IMEKO 20th TC3, 3rd TC16 and 1st TC22 International Conference
Cultivating metrological knowledge
27th to 30th November, 2007. Merida, Mexico.

Measuring the free-fall acceleration with the IMGC-02 transportable absolute gravimeter

G. D'Agostino [1], A. Germak [1], C. Origlia [1], D. Quagliotti [1], G. Barbato [2]

[1] National Institute of Metrological Research, INRIM, Turin, Italy.
[2] Polytechnic of Turin, Turin, Italy.

Abstract

The knowledge of the acceleration *g* due to gravity plays an important role in force metrology in calibration of mechanical standards and, recently, in mass metrology in realizing new mass standards based on electrical references for the redefinition of kilogram. Moreover gravimetric surveys are carried on for applications in Geophysics and Geodesy.

Over the past thirty years the development of transportable ballistic absolute gravimeters has dramatically pushed up the ability to measure the *g* value. The application of new technological advances and the deep study of the physical phenomena influencing the gravity measurement allowed a significant reduction of the uncertainty, estimated to be some parts in 10^9. Nowadays the future progresses are expected to reduce instrumental size, weight, costs and operational simplicity.

The Istituto Nazionale di Ricerca Metrologica (INRIM) developed a transportable absolute gravimeter, called IMGC-02 [1-2-3]. It uses laser interferometry to measure, from an inertial reference point, the symmetrical free rise and falling motion of a test-body in the gravity field. The local *g* value is extracted from the trajectory by fitting a suitable motion model to the space-time coordinates.

The description of the instrument, the measurement principle, the reconstruction of the test-body trajectory, the user interface of the software and the results obtained during the last International Comparison of Absolute Gravimeters (ICAG-2005) are shown.

Keywords: Free-fall acceleration, absolute gravimeter, INRiM.

References

[1] G. D'Agostino "Development and metrological characterization of a new transportable absolute gravimeter", PhD thesis, Polytechnic of Turin, Italy, 2005.

[2] A. Germak, S. Desogus, C. Origlia "Interferometer for the IMGC rise-and-fall absolute gravimeter", Metrologia Vol. 39, No. 5, pp. 41-475, 2002.

[3] G. D'Agostino, A. Germak, S. Desogus, G. Barbato, "A Method to Estimate the Time-Position Coordinates of a Free-Falling Test-Mass in Absolute Gravimetry", Metrologia Vol. 42, No. 4, pp. 233-238, August 2005.