Geophysical Research Abstracts
Vol. 16, EGU2014-16953, 2014
EGU General Assembly 2014

Analytical continuation in physical geodesy constructed by means of tools and formulas related to an ellipsoid of revolution

Petr Holota (1) and Otakar Nesvadba (2)

(1) Research Institute of Geodesy, Topography and Cartography, 250 66 Zdiby 98, Praha-vychod, Czech Republic, e-mail: holota@pecny.asu.cas.cz, Tel.: +420 323649235, Fax: +420 284890056, (2) Land Survey Office, Pod Sídlištěm 9, 182 11 Praha 8, Czech Republic. e-mail: nesvadba@sky.cz

In physical geodesy mathematical tools applied for solving problems of potential theory are often essentially associated with the concept of the so-called spherical approximation (interpreted as a mapping). The same holds true for the method of analytical (harmonic) continuation which is frequently considered as a means suitable for converting the ground gravity anomalies or disturbances to corresponding values on the level surface that is close to the original boundary. In the development and implementation of this technique the key role has the representation of a harmonic function by means of the famous Poisson's formula and the construction of a radial derivative operator on the basis of this formula. In this contribution an attempt is made to avoid spherical approximation mentioned above and to develop mathematical tools that allow implementation of the concept of analytical continuation also in a more general case, in particular for converting the ground gravity anomalies or disturbances to corresponding values on the surface of an oblate ellipsoid of revolution. The respective integral kernels are constructed with the aid of series of ellipsoidal harmonics and their summation, but also the mathematical nature of the boundary date is discussed in more details.