

New system development for the helicopter-borne magnetic survey

Tadashi Nakatsuka[1], Shigeo Okuma[2]

[1] Geoinf. Div., GSJ/AIST, [2] GSJ, AIST

We are developing a new high-resolution helicopter-borne magnetic survey system, in use of a Cs magnetic sensor installed in a nose boom specially equipped to the helicopter (so-called stinger type).

Magnetic sensor Scintrex CS-2 of Cesium optically pumped type is situated at the tip of the nose boom, which is fixed to the helicopter's skid frame toward forth. This location of magnetic sensor cannot escape from the aircraft's magnetic field, and the compensation of its effect is a subject to consider. Our system has no active compensation function, but the software correction scheme is to be applied. For determining correction coefficients, it is necessary to get the precise data of the aircraft's attitude (Roll, Pitch and Yaw). A three-axis fluxgate magnetometer (Billingsley Magnetics TFM100G2) is settled at the middle of the boom, and the data from this fluxgate magnetometer are used to determine coefficients. As the geomagnetic three components in the air are not predetermined, the data from fluxgate do not mean the helicopter's attitude itself, however, a procedure of determining optimum parameters to minimize the coherency between fluxgate data and the cesium data corrected with the coefficient parameters can be applicable using test flight data with the maneuvering of the aircraft.

The position fix of the flying helicopter is determined through a differential comparative process using both of on-board GPS receiver (NovAtel PowerPak-4E) and ground GPS receiver (with equivalent performance with the on-board one). The real-time data from the on-board GPS receiver is supplied to a navigation controller (AGNAV PNAV2100), which displays the trackline paths actually flown and various supporting data to guide the aircraft onto a preferred track of the survey.

All data acquired on-board are recorded by a data acquisition system, an industrial Windows PC with some special interface boards including A/D converter etc. The basic software on it is AIRLOGS II by Developing Technology, which was developed based upon LabVIEW, a tool developing application supplied by National Instruments.

The presentation is to include the introductions of hardware construction, software development, and the actual data acquired during the test survey.