IAF SPACE EXPLORATION SYMPOSIUM (A3)
Interactive Presentations - IAF SPACE EXPLORATION SYMPOSIUM (IP)

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NOVEL METHODS FOR QUALIFYING ROVERS - IN-ORBIT DEMONSTRATION AND VERIFICATION FOR MOON ROVERS

Abstract

NEUROSPACE GmbH has already reported on a rover with an open standard approach in the past. This rover is based on the CubeSat standard on the one hand and on open-source technologies on the other. The development of the CubeSat industry over the past few decades has led to a revolution in access to space. Low start-up costs and cheaper, standardized components have created a broad market that further reduces costs through competition. These components include, but are not limited to: solar panels, satellite structures, maneuvering systems, thermal controls and communications facilities. The prices correspond to those of PC components. It should be emphasized that they have to prove themselves in space, a difficult hurdle that requires demanding tests. The development of CubeSats now enabled access to space for institutions interested in deploying satellite constellations or conducting scientific experiments. Neurospace chooses the approach of verifying its components through various missions in space. First is a mission in which a future manned capsule is prequalified by pure payloads. The capsule orbits the earth several times with a rocket and is then undocked from the rocket and falls into the ocean, slowed down by parachutes. Neurospace takes the opportunity to fly a 12U experimental box into the capsule as a secondary payload. Inside the capsule there are two different landing gears developed by Neurospace, which are locked during flight and moved by a mechanism in weightlessness. The motors rotate and the suspension is caused to move up and down by deflection mechanisms. This means that both the chassis and engines can be tested during the microgravity phase. Before the capsule lands, the systems are locked again. Then comes the hard landing in the ocean. This is also another stress test for the mechanical systems, which can then be examined in detail so that targeted joint reinforcements can be made. Another mission enables Neurospace to install its rover electronics in a satellite, which is ejected at an altitude of over 38,000 km, but before the satellite has to pass through both van Allen radiation belts. The rover's microcontrollers are carried on three separate circuit boards, which will then detect single-event effects. A shielded rover board is also carried. Additional radiation sensors should provide even more information about the radiation inside and outside the belts. This unique but also insightful mission makes a major contribution to both the rover and all subsequent missions.