Geophysical Research Abstracts
Vol. 19, EGU2017-7294, 2017
EGU General Assembly 2017

Hierarchical matrices implemented into the boundary integral approaches for gravity field modelling

Róbert Čunderlík (1) and Francesca Vipiana (2)

(1) Dept. of Mathematics, Faculty of Civil Engineering, Slovak University of Technology, Bratislava, Slovakia (cunderli@svf.stuba.sk), (2) Dept. of Electronics and Telecommunications, Politecnico di Torino, Italy (francesca.vipiana@polito.it)

Boundary integral approaches applied for gravity field modelling have been recently developed to solve the geodetic boundary value problems numerically, or to process satellite observations, e.g. from the GOCE satellite mission. In order to obtain numerical solutions of "cm-level" accuracy, such approaches require very refined level of the discretization or resolution. This leads to enormous memory requirements that need to be reduced. An implementation of the Hierarchical Matrices (H-matrices) can significantly reduce a numerical complexity of these approaches. A main idea of the H-matrices is based on an approximation of the entire system matrix that is split into a family of submatrices. Large submatrices are stored in factorized representation, while small submatrices are stored in standard representation. This allows reducing memory requirements significantly while improving the efficiency. The poster presents our preliminary results of implementations of the H-matrices into the existing boundary integral approaches based on the boundary element method or the method of fundamental solution.