Second European Physical Society Conference on Gravitation: measuring gravity

Contribution ID: **79**

Type: **talk**

Scientific Benefits of Strongly Reduced Acceleration Noise Level Requirements for a NGGM

Wednesday, July 7, 2021 2:00 PM (10 minutes)

A strong candidate for the Next Generation Gravity Mission (NGGM) is a mission like GRACE Follow-On, with laser interferometry measurements between the two satellites, but with a much lower non-gravitational acceleration noise level requirement for the satellites. That level could be reduced to below 1x10-12 m/(s2)/(Hz0.5) from 0.3 mHz to 1 Hz by making use of a much simplified version of the Gravitational Reference Sensors (GRSs) flown very successfully on the LISA Pathfinder mission. A satellite altitude of 362 km is assumed, which corresponds to 172 orbital revolutions in 11 days. For this case, simplified estimates give quite low levels for the geopotential height variations over 1 revolution arcs of data. For orbital frequencies of 20, 40, 60, 80, 100, and 120 cycles per revolution, the resulting geopotential height variation uncertainties are as follows: [4.0, 2.1, 1.6, 1.4, 1.2, 1.1] x 10-9 m/(cycles/rev)0.5.

In the future, with this level of measurement asccuracy, it is expected that the along-track resolution for one revolution arcs of data would be improved to about 200 km. However, there still would be serious limitations in interpreting the results because of temporal aliasing and from the difficulty of separating the effects of mass variations due to the atmosphere from those due to hydrology or the oceans. But the high measurement accuracy would permit strong tests to be made of potential improved methods for understanding the observed mass distribution changes based on other types of geophysical data. Also, including a second pair of satellites with about 70 degree inclination would strongly increase the scientific benefits of the NGGM.

Primary author: BENDER, Peter (University of Colorado)

Presenter: BENDER, Peter (University of Colorado)

Session Classification: Recorder Talks: Geodesy and Ranging

Track Classification: Geodesy and Ranging