On the effect of planar approximation in the Geodetic Boundary Value Problem

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In the framework of the analytical treatment of the Geodetic Boundary Value Problem (GBVP) various approximations are necessary in order to end up with a solution in "closed" form. Besides linearisation and isotropic ("spherical") approximation the so-called planar approximation has been introduced by Moritz (1980) in the case of a non-spherical, topographic boundary surface.

In the paper the effect of the planar approximation on the boundary condition and on the disturbing potential is estimated. This analysis which is valid for the free and the fixed versions of the GBVP simultaneously is based on high-resolution digital elevation models (DEM) and shows that the numerical estimates depend on the resolution of the DEMs.