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Visualization of Geodetic Data in ArcGIS

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Almost all processes taking place in nature have analog character (gravitational interaction, atmospheric pressure, air temperature, etc.) and vary continuously with time.

In practice, we, as a rule, have separate measurements performed either at a specific moment of time, or in a certain place of space, i. e., we deal more often with discrete representation of a continuous process. Discretization of continuous processes is one of the fundamental ideas of digital information processing.

In problems of physical geodesy, initial data has discrete representation; therefore, it is effective to implement for their resolution algorithms of linear discrete transforms, such as the Fourier transforms, Hartley transforms, wavelet-transforms. An effective method of calculations is developed for the above discrete transformations - fast algorithms; they allow one to calculate arrays of discrete information that are characteristic of problems of physical geodesy in real time. It is especially important that implementing such algorithms results in obtaining solutions at knots of a regular grid, which helps considerably their further application to visualizing solution results.

Modern development of computer technology and software makes it possible to build 2-D and 3-D digital models of various solution results of physical geodesy problems. The models can be used not only for demonstrations, but also for practical purposes, for example, for modeling a relief, situation, modeling geoidal surface, for doing special scientific calculations, etc.

The paper discusses the issue of computing anomaly height by the fast Fourier transform (FFT), which performs the calculation process by two orders faster than by traditional methods. Calculation of anomaly height has been done by two algorithms: the first one used gravity disturbances and the second one utilized gravity anomalies.

From the results of calculations, there have been generated anomaly height maps for both the water area of the Okhotsk Sea and the area of the Central Alps, as well as a 3-D relief model of this area of the Central Alps.

ArcGIS has been selected as a tool for building the three-dimensional relief model, it being a family of software products of the American company ESRI.

: Fast Fourier Transform(FFT), anomaly height, digital models, ArcGIS
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