A new upwind treatment of the oblique derivative condition in geodetic boundary value problems

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Our aim is to present upwind-based approach for solving oblique derivative boundary-value problem by the finite volume method. The main idea is to understand the oblique derivative boundary condition as a stationary advection equation for the unknown disturbing potential. We combine this approach on the bottom boundary with the finite volume approximation of the Laplace equation outside the Earth. On the upper spherical boundary the Dirichlet boundary condition was generated from satellite geopotential model.

In the numerical experiments we first apply the proposed approach to testing examples in order to find its experimental order of convergence. Finally we present the practical numerical experiments dealing with the global and local gravity field modelling.