Geophysical Research Abstracts
Vol. 14, EGU2012-1468, 2012
EGU General Assembly 2012

Comparison of Methods of Height Anomaly Computation

E. Mazurova (1), A. Lapshin (2), and A. Menshova (3)

(1) Moscow State University of geodesy and cartography(MIIGAiK), Geodesy, Moscow, Russian Federation (e_mazurova@mail.ru, +7 499 261 85 53), (2) Moscow State University of geodesy and cartography(MIIGAiK), Geodesy, Moscow, Russian Federation (lapshinel@rambler.ru), (3) Moscow State University of geodesy and cartography(MIIGAiK), Geodesy, Moscow, Russian Federation (menshova_e@mail.ru)

As of today, accurate determination of height anomaly is one of the most difficult problems of geodesy, even with sustainable perfection of mathematical methods, computer possibilities. The most effective methods of height anomaly computation are based on the methods of discrete linear transformations, such as the Fast Fourier Transform (FFT), Short-Time Fourier Transform (STFT), Fast Wavelet Transform (FWT).
The main drawback of the classical FFT is weak localization in the time domain. If it is necessary to define the time interval of a frequency presence the STFT is used that allows one to detect the presence of any frequency signal and the interval of its presence. It expands the possibilities of the method in comparison with the classical Fourier Transform. However, subject to Heisenberg's uncertainty principle, it is impossible to tell precisely what frequency signal is present at a given moment of time (it is possible to speak only about the range of frequencies); and it is impossible to tell at what precisely moment of time the frequency signal is present (it is possible to speak only about a time span). A wavelet-transform gives the chance to reduce the influence of the Heisenberg's uncertainty principle on the obtained time-and-frequency representation of the signal. With its help low frequencies have more detailed representation relative to the time, and high frequencies - relative to the frequency.
The paper summarizes the results of height anomaly calculations done by the FFT, STFT, FWT methods and represents 3-D models of calculation results.
Key words: Fast Fourier Transform(FFT), Short-Time Fourier Transform (STFT), Fast Wavelet Transform(FWT), Heisenberg's uncertainty principle.