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Microgravity Experiments from Sub-Orbital to Orbital Platforms (3)

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RIBES PRECURSOR PAYLOAD ON BION-M1

Abstract

RIBES is a payload concept that allows the execution of experiments in the areas of life science and physical science on board free flyer capsules and space stations. Its characteristics are flexibility, modularity and multidisciplinarity. Indeed, RIBES is made of a pool of standard BIOKON containers, already qualified for several hosting platform and flight proven; each BIOKON can be sealed or vented, powered by an its own battery pack, or by the hosting platform via a power interface, or not powered at all. Each BIOKON can host from one to several experiments, if their environmental requirements are compatible, even if the experiments fall in different disciplinary areas. The accommodation inside the hosting platform can be always easily accomplished, thanks to the fact that the small BIOKON boxes can be installed everywhere in the capsule. A RIBES precursor payload, made of a single BIOKON accommodating the two different experiments FOAM2 and DIASPACE2, is going to fly on the Russian BION-M1 capsule in April 2013. FOAM2 is an experiment on shape memory epoxy foams to evaluate the feasibility of their use for building multi-functional composite structures. The experiment shall simulate the actuation of simple devices in micro-gravity conditions, where three different configurations (loaded and unloaded compression, bending) are chosen during the memory step of the foams so as to produce their recovery on board. DIASPACE2 is an experiment using polycrystalline diamond films as dosimeters for space applications. The capability of diamond films to detect low doses has been demonstrated down to the mGys range. The BIOKON is equipped with a battery pack to provide the necessary heating for shape recovery, data acquisition of sensors and image acquisition of the foam recovery phases. The

RIBES precursor payload flight on BION-M1 aims to demonstrate the validity of the payload concept as a general payload concept suitable for the execution of physical and life science experiments on board BION/FOTON capsules, as well as on others, like the USA Space-X/Dragon and the Chinese Shenzhou and Tiangong capsules.