



High-resolution numerical solution to the fixed gravimetric BVP by direct BEM

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A direct formulation of the boundary element method (BEM) gives the numerical solution to the fixed gravimetric boundary-value problem. Presented numerical experiment discretizes the Earth's surface in a resolution of 0.1 deg. Topography of the Earth on lands and the DNSC08 mean sea surface at oceans form properties of a stiffness matrix. Oblique derivative boundary conditions in the form of surface gravity disturbances are computed from the DNSC08 global gravity field. ITG-GRACE03S satellite geopotential model up to degree 180 is used to eliminate far zones' interactions. It rapidly reduces enormous memory requirements. This allows increasing a level of discretization for the available HPC (high-performance computing) facilities. The numerical solution obtained by BEM is compared with the EGM2008 geopotential model. Standard deviation of residuals at oceans is about 0.12 m. A bias -0.034 m between both solutions is estimated by an iterative way. The presentation also shows a possibility to use the numerical approach for a unification of height systems in a case when terrestrial gravimetric data accompanied by the precise satellite positioning are available.