



Determination of gravitational potential distribution over a geocentric quasi- sphere based on links between GRACE- and GNSS-type satellites

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We provide a formulation of determining the Earth's gravitational potential distribution over a geocentric quasi-sphere (QS) that is constructed by a GRACE-type satellite (GTS), based on frequency signal transmission between the GTS and a cluster of GNSS satellites (CGS). By emitting and receiving frequency signals between the GTS and a GNSS satellite, we can determine the gravitational potential at the GTS orbit. For a near-polar GTS with height about 350 km above the geoid, we choose sufficient GNSS satellites to determine the gravitational potential at the GTS position. Simulation results show that the accuracy of the determined gravitational potential distribution over the QS can achieve centimeter level if (1) the accuracy of the given potentials at GDSs is about 1 cm level, and (2) optical atomic clocks with instability of 1×10^{-18} are available. Our final purpose is to determine the Earth's external gravity field based on the potential distribution on the QS. This study is supported by National 973 Project China (grant No. 2013CB733301 and 2013CB733305) and NSFCs (grant Nos. 41174011, 41429401, 41210006, 41128003, 41021061)