Comparison of numerical solutions by BEM, FEM and FVM with EGM2008

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Efficient numerical methods namely the boundary element method (BEM), the finite element method (FEM) and the finite volume method (FVM) give numerical solutions to the fixed gravimetric boundary value problem. They are based on the weak formulation of the Laplace equation. In the direct BEM formulation, boundary integral equations are derived through the method of weighted residuals. The numerical solution by FEM, considering the idea that any continuous function can be approximated by a linear combination of algebraic polynomials, is sought as a linear combination of basic functions. The main feature of FVM is that numerical flux is conserved from one discretization volume to its neighbor.
The presentation discusses theoretical background of all numerical approaches. Numerical experiments deal with the global and local gravity field modelling. Here oblique derivative boundary conditions in the form of surface gravity disturbances are computed from the DNSC08 global gravity field. The obtained numerical solutions are compared with EGM2008.