Gravity gradiometer system for Earth Exploration

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We develop a gravity gradiometer (GG) for use on planetary missions to planets like Mars and Jupiter [1]. With some modifications this development is extended to include (airborne) applications for the Dutch exploratory industry [2]. We adapt key technology of the space based GG for the use in an environment with considerable acceleration noise. The major benefit is the considerable decrease in weight and size with the presently used gradiometer systems.

The major difference to our space based GG is that multiple small accelerometers are used on a rotating platform (like in the Falcon GG [3]) instead of two relatively large accelerometers (~6x3 cm) on a fixed platform. Rotating the accelerometers allows the use of lock-in techniques to increase the sensitivity at the cost of extra acceleration load on the accelerometers.

We have designed and built a mechanical platform onto which different modules can be placed. There are several modules with accelerometers on them and a central module for command, processing and communication. The boards for these submodules have been built and are tested at this moment.

A MEMS based accelerometer for this application is currently in production. It is designed to have a good resolution in a 1g environment at low frequencies. The modular design of the platform allows the commercial accelerometers which are now used to be replaced with our accelerometers.

References:


[2] Participation of Fugro and Shell in Microned