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Use of Green's function for determining the perturbing potential of an ellipsoidal Earth

Elena M. Mazurova and M. I. Yurkina
Moscow State University of Geodesy and Cartography, Russian Federation (e_mazurova@mail.ru)

Spherical approximation makes the basis for a majority of formulas in physical geodesy. However, the present-day accuracy of determining the perturbing potential requires ellipsoidal approximation.

The paper deals with constructing Green's function for an ellipsoidal Earth by a spherical harmonic expansion and using it for determining the perturbing potential. From the result obtained, the part corresponding to spherical approximation has been extracted. The remaining expansion is represented by a series whose terms decrease inversely proportional to the power number of the harmonic of the spherical harmonic expansion of the gravity force.

The Green function is known to depend only on the geometry of the surface where boundary values are set. Thus, it can be calculated irrespective of the gravity data completeness.

Any changes of gravity data do not have an effect on Green's function and they can be easily taken into account if it has already been computed. Such a solution method, therefore, can be useful in determining the perturbing potential of an ellipsoidal Earth.

ywords Green's function, spherical harmonics, ellipsoidal approximation, ellipsoidal Earth.