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Development of the local quasigeoid model for the Czech Republic

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Increasing demands for precise GNSS levelling in the Czech Republic as well as exclusively available gravity and terrain data raised up the realization of a more accurate transformation between the ETRS and the vertical reference system Bpv (Baltic after adjustment), known also as a quasigeoid model. In order to meet high accuracy requirements for the model, the setting and the solution of the geodetic boundary value problem were reconsidered. The problem is formulated for gravity disturbances and the representation formula for the solution was derived by means of the Green's function method constructed for an oblate ellipsoid of revolution. Resulting integral kernel, as an analogue to the so-called Hotine function, was used in the convolution for numerical evaluation of the disturbing potential. The difference between the ellipsoid and the terrain was taken into account through successive approximations. The resulting solution leads to a detailed knowledge of the residual disturbing potential T on the Earth's surface in the area of interest. In addition, restoring the global low-frequency part of T and inserting non-gravitational systematical effects associated with Bpv, that have been identified too, make it possible to interpret the results in terms of height anomalies or quasigeoid heights within the Bpv system. The resolution, accuracy and precision of the transformation between ETRS and Bpv is discussed and compared with the quasigeoid models available today.