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GREMLIT : an airborne gravity gradiometer inheriting from GOCE

B. Foulon (1), K. Douch (1), B. Christophe (1), I. Panet (2), D. Boulanger (1), and V. Lebat (1)
(1) ONERA, The French Aerospace Lab, (2) Laboratoire de Recherche en Géodésie de l'Institut Géographique National

The knowledge of the gravity field of the Earth has been considerably improved thanks to global positioning satellites constellations and to space gravity measurements from recent GRACE and GOCE missions. But the spatial resolution of those gravity data essentially addresses the large and medium wavelengths of the field (down to a resolution of 90km) and it is therefore essential to complete them at the shorter wavelengths in particular in the areas where spatial distribution and quality of ground data remain quite uneven like in high mountain or coastal areas. To this aim, gravity gradiometry systems may be particularly suitable by covering the land/sea transition zone with a uniform precision, and a spatial resolution higher than from gravimetry.
The GREMLIT instrument is taking advantage of technologies, formerly developed by ONERA for the GRACE and GOCE space missions. The gradiometer is built using a planar configuration for the gradiometer and is mounted on a dedicated stabilized platform which is controlled by the common mode outputs of the instrument itself to achieve a sufficient rejection ratio of the perturbations/vibrations induced by the airborne environment.
Such a planar configuration is especially well suited to sustain the proof-mass levitation in the Earth's gravity field. It also presents intrinsic linearity, which minimizes the aliasing due to high frequency vibrations or motions generated outside the measurement bandwidth. The compactness of the design ensures excellent dimensional stability, good thermal homogeneity and makes the conception of the stabilized platform easier.
The performance objective is between 0.1 and 1 Eötvös taking into account the difficulty of measurements onboard an aircraft by comparison to the particularly conducive satellite measurement environment.