

521 M7280 – SATELLITE GEODESY

SPRING SEMESTER 2014

Lab No. 6

handed out Wednesday, April 09, 2014
due Wednesday, April 16, 2014, 09:10 Name: _____

Satellite Orbit in 3-D Space (I) Reading a SP3 file

1. From a GPS orbit final solution (in a sp3 format), please write a Matlab program which retrieves the satellite's (satellite ID = your date of birth) positions every 15 min for a 48-hour period.
 - a. List your results in both an initial frame and ECEF Cartesian frame with 7 columns (time, X_{in} , Y_{in} , Z_{in} , x , y , z).
 - b. Plot the satellite's position in two 3-D maps (one for inertial and the other for ECEF Cartesian).
 - c. Which GPS sp3 file do you use?
2. Convert your ECEF Cartesian coordinates into the ECEF spherical frame.
 - a. List the results in a table with 4 columns (time, longitude, latitude, height).
 - b. Plot in a 2-D map for the longitude, latitude, and height values as functions of time.
3. Discuss your results.

Note:

The GPS sp3 files are available from IGS or NGS websites. Use only the latest final orbits.

IGS: http://igsceb.jpl.nasa.gov/components/dcnav/sopac_products.html

NGS: <http://www.ngs.noaa.gov/orbits>

Use for $GM = 398600.4418(\text{km}^3/\text{s}^2)$, $\omega_e^* = 7292115.8553 \times 10^{-11}(\text{rad/s})$,
 $\omega_e = 7292115 \times 10^{-11}(\text{rad/s})$, and $R = 6371.000000(\text{km})$.

Your (individual) final report should contain (use A4 papers):

- this page as the cover sheet
- source code(s) and outputs; do not forget to add your name and lots of comment cards to the source listing (%
- input and output files from program [input/output values used and calculated], if any
- plots, including captions on axes, title, your name, LB#/HM#, course title, date (if any)
- derivation and description of formulas used, accompanied by figures where applicable
- evidence of computational accuracy
- discussion of results