

SPACE DEBRIS SYMPOSIUM (A6)
Mitigation and Standards (4)

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PW-SAT – THE FIRST POLISH SATELLITE - TEST OF THE NEW CONCEPT OF DEORBITING
SYSTEM

Abstract

PW-Sat is the first Polish satellite designed and built by students at the Warsaw University of Technology (WUT) in cooperation with the Space Research Centre of the Polish Academy of Sciences. Members of the SSA started the project in 2005 at the Faculty of Power and Aeronautical Engineering of WUT. The main assumption was to design and develop a 1U CubeSat and to demonstrate a new concept of de-orbiting technology. The satellite was launched on 13 February 2012 on board the Vega Maiden Flight and successfully released into an orbit with 300 km perigee and 1450 km apogee (inclination 69.5) and is working perfectly. As an educational project, the PW-Sat is supposed to help and educate young engineers to understand space technologies, especially in project management, space engineering (electronics, mechanics, software), spacecraft manufacturing and assembling. The second aim of the project is to test new technologies in space. The PW-Sat team is proposing to de-orbit PW-Sat using a drag augmentation device which is a special deployable tail about 1.2 m long. The tail has a square-shaped cross section with the dimensions of 80x80 mm. On the sides of this structure there are special solar cells that are flexible. These solar cells are placed on a thin foil that can be rolled or folded and stored in a small volume (about 80x80x30 mm). The drag area of the satellite ranges from 10 cm² (tail not released) to about 970 cm² (when the satellite with its tail fully deployed is perpendicular to the flight trajectory). It is estimated that the satellite will de-orbit in about one year after tail deployment. An additional test on orbit is an experiment with new solar cells that have never been tested in space. When the tail is deployed the solar cells on the tail will generate electrical power. The currents and voltages generated by the solar cells will be measured and transmitted to the ground station. These results will allow assessing the application potential of these very light and small solar cells for use in future space missions.