 was a new nose tip, made with an alternative kind of manufacturing technique: selective laser melting. This nose allowed us to substitute the new nose to the Pitot tube. It incorporates 5 holes used for pressure sensors. We also design the interface to get measures from this nose and a real time video transmission system.

There were ten students members of OCTAVE working on this project with the help of teachers of the University of Evry. We chose to build three teams according to our skills : the first was responsible for mechanical designs (design, structure optimization), the second was responsible for the electrical systems (design, integration) and the third was responsible for developing embedded softwares.

The final prototype has been launched during the C'SPACE 2013, organized by CNES, in the military site of DGA EM, the last week of august 2013.