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Airborne Lacoste-Romberge gravimetry; an alternative computation approach

M. Abbasi (1), J.P. Barriot (1), J. Verdun (2), H. Duquenne (2)

(1) Bureau Gravimétrique International (BGI), UMR5562, Observatoire Midi-Pyrénées, 31400, Toulouse, France
(madjid.abbasi@obs-mip.fr , Jean-Pierre.Barriot@cnes.fr)
(2) Ecole Nationale des Sciences Géographiques, 77455, Marne la Vallée, France
(verdun@ensg.ign.fr , Henri.Duquenne@ensg.ign.fr)

The problem of separation of the accelerations sensed by an airplane and the gravity signal at flight height is the main problem of airborne gravimetry. The generally used method is the low pass filtering of the measured signal. This is based on the assumption that the airplane induced accelerations have a high frequancy nature while the gravity acceleration is a low frequancy signal. The cut-off frequency is usually not higher than 0.01 Hz. This corresponds to 6 km at a mean speed of 60 m/s, meaning that the gravity accelerations with shorter wavelength are overfiltered. We have developed a new filtering method based on integral equation modelling and least squares estimation. By taking into account the covariance matrices of the observations and the a priori unknowns, as well as the mathematical formulation of the gravimeter as a spring-damper system, we obtain results with an improved content on the high frequency band. The method is applied to the data acquired over the French Alpes mountains.