AA575: Satellite Navigation

Homework 4: Satellite Orbits

Assigned: Thursday, November 17, 2011
Due: Friday, December 2, 2011

Files associated with this assignment contain the almanac and the ephemeris broadcast October 30th 2001 (GPS week 1138). The orbit elements defined for the almanac are a subset of those defined for the ephemeris (although computed separately). A precise ephemeris generated by the International GPS Service (IGS) is also provided for this same time period (`igr11382.sp3`). The format of the IGS ephemeris is provided along with this assignment.

Problem 1 (50 Percent): Compute the positionn of GPS satellites 3 and 5, in the ECEF reference frame, based upon the ephemeris, at each time that an IGS position is available. Plot the error in each component of position as a function of time. Explain the range of errors that you see.

Problem 2 (50 Percent): Compute the position of the same satellites using the data in the almanac, at the times for which the IGS ephemeris is provided. (Note that the the time of applicability for the almanac and that for the ephemeris are not the same) Plot the error between the almanac position and the IGS satellite position as a function of time. Explain the range of errors that are seen and compare the almanac results to the ephemeris results.