Journal

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Winter 2008

Week 2 (Jan 14-Jan 18)

Prof. Martin gave me a new topic about the GRACE (Gravity Recovery And Climate experiment) project. In the first few days this week, I hoped to have some basic ideas of the GRACE system and its applications. I visited two main websites, http://gracetellus.jpl.nasa.gov/ and http://www.csr.utexas.edu/grace/. These websites gave me a vivid description of the GRACE system, which is designed to track changes in the Earth's gravity field for a period of five years. I also got some general ideas of its applications including:
· measuring shallow and deep ocean currents;
· measuring the changing mass of polar ice caps;
· measuring changes in water resources on land;
· understanding sea level change resulting from ocean temperature and water mass changes;
· understanding atmosphere-ocean mass exchange;
· understanding the forces that generate Earth's geomagnetic field; and
· understanding internal Earth forces that move tectonic plates and result in earthquakes and volcanic eruptions.

Next week, I will read some papers on the basic model of low-low satellite to satellite tracking technology and try to find the application of our recent research on the numerical simulation of the Earth gravity field.

Week 3 (Jan 21-Jan 25)

With the coming and development of satellite technique, the satellites provide the efficient tools for physical geodesist to map the global gravity field. A satellite orbit can be taken as sensor carrying gravity information, since satellite orbital motion is dominated by field.

This week, I tried to understand the basic idea of satellite orbit, especially the relationship between satellites and Earth gravity field. But, I still have question on the strict definition and mathematical expressions of associated different time/space reference systems and practical computation models for mutual transformation.

Week 4 (Jan 28-Feb 1)

This week, I read a paper on theory and methodology of Earth gravity recovery by satellite to satellite tracking data. This paper gave me some detail explanations of the Grace system and the model of the low-low satellite to satellite tracking technology.

Next week, I will focus on a more basic idea of solving Keplerian orbits.

Week 5 (Feb 4-Feb 8)

This week, I tried to understand the applied algorithm for solving Keplerian orbits. Meanwhile, I found some papers, which describe various perturbation forces laying stress on the numerical analysis about the orbit models.

I hope I could summarize the factors that determine the satellite orbits and put these factors together.

Week 6 (Feb 11-Feb 15)

This week, I had a talk with Prof. Martin and discussed how to apply the numerical tools to solve the problems in measuring the Earth gravity. Prof. Martin suggested me to read a paper toward multi-resolution estimation and efficient representation of gravitational fields. This paper demonstrate performance of several local and multi-resolution gravity models derived from existing spherical harmonic models to avoid some computational difficulties. I am still considering why Prof. Martin suggested me to read this paper and what can I learn from this paper.

Week 7 (Feb 18-Feb 22)

Actually, the Grace system prove us a large number of data to investigate the Earth gravity. We hope to apply the numerical tools to simulate these data and finally find a general function to describe the Earth gravity.

Next week, I will read the 'regression paper' written by Prof. Martin. I hope I can find a way to apply the method mentioned in this paper to solve the problem in gravity measurement.

Week 8 (Feb 25-Feb 29)

This week, the main task is to read the 'regression paper'. I think I need more time to read and understand this paper.

Week 9 (Mar 3-Mar 7)

I generally know the usefulness of the 'regression paper'. But, I still need time to have a better understanding of this paper and try to apply the knowledge of 'regression paper' in representation of gravitational fields.

Week 10 (Mar 10-Mar 14)

I am working on my journal and preparing for the presentation.