GEODETIC APPLICATIONS OF TORSION BALANCE MEASUREMENTS IN HUNGARY

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First the base principle of torsion balance is outlined, then a short history of measurements in Hungary is discussed. Hungary has got a lot of torsion balance measurements and is one of the best measured country on the world.

Under Hungarian conditions, in addition to gradient values W_{zx} and W_{zy}, also curvature data W_{xy} and $W_{\Delta} = W_{yy} - W_{xx}$ are available with great precision. Since earlier torsion balance measurements were made mainly for purposes of geophysical prospecting, mostly only gravity gradients have been processed. Up to now, gravity curvature values essential in geodesy - rather promising for detailed determination of deflections of the vertical and precise geoid forms - have been left unprocessed.

A software was developed for computations which can be used to determine deflections of the vertical by any method of interpolation either along chains or in networks covering arbitrary areas, to compute very precise local geoid forms by astronomical leveling, and to draw vectors of interpolated deflections of the vertical and geoid forms.

Test computations were performed an area extending over some 1200 km^2 and well measured by torsion balance, where both topographic conditions and the densities of torsion balance measurements and astrogeodetic stations reflects average conditions in Hungary; and there was a possibility to check calculations because astrogeodetic and astrogravimetric data were available.

The ± 0.60" values of standard deviations of interpolated deflections of the vertical, and ± 4 cm values of computed geoid heights corroborate the fact that torsion balance measurements can be used very effectively for determination of deflections of the vertical and geoid heights.

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