Space test for Swiss-designed solar antennas

September 27 2005

The rocket's payload will also include a satellite designed and built by students from several European universities, including a group of EPFL students.

Because of the enormous cost of getting to their destination, structures used in space applications have to be lighter, smaller, and more reliable than their Earth-bound counterparts. In confronting this challenge, the European Space Agency (ESA) drew upon the recognized expertise of the Electromagnetics and Acoustics Laboratory at the EPFL in Switzerland, asking them to develop a single surface that could function as both antenna and solar cell array.

As EPFL professor Juan Mosig notes, "The planar antennas have plenty of quiet real estate available for solar cells," and a combined surface is ideal as it results in a substantial efficiency gain and weight reduction for the satellite.

Advances in both solar cell and antenna technology have been made in the development of the antenna, nicknamed Asolant (Advanced SOLar ANTenna). Six years after initiation, it's ready for its new life in space. The structure is light and thin. It's strong and provides its own source of energy. Its gallium arsenide solar cells are adapted to the conditions of space. The antenna will communicate with Earth, sending and receiving GPS signals as well as signals from mobile telephone networks such as Orbcomm.

The Zurich-based firm HTS handled the antennas' manufacture, and the

structure will ride aboard a Rubin satellite, adapted to the Electromagnetics and Acoustics Lab's specifications by the German company OHB Systems.

Earth-based solar antenna applications

Because Asolant is autonomous, providing its own power source with the solar cells on its surface, it also has the potential for many exceedingly practical Earth-based applications. Sheets of solar antennae on residential rooftops could simultaneously power the home and send and receive TV, radio and wireless phone and internet signals. Buoy-based solar antennas could improve atmospheric and oceanic data-gathering capabilities, providing better early-warning systems for hurricanes, tsunamis and other natural disasters. Solar antennas could be used in increasingly power-hungry cell phones. Information from remote regions could be sent via autonomous transmitters.

The EPFL's Electromagnetics and Acoustics Lab has spun off a Swiss start-up company, JAST, that is in the process of studying the market possibilities of these kinds of applications.

A student satellite

The Cosmos rocket will also launch a student satellite. This ESA-sponsored project, carried out in the framework of the Student Space Exploration and Technology Initiative (SSETI), caught the attention of a small group of EPFL students. The electronics they developed will contribute to the satellite's propulsion system, according to PhD student Renato Krpoun. After undergoing several tests in the first few months in orbit, the satellite will ultimately function as an amateur radio transponder.