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Stability of metrological parameters and performance of the A10 free-fall gravimeter

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The ability of the A10 free-fall gravimeter to perform rapid absolute gravity determinations in laboratory and field conditions makes it very useful for modernization and maintenance of national gravity control as well as for validation of satellite gravimetric missions. In order to provide a quality data with the A10 gravimeter, its metrological parameters need to be verified on regular basis.
The Institute of Geodesy and Cartography in Warsaw, Poland, operates the A10-020 free-fall gravimeter since November of 2008. Experience with the meter, including its use in modernization of gravity control, proves its high efficiency and accuracy. Data series consisting of gravity measurements with the A10-020 conducted for three years in regular monthly intervals at three stations (one field and two laboratory) at the Borowa Gora Geodetic-Geophysical Observatory is analysed considering the results of several calibrations of rubidium oscillator and the polarization-stabilized laser interferometer performed in various metrological laboratories. The influence of updating metrological parameters on the performance of the A10-020 gravimeter results was investigated. Comparisons with previous FG5 measurements as well as relative gravity surveys in a local gravity network in the Observatory were also performed.